



Determinants of Green Finance Growth: Evidence from Egypt

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*Scientific Journal for Financial and Commercial Studies and Research
(SJFCSR)*

Faculty of Commerce – Damietta University

Vol.7, No.1, Part 1., January 2026

APA Citation

Mohamed, W. M. H. (2026). Determinants of Green Finance Growth: Evidence from Egypt, *Scientific Journal for Financial and Commercial Studies and Research*, Faculty of Commerce, Damietta University, 7(1)1, 29-102.

Website: <https://cfdj.journals.ekb.eg/>

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Abstract

The objective of this study is to provide insights into the growth of green finance in Egypt along with determination the main influential factors driving the growth of green finance. Rooted in a broad theoretical framework, the study synthesizes theoretical strands of sustainable development theory, environmental economics and Institutional Theory. Using a combined approaches of quantitative method such as bootstrap regression model and structure questionnaire-based approach, this research investigates the macroeconomic determinants of green finance growth in Egypt between 2019-2024 as per limitation of data availability about green finance in Egypt. Additionally, the structured questionnaire investigates the relationship between five factors (policy and regulation, market and demand, institutional and financial, economic and financial, and technological) and green finance growth in Egypt. The results of bootstrap regression analysis revealed that foreign direct investment (FDI) is the only and the most significant factor that has a positive significant impact on green finance growth in Egypt, while the effect of GDP growth and Interest rate have no significant impact. The results of the questionnaire analysis also show that policy and regulation factors, market and demand factors, and economics and finance factors have a strong influence on green finance development; however, institutional and technology factors have a high influence degree on green finance development. These elements are vital to easing the transition to a very low-carbon economy in Egypt. The core findings are that the current green financial initiatives effectiveness can be increased and recommendations for policy intervention, market incentives and infrastructure initiatives are proposed. The study contributes to the increasing literature of green finance and provides useful implications for policymakers and financial institutions in Egypt and other emerging countries while promoting the green finance area.

Keywords: Green Finance, Macroeconomic Variables, FDI, Sustainability, Policy & Regulation, Market, Financial factors, Institutional & Technological factors.

1.Introduction

In recent years, as countries are trying to shift towards a more sustainable development path, green finance has become a central topic of the economic and environmental policy debate across the world. Egypt is witness to the challenges & opportunities presented to a rapidly growing nation that the adoption of green finance presents, as the most pressing issues of climate change, energy security & environmental degradation rapidly approach.

Egypt is well-positioned to be a regional hub for green finance, thanks to being well-located, having large renewable energy resources, and even being aligned with international sustainability targets through arrangements such as the Paris Agreement. Nevertheless, significant barriers still exist, including low awareness of green financial instruments, a lack of regulatory framework, and an insufficient level of investment in sustainable infrastructure. In this research paper, the researcher investigates the current situation of green finance in Egypt, the major barriers it faces in its development and innovations and collaborations that might exploit these opportunities for development. This research aims to draw upon case studies, policy practices and trends to produce practical recommendations for stakeholders—governments, finance institutions, and private investors—to unlock Egypt's potential to use green finance, in driving sustainable economic development.

To understand the concept of green finance, one must first define the word "sustainability." Sustainability, in fact, is highly contextual and variously defined. A commonly adopted definition is the one by the United Nations (1987), which defines sustainability as (meeting) "the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs". Sustainable finance, in the financial context, is the consideration of financial returns alongside environmental, social, and governance (ESG) criteria.

Sustainable finance (or green finance) refers to taking ESG criteria into account when making investment decisions in the financial sector (European Commission, 2021). It encourages long-term investment of capital into sustainable economic activities and projects, and a more sustainable financial system in general; The ESG factors are also defined in detail by the European Commission (2021) as:

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- a. Environmental environmentalism, which, as it sounds, focuses more on climate change but also on a wider environmental agenda, for instance, pollution. This also touches on the circular economy as it relates to finance.
- b. social factors include human rights and other challenges such as inequality and social inclusion.
- c. Governance measures are the policies and practices of governance of the institution itself, including such issues as employee relations and management structures and practices.

There is a widespread interest in sustainable finance to offer cost-effective capital, mitigation of climate and regulatory risks, and support for long-term value creation (Joshupura et al. 2024). Yet the sustainable finance is still an emerging and fragmented literature and hard to identify the field and delineate it from finance in general (Cunha et al. 2021; Singhania et al. 2023). Different countries have developed their own respective taxonomy, which leads to no global consensus as regards to a standard definition for the wide-ranging activities in the field of sustainable finance (Singhania et al. 2023). This means one type of best scoring on sustainable finance metrics in one country may yield another type of best result in another country.

Although there is no single universal definition covering the entire scope of activities inside sustainable finance (Singhania et al., 2023), Zio et al. (2020) provides a wide-ranging definition of what this is by describing it as financing that integrates environmental, social, and governance (ESG) considerations into business and stakeholder decisions on the allocation of financial resources. The European Commission (2022) further clarifies this notion, defining sustainable finance as covering not just investments in green projects, but also those covering projects that are on the way to becoming significantly more environmentally sustainable. This means funding projects whose environmental benefits are clear as well as projects that connect the financial success of issuers with broad sustainability goals, providing a financial incentive to maintain or even improve environmental performance.

The potential of sustainable finance to provide low-cost capital, reduce climate and regulatory risks, and promote long-term value creation has made the field one of the most attractive fields of study and practice (Joshipura et al., 2024). This increase in interest is yet to be paralleled by a cohesive body of literature; a unified structure is still lacking, which makes it possible defining the field and separating it from traditional financing mechanisms (Cunha et al., 2021; Singhania et al., 2023). One of the key challenges is the lack of common understanding of what sustainable finance means because countries have different interpretations subject to their own taxonomies. Hence, there is no universal agreement on a standardized concept for the broad spectrum of activities included by sustainable finance (Singhania et al., 2023). Such lack of comparability gives an organization a high rating on sustainable finance practices in one country based on the taxonomies, while receiving a radically different rating in another country where the criteria for assessment are different.

Green finance plays a key role in promoting sustainable development, and its efficiency is closely related to fundamental macroeconomic indicators. Evidence suggests that GDP growth increases fiscal room for mobilizing environmental investment, and that low interest rates diminish the costs of capital, encouraging green long-term projects. The stability of exchange rates has created a favorable atmosphere for cross-border green investment by curbing currency risk, while the FDI has been a conduit for carrying green technology and green financing to host economies.

However, there are still a number of challenges for the development of green finance. These include policy and regulatory uncertainty, underdeveloped markets, institutional inefficiencies, financial constraints, and technological limitations. These multifaceted challenges can only be addressed by coherent macroeconomic policies and institutional reforms that orient financial systems toward sustainability.

1.1 Research Problem:

Climate change has brought extensive awareness to the importance of the role of green finance in achieving economic growth while addressing some of the most critical challenges facing the world through sustainable development. Nevertheless, Egypt still experiences a range of obstacles to mobilizing green

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finance mechanisms which would help to kick-start sustainable development across the region, especially considering how Egypt is still a developing economy with inherent renewable energy potential, and with environmental issues of worsening urgency.

Major challenges include the lack of a national regulatory framework for sustainable finance, low institutional capacities, limited knowledge of green finance instruments, and insufficient domestic and international capital for green investments. Moreover, there is a dearth of empirical studies that investigate how these challenges can be systematically overcome in the context of Egypt given its socio-economic, political, and institutional circumstances. This consequently leads to a lack of knowledge on the strategic approaches needed to assimilate green finance within Egypt's wider economic and environmental policy plans.

The current study aims to fill this gap in research by exploring the core research questions:

- What are the systemic challenges hindering the development of green finance in Egypt?
- How can these barriers be overcome to leverage sustainable economic growth in Egypt?

1.2. Research Objectives:

- To identify the main factors affecting the growth of green finance instruments in Egypt.
- To explore the potentials of enhancing green finance in Egypt especially for renewable energy investments, sustainable infrastructure projects and international climate finance mechanisms.
- To recommend policy recommendations to help Egypt in developing its green finance ecosystem to secure a greater share of investment flows into sustainable projects and help position the country as a sub-regional leader of sustainable economic development.

2. Literature Review and Hypothesis development

This literature review is structured into two key sections to provide a comprehensive overview of green finance. The first section delves into the main theories underpinning green finance exploring frameworks such as environmental economics, sustainable investment theory, and institutional theory, which collectively shape the conceptual understanding of how green finance operates within broader economic and environmental contexts. The second section synthesizes previous empirical research , analyzing studies that evaluate the drivers, barriers, and outcomes of green finance initiatives across different regions and sectors. By bridging theoretical insights with empirical findings, this review aims to highlight the current state of knowledge and identify gaps for future research in the burgeoning field of green finance.

2.1 Theoretical foundation and conceptual framework

Green finance and sustainability are underpinned by several theoretical frameworks that provide a foundation for understanding the interplay between financial systems, environmental goals, and sustainable development. Below are some of the key theories relevant to this field:

2.1.1 Environmental Economics Theory

Environmental economics theory focuses on the integration of environmental considerations into economic decision-making, emphasizing the need to internalize externalities such as pollution and resource depletion (Pigou, 1920). This theory supports the use of market-based instruments like carbon pricing, green bonds, and subsidies for renewable energy projects to align financial decisions with environmental sustainability (Russel,2001). In the context of green finance, this framework highlights how financial tools can be leveraged to mitigate environmental degradation while promoting economic growth. (Heinz, 2009)

The main criticism of Environmental Economic Theory is that it is over-reliant on market-based solutions like carbon trading for environmental problems. Moreover, it highlights that most environmental problems are multifaceted, and the market-based approaches can fall short of addressing environmental degradation.

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Another criticism is that Environmental economics makes the common assumption that natural resources can be substituted with human-made capital. For instance, the theory may dismiss the fact that ecosystem services (e.g., biodiversity or clean water) cannot be compensated by technological innovations. But it is often criticized that a lot of earth nature cannot be replaced and that not everything can have a market-based solution, for that some goods are non-market goods, and hence they lack a market price, whilst being more than relevant to human life.(Daly ,1997)

The interconnected challenges in the 21st century like climate change, depleting resources, and biodiversity loss have made Environmental Economics and Sustainable Finance relevant. Climate change, for example, is the grandest of global market failures, the enormous costs of environmental degradation are largely disregarded. As noted above, sustainable finance is becoming more and more important for solving these issues, however greenwashing and short-term investment horizons are blocking the progress. And the rising numbers of extreme weather events and the financial burden of environmental destruction create mounting pressure on policymakers and financial institutions to respond more robustly. Despite this, we are still hampered from full adoption of the policies and financial products that will reflect environmental economics by the inefficiencies of existing markets, inconsistencies in public policy and the lack of global coordination. Critics have suggested that such an approach turns nature into a commodity that can be priced and solved with cost-benefit equations, which generally ignore the internal value of ecological value or the long term (Sagoff, 2004).

Daly (1997) also challenges environmental economic from a steady state framework arguing that it is fundamentally incompatible with ecological limits because they are based on neoclassical growth paradigms. And there are also ethic concerns regarding the discount of future generations' well-being in the economic models, which could legitimize current environment degradation from a future technology' benefits perspective (Howarth & Norgaard, 1992). While environmental economics has greatly informed policy instruments such as carbon costs and tradeable emissions, the theoretical underpinnings of such approaches are highly contested, particularly with respect to their capacity to address systemic injustice and non-market values (Faber et al., 1998).

2.1.2 Sustainable Development Theory

The concept of sustainable development, as outlined in the Brundtland Report (1987), emphasizes meeting the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development theory provides a holistic lens through which green finance can be analyzed, advocating for the alignment of financial systems with social, economic, and environmental objectives. This theory underscores the importance of integrating sustainability metrics into investment decisions and fostering long-term value creation.

The theory highlights a balance between three core pillars:

- **Economic Development:** It is economic growth that comes with ensuring prosperity and wealth generation place v.
- **Environmental Stewardship:** The management of natural resources in such a way that depletion of the environment is avoided, that it can continue to support human], plant and animal life for future generations.
- **Social Equity:** Supporting social justice, equality and inclusion and ensuring all people have access to development.

The main concept of Sustainable Development Theory is the concept that we should not seek human development at the cost of our future generations. Sustainable development demands tenure in the decision-making process, reflects the interconnected nature of the social, cultural, political and economic impacts of the environmental crisis, and calls for comprehensive policies that are socially just, ecologically sound, and economically viable (Mensah,2019).

The main criticism of Sustainable Development theory is that it often relies too much on a technological innovation towards various aspects such as renewable energy or green technologies. This solution may overlook deeper transformations that are necessary in lifestyles, consumption patterns, and values. Lack of enforcement mechanisms is another criticism as they are often missing in sustainable development frameworks. Such voluntary commitments and international agreements are difficult to enforce and may leave countries or companies may not fulfill their commitments toward sustainability.

Some scholars claim that the term's flexibility enables it to be appropriated by a wide variety of – sometimes contradictory – interests and therefore to lose any operational value (Adams, 2009; Redclift, 2005), whilst its underlying assumption that economic growth is consistent with ecological limits has been called into question as ecologically unsustainable (Daly, 1990). Additionally, the paradigm has been criticized for facilitating greenwashing and perpetuating neocolonial relations of power, especially in the Global South (where local knowledge systems tend to be sidelined for technocratic solutions) (Escobar, 1996; Delmas & Burbano, 2011). The lack of attention to social justice and inequality is equally problematic, and is at the heart of critics' insistence that environmental justice users must form part of all genuine sustainability agenda (Agyeman et al., 2003; Swyngedouw, 2010).

2.1.3 Triple Bottom Line (TBL) Framework

The Triple Bottom Line framework, introduced by Elkington (1997), expands traditional financial metrics to include social and environmental dimensions, often summarized as "people, planet, and profit." (Zak, 2015). This theory is particularly relevant to green finance, as it encourages financial institutions and investors to evaluate the broader impacts of their decisions beyond financial returns. By adopting TBL principles, green finance initiatives aim to generate positive outcomes for society and the environment while ensuring profitability (Correia, 2019).

The criticisms levelled against TBL primarily relate to the vagueness of the concept, the practical validity of TBL and the assumptions underlying TBL. TBL framework does not have a clear explanation or specific methods for the measurement and balancing of the three main dimensions in a consistent and comparable way across industries. In contrast with "profit", which can be evaluated through conventional financial statements, both social and environmental components are more subjective in nature and complex, such that reporting standards vary widely, leading to confused reporting. Yet the absence of a common, agreed upon set of metrics to measure social and environmental performance only complicates this problem.

Critics claim that the model is reductionist in its oversimplification of relationships between social and ecological systems, and its misleading suggestion of equal weight among three very different dimensions, despite the inherent power differentials and interconnections among them (Henriques & Richardson, 2004; Slaper & Hall, 2011). TBL is also criticized for ensuring instrumentalization, whereby corporations cherry-pick sustainable elements to brand themselves as sustainable without significant changes to business (greenwashing') (Banerjee, 2003; Delmas & Burbano, 2011). Furthermore, critics pointed out that the neoliberal presuppositions of the TBL act in favor of market-driven measures and marginalize structural inequalities and ecological thresholds (Gladwin et al., 1995; Henriques, A., & Richardson, J. (Eds.). 2004). Accordingly, although TBL endures as a policy and business influence, its theoretical coherence and practical utility continue to be contested within critical scholarship on sustainability.

2.1.4 Stakeholder Theory

Stakeholder theory, developed by Freeman (1984), posits that organizations should consider the interests of all stakeholders—such as investors, employees, communities, and the environment—when making decisions. In the context of green finance, this theory highlights the importance of collaboration among diverse stakeholders to achieve sustainability goals. For instance, financial institutions must balance the interests of shareholders with the environmental and social needs of communities when designing green financial products. (Mahajan et. al.,2023).

Stakeholder theory is widely criticized for being conceptually vague and operationally ambiguous when it comes to determining how to identify, prioritize, and compromise between competing stakeholder interests (Donaldson & Preston, 1995; Mitchell et al., 1997). Furthermore, others argue that the theory has been hijacked by neoliberal capitalist regimes that it is used to fulfill stakeholder' desire to see companies talking about such things instead to promote real social or environmental equity (Branco & Rodrigues, 2006; Banerjee, 2008). Others are concerned with the asymmetry of power, expressing that traditionally disenfranchised groups are still often excluded from participating substantively in corporate governance (Freeman et al., 2004;

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Savage et al., 1991). Although stakeholder theory continues to develop—especially when it comes to the pressure of planetary sustainability challenges—it is accused of having little ability to disrupt systemic inequalities and deliver accountability that extends beyond market imperatives.

A major critique of stakeholder theory is that it fails to demonstrate how to rank competing stakeholder interests. However, there can be competing stakeholder interests (e.g. shareholders would like to maximize profits; environmentalists would like to minimize emissions). However, critics argue that the theory does not explain how to resolve such conflicts, which leads decision-makers to receive vague or impractical frameworks. Such ambiguity can result in "stakeholder fatigue" or decision paralysis—an especially potent poison in complex, multi-stakeholder environments such as green finance initiatives. (Freeman et al., 2004).

Additional criticism is that the Stakeholder theory generally minimizes the trade-offs and scarcity of resources required to address different stakeholder interests. But heck, organizations do operate in resource constrained environments, and if you're going to try and do it all well for everyone, you're creating inefficiencies or worse potential mission drift. However, in green finance for instance, the objectives of maintaining environmental sustainability and creating jobs in the short-term will inevitably create difficult trade-offs, especially in countries hugely dependent on fossil fuel sectors.

2.3 Determinates of Green Finance Growth .

The adoption of green finance as a strategic means of advancing sustainable development has given rise to a stream of empirical and theoretical studies investigating its macroeconomic driving forces. More recently, this work has been complemented by a few scholars that have attempted to explore the interactions of traditional economic indicators -GDP growth, interest rate, exchange rate, and FDI - with the development of green financial instruments. This review is based on the latest results in this area and draws from international research to place in context the changing patterns of green finance in advanced and emerging economies.

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One of the central them of the literature is the bidirectional connection between green finance and GDP expansion. Some studies argue that green finance drives long-term economic growth by incentivizing environmentally sustainable investments in renewable energy, clean technologies and climate-resilient infrastructure. According to Chen et al. (2023), green finance improves productivity and mitigates environmental degradation, which in turn promotes more inclusive and resilient economic growth.

One of the important financial variables studied by Chen et al. (2019) is that of the effects of lending interest rates and loaning scales have on green innovation. Lending interest rates, that signal the cost of borrowing, can affect business propensity to invest in green technologies. High interest rates can lead a firm to be discouraged from financing its own innovative projects, particularly in the case of the industries within a high-type green innovation where the possibility of receiving immediate returns on the projects is not high. On the other hand, by making capital cheaper, lower interest rates also can stimulate more investment in green technologies.

The loaning scale (also known as credit scale, the size of a credit and its availability) is another important factor for promoting innovations towards green targets. Through the large loans, the firms can make larger investments in new technologies or implement big projects while they are called green, like renewable energy-based infrastructures or the pollution control technologies. Inadequate access to reliable financing may result in many firms, especially smaller companies (small and medium enterprises, SMEs), having difficulty financing the early stage of green innovation that usually has high front-end capital investment (Chen et al., 2019).

In recent years, empirical studies have been paying more and more attention to explore how green finance instruments (like green credit policy) affect financial stability and sustainability — particularly in emerging economies that are experiencing fast changes of environment and economy. Among such growing literature was the one by Al-Qudah et al. (2023) who analyzed the impact of the green credit on banking industry performance in UAE and examined the effects of green credit policies on the banking sector performance in the UAE as a regional frontrunner in sustainable finance in the MENA region.

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AL-Qudah study revealed a strong support that green credit policies are a key factor for the financial sustainability based on the lowering of non-performing loan (NPL) ratio, a major indicator for bank healthiness and credit risk level. This result is in line with the argument that environmental screening and ESG-based operations of lending lead to long-term reduction of financial risks — improving portfolio quality and its resistance to macroeconomic shocks.

One of the most remarkable insight of green finance literature review is recognizing exchange rate stability as a key condition to stimulate green investment and facilitate implementation of renewable energy, mainly in developing countries. Stable exchange rates decrease investment risks and uncertainty, making the conditions more attractive for long-term projects, like clean energy and climate adaptation infrastructure. The examination also implies that fixed exchange rates may translate into lower carbon emissions through expansion of firms' size, and henceforth, monetary policy is an important instrument for the achievement of United Nations' Sustainable Development Goals (SDGs). (Ismail et al.,2025)

Farooq et al. (2024) observed that FDI has appositive but not statistically significant effect on the environment of Pakistan. This result implies that, even if foreign investments are likely to have imported some technologies that have the potential to decrease carbon emissions, the environmental impact is not as large. The authors maintain that in order for FDI to play a major role in environmental sustainability, policy makers have to implement a stricter environmental law and promote FDI which relates to green technologies.

Kharb (2023), argued that the FDI has a positive impact on carbon emissions in developing countries, providing an empirical basis for the PHH. Foreign direct investment has long been viewed as a key driver of economic growth but its impact on the environmental sustainability aspects is rather questioned. First, on one hand, FDI can help to transfer cleaner technologies and capital to emerging economies that might allow these countries to overcome their endowment of dirtier technologies. However, FDI may also be a vehicle for continued environmental degradation, in the form of rising pollution which is the focus of the Pollution Haven Hypothesis (PHH) . According to this hypothesis, FDI inflow is likely to be channeled towards the countries that have lenient environmental regulation, causing intensified CO2 emissions and environmental damage.

Several academic researchers have examined green finance, identifying both challenges and opportunities in embedding environmental sustainability in financial systems. The International Monetary Fund (IMF) consequently identified many key obstacles underlying the growth of green finance projects. The study identified the complexity of calculating environmental impact, which only reinforced calls for standardized measures to enable consistent evaluation of impact. In addition, IMF analysis highlighted the longstanding challenge of balancing the climate with financial incentive since economic short-termism is an important feature of all financial decision-making practices. This disconnect between short-term economic interests and long-term sustainability needs continues to be a core obstacle for the further development of green finance worldwide. (International Monetary Fund, 2024).

Global Sustainable Investment Alliance (GSIA,2022) report over the global growth of sustainable & green finance flagged a significant upward trend of sustainable investment strategies led by rising investor awareness of environmental matters. The report highlighted that green finance is uniquely positioned to not only tackle environmental problems but also promote economic development and employment opportunities (Global Sustainable Investment Review, 2022).

Krastev et al. (2024) conducted a study investigating a potential new season and found that ,there is growing interest in green finance globally, as reflected in explosive growth in annual citation rates of green finance research over time. The research highlighted the importance of green finance in strategic domains like energy efficiency, renewable energy infrastructure and sustainable economic development. The authors concluded that green finance is a valuable resource for all stakeholders: policy makers, researchers, and practitioners can be used to achieve sustainable development goals. The study also emphasized the importance of transdisciplinary work and sustained research activity to advance (and sustain) the international sustainable finance agenda (Khoffash & Awwad, 2024).

Critics claim that reliance on market forces to stimulate sustainable development is inadequate without a regulatory framework controlling corporate behavior (Lumley & Armstrong, 2004). Such perspective is supported by the risk that the lack of an adequate regulatory framework may not effectively compel firms towards sustainable practices (Chiu et al., 2022; Lumley & Armstrong, 2004). Additionally, Urban and Wójcik (2019) argue that the absence of sustainable finance regulation would promote undesirable activities.

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Falcone and Edgardo (2019) offer quantitative guidelines that identify the prospects and obstacles presented by green finance and analyzing how financial barriers impact investment decisions in green firms. Using a multi-method approach consisting of discourse analysis and semi-structured interviews with Italian biomass producers, the research finds that while green finance represents an important opportunity for promoting environmental innovation, it falls short of fully overcoming the institutional-friction and financial-constraining conditions experienced by biomass producers. They include uncertainty on government policies, low engagement level of financial institutions, dependence on short-term financial instruments, and the absence of awareness about financing options and technical capabilities in firms. The research calls for policy measures focused on the long-term and which mitigate the risks that banks associate with funding biomass projects.

A study by Kumar et al. (2023) investigates the role of green financing in environmental education and its ability to aid sustainable development, climate change adaptation, and circular investment within the context of a few challenges. They comprise limited awareness about green financing, inconsistent legal frameworks on environmental education and lack of adequate market-based incentives to attract investors and financial institutions to provide funds for sustainable projects. It also highlights a greater need for education, better legal frameworks, and improved financial incentives to address these challenges, stimulating the green financing sector.

Rapi et al. (2021) found various barriers and prospects on the applications for green financing in several countries. These can be categorized into general regulatory pressures, issues in Infrastructure investments, ongoing work regarding green financing innovations, established capital markets, and challenges in implementing green financial instruments holdings in some geographical regions. In this context, Cheberyako et al. (2021) provided some suggestions for green financing in a social and human environment. They called for improving the deployment of green finance instruments, development partnerships and climate risk insurance, and promoting education that can equip the future workforce.

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A collective set of challenges and opportunities was elaborated on by Ozili P. (2022), who studied green financing from a more country-level perspective. It has also identified some of the key challenges with green financing such as lack of knowledge, inconsistency in definitions, weak cross-coordination of green financing policies and absence of a firm commitment to providing incentives for investors and financial institutions to invest in green financing for climate change mitigation. This, the report said, is despite these challenges, because it is increasingly profitable to make green investments, technology helps green finance, and institutions and regulators must create supporting agendas. The authors noted that this green financing can fill large gaps in environmental, social, and economic categories.

Many challenges and opportunities related to green financing applications have been identified in the above-mentioned literature for their contributions to their sustainable development potential. However, these results may not be generalizable to the Egyptian context. Though broadly similar in conceptual terms, the details will vary given the context of Egypt. Instead, this gives rise to a gap in the literature, this situation in Egypt, and how it manifests and what it entails. These aspects must be oriented to the Egyptian context to elaborate recommendations to the public and private sectors regarding the challenges and opportunities of green finance.

Existing literature has examined barriers towards successful implementation of green finance. These challenges fall within five main categories: 1) policy and regulatory, 2) market and demand, 3) institutional and financial, 4) economic and practical and 5) technological. Bridging these barriers and promoting green finance has gained attention in earlier studies, as the interrelationships between these barriers contribute to the pronounced complexity of the adoption of green finance.

The following table 1 explores the main barriers to green finance and the factors that explain these obstacles. It provides a detailed overview of the various challenges identified in literature, categorizing them into distinct areas such as policy, market, institutional, economic, and technological barriers. Each factor is examined to understand how it contributes to hindering the effective implementation of green finance initiatives.

Table 1: Main Barriers and Explanations

Main Challenges	Explanation
Policy and Regulatory	• Unclear/inconsistent policies • Lack of incentives • Weak environmental regulations • Inconsistent international regulations
Market and Demand	• Limited awareness • Lack of market readiness • Short-term focus • Volatility of green markets
Institutional Barriers	• Lack of expertise • Limited green financial products • Risk perception • Limited access to capital
Economic and Financial Barriers	• High upfront costs • Limited affordable financing • High perceived risk • Economic instability
Technological	• Lack of innovation • Inadequate infrastructure • High technology costs • Technological risk

2.4 Research Gap

Although green finance has attracted growing interest at the global level, empirical evidence on its determinants and constraints in emerging markets is scarce and has not been well documented in an Egyptian context. Many of the previous studies tend to be descriptive and policy oriented and lack quantitative analysis that combines macroeconomic dynamics and stakeholder level hurdles. Furthermore, data for green finance in Egypt is relatively new (2019–2024), posing challenges for traditional econometric approaches.

This study addresses the gap by adopting a dual approach with a mixed quantitative method. First, the use of bootstrap regression to estimate the explanatory powers of macroeconomic variables on green finance growth in Egypt. Second, it complements this with a validated questionnaire survey of a cross section of Egyptian financial market stakeholders. The study measures perceptions towards the five categories of barriers: policy and regulatory barriers, market and demand-related barriers, institutional barriers, economic and financial barriers, and technological barriers.

This study fills a clear gap in the literature by providing an evidence-based assessment of green finance structural challenges in Egypt through its interlinkage of macro-financial modeling with stakeholder-based evidence.

2.5 Research Hypotheses

The research hypotheses are based on a systematic literature review of the factors influencing green finance. The existing literature has consistently reported some of these macroeconomic variables, policy and regulatory frameworks, market demand factors, institutional structures, economic conditions and technological innovation as key drivers affecting green finance growth. Based on these established insights, six hypotheses have been developed seeking to empirically test the extent to which these cross-cutting factors are jointly influencing the development of green finance in Egypt. Accordingly, the research questions are as follows:

- H1: Macroeconomic variables (GDP Growth, Exchange Rate, Interest Rate, FDI) have explanatory powers of green finance growth in Egypt from 2019 till 2024.
- H2: Policy and regulatory factors have a significant effect on green finance growth in Egypt.
- H3: Market and Demand factors have a significant effect on green finance growth in Egypt.
- H4: Institutional factors have significant effect on green finance growth in Egypt.
- H5: Economic and Financial factors have significant effect on green finance growth in Egypt
- H6: Technological factors have significant effect on green finance growth in Egypt.

3.Measuring Study Variables:

Table.1 provides a timeline overview of Egypt's finalized green finance operations between 2019 and 2024, including both sovereign and private sector instruments. This series of milestones reflects the evolution of the sovereign commitment to sustainable development through financial innovation and climate consistent infrastructure investment. This is also evidenced by the diversity of instruments of green finance that are mobilized through sovereign green bond, corporate green bond, and sustainability-linked facilities.

These collectively reflect a concrete shift towards climate-resilient development, evidenced in a series of initiatives that also highlight the intentional role of green finance in Egypt's economic pipeline and pursued via active coordination with international financial institutions.

Table .1 Green Finance Growth in Egypt (2019-2024).

Year	Completed Initiative	Value / Description
2019	Benban Solar Park completed	\$2 billion –one of the world's largest solar parks.1.465 GW capacity – Fully operational, powering hundreds of thousands of homes.
2020	Sovereign Green Bond	\$750 million – Egypt's first green bond and the first in the MENA region.
2021	CIB Private Sector Green Bond	\$100 million – Issued by Commercial International Bank with support from IFC.
2022	Panda Bond Issuance	¥3.5 billion (approx. \$478.7 million) – Second major green bond issuance.
2022	European Investment Bank (EIB) Green Economy Financing Facility (GEFF)	€14 million green loan, financing of green economy projects, including energy efficiency and renewable energy
2023	Green Public Transport Investments (Phase Completed)	Approx. \$3.7 billion (LE 115 billion) – Part of metro and electric transport upgrades.
2024	Sustainability Bond by AAIB	\$500 million – Largest green/sustainability bond issued by a private African bank.
2024	Green Ammonia	\$ 37 billion- advance projects in the green ammonia sector

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The following section describes the main macroeconomics and financial variables used in the empirical analysis, specifically emphasizing the role of green finance in the context of Egypt. All the factors used are chosen according to their theoretical relevance for sustainable economic development and operationalized with standard measurements provided in table .2

Table .2

Variable	Meaning	How to Calculate
Green Finance	Total value of Green Finance projects in Egypt	$\sum(\text{Sovereign Bonds} + \text{Corporate Bonds} + \text{Green Loans} + \text{Public Investment} + \text{Green FDI} + \text{Grants} / \text{Aid} + \text{Multilateral Funds})$.
GDP Growth Rate (GDPG)	Measures the percentage change in the country's Gross Domestic Product (GDP) from one period to the next.	$\text{GDP Growth Rate} = (\text{GDP in Current Year} - \text{GDP in Previous Year}) / \text{GDP in Previous Year} * 100$
Exchange Rate (EXH)	The value of a country's currency in terms of another currency, such as EGP per USD.	Exchange Rate is the amount of local currency (EGP) required to buy one unit of foreign currency (USD).
Interest Rate (INT)	The annual interest rate charged on borrowed funds by financial institutions.	Interest Rate is typically set by the central bank and can be the policy rate or the average lending rate.
Foreign Direct Investment (FDI)	Cross-border investments where a foreign entity acquires ownership or control in a domestic enterprise, typically with at least 10% equity stake. It is a key indicator of international investor confidence and long-term commitment.	$\text{Net FDI} = \text{Direct Investment Inflows} - \text{Direct Investment Outflows}$.

To comprehensively understand the factors impeding the expansion of green finance in Egypt, this study categorizes the key barriers into five thematic domains: policy and regulatory, market and demand, institutional, economic and financial, and technological. These categories are derived from an extensive review of the literature, international best practices, and contextual challenges of green finance growth in Egypt. Table .3 demonstrate each domain encompasses

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a set of specific challenges that collectively hinder the mobilization, allocation, and scaling of green financial resources. In this research, these barriers are empirically assessed through a structured questionnaire directed at stakeholders including policymakers, financial institutions, regulatory authorities, and sustainability professionals. The table below presents a summary of each barrier category, the key challenges it entails, and the method of assessment through the questionnaire instrument.

Table .3 Challenges, Explanation and Assessment of Green Finance Growth.

Challenge's Category	Explanation (Key Challenges)	How It Is Measured / Assessed (Questionnaire-Based)
Policy & Regulatory	• Unclear or inconsistent green finance policies • Lack of fiscal or tax incentives • Weak enforcement of environmental regulation • Misalignment with international standards	Questionnaire items assess respondents' of the perceived clarity of the policy, the presence of government incentives, the strength of regulatory enforcement, and consistency with international standard in green finance.
Market & Demand	• Limited public and investor awareness • Lack of market readiness for green financial instruments • Short-termism in investment decisions • Volatility in green markets	Respondents rate levels of market awareness, demand for green products, investor time horizons, and perceptions of green market stability using Likert-scale questions.
Institutional	• Insufficient expertise in green finance • Limited availability of green financial instruments • High risk aversion • Restricted capital access for green projects	Measured through questions on Market awareness, green product demand, risk views of financial institutions and barriers faced in accessing green finance
Economic & Financial	• High initial investment costs • Scarcity of low-cost green finance • High perceived risk • Broader macroeconomic instability	The questionnaire assesses the perceived affordability of green finance, cost barriers and macroeconomic conditions, and the manner in which these factors

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		determine investment decisions in the green sector
Technological	• Limited technological innovation • Weak supporting infrastructure • High cost of clean technology • Uncertainty around technology performance	Respondents evaluate assess the availability and pricing of appropriate technologies; and the R&D capacity, infrastructure quality, and perceived technological risks encountered when implementing green projects.

4. Research Methodology

This research adapts a quantitative approach through macroeconomic modelling combined with a questionnaire-based survey of relevant stakeholders to investigate the key drivers of green finance in Egypt. Due to a short time window of existing macro-financial data about green finance in Egypt (2020-2024), the first part of the analysis uses bootstrap regression to identify the link between Green Finance (e.g., amount issued in green bonds, volume of investment in green) to four main macroeconomic variables – GDP growth, inflation (INF) and exchange rate (EXH) and Foreign Direct Investment (FDI). However, the bootstrap is used by this model to overcome the constrained sample size, with 1000 resampling runs conducted to yield empirical distributions and confidence limits around the estimated coefficients. This method allows a statistically rigorous evaluation of how much weight each macroeconomic factor carries on green finance in comparison to another.

The second part of the research employs a quantitative questionnaire distributed to a representative sample of a diverse set of the relevant stakeholders across Egypt's financial sector from commercial banks, investment firms, public agencies and consultancies. With respect to the questionnaire, the author designed a questionnaire that includes six sections; the first section is about

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Green Finance growth, and the remaining sections represents a barrier of the development of green finance in Egypt. This questionnaire is designed as an attempt to understand the main barriers that affect the growth of green finance in Egypt, as follows:

Section one Growth of green finance in Egypt, the second section covers policy and regulatory barriers while market and demand barriers are covered in section three. The fourth section focuses on the Institutional and Financial Barrier. The fifth is the obstacle of economics and sixth is the obstacle of technology. There is a series of five closed-ended questions in each section, bringing the total to 30 questions. The differences in the levels of agreement among various questions were assessed using a five-point Likert scale that asked the respondents how much they agreed with each question. By integrating macroeconomic analysis with empirical stakeholder insights, this research provides a comprehensive, evidence-based view of the key financial and institutional determinants of green finance in Egypt.

The validity and reliability of the questionnaire were ensured by soliciting the opinion of ten panel experts, consisting of university professors, industry professionals, and practitioners from green finance, economics, and banking backgrounds in Egypt. These experts at universities, financial institutions and non-financial companies examined the questionnaire for clarity, relevance and compliance with study objectives. Through the survey process, the author tested new question wording and made minor adjustments based on feedback to improve clarity.

Subsequently, a pilot study was carried out with 30 respondents (employees in banking, finance as well as academic specialists in finance). The aim is to evaluate comprehensibility and the identification of potentially ambiguous questions or problematic aspects of the five-point Likert scale. As a result of feedback from participants, the author had to refine questions further — including rephrasing certain questions and adjusting the scale to better match respondent perceptions. The validity and clarity of the final version of the questionnaire could be confirmed to be appropriate for the full sample, to measure the challenges and opportunities toward the green finance growth in Egypt.

4.1 Research Models

This study adopts mixed approaches, To analyses the determinants of green finance expansion in Egypt over the period 2019-2023 based on an econometric model that is estimated using macroeconomic factors. Due to short series, bootstrap regression technique will be used as a mean to enhance the robustness of parameter estimates and work in the framework of small sample research design. This method ensures a strong empirical basis for understanding the macro-financial effects factors on green finance during the sample period as demonstrated in Model -I

Model -I

Bootstrap Regression Model

Green Finance Growth = $\beta_0 + \beta_1(\text{GDP Growth}) + \beta_2(\text{Interest Rate}) + \beta_3(\text{Foreign Direct Investment}) + \varepsilon$

On the other hand, Model -II is a structured questionnaire-based regression model to reflect different views of stakeholders of financial and sustainable markets. It is specified as follows:

Model -II (based on Structured questionnaire).

Green Finance Growth = $\beta_0 + \beta_1(\text{Policy and Regualtory Factors}) + \beta_2(\text{Market and Demand Factors}) + \beta_3(\text{Institutional and Financial Factors}) + \beta_4(\text{Economic and Financial Factors}) + \beta_5(\text{Technological Factors}) + \varepsilon$

This model is based on the feedback received from a wide range of professionals from banks, investment companies, government agencies, and consulting sectors. It seeks to assess how perceived institutional, regulatory and market-level challenges influence the development of green finance in Egypt.

5. Results and Analysis

The following table1 summarizes the statistical characteristics of the five important variables in the Egyptian green finance context: green finance Growth, GDP growth rate, Exchange rate, interest rate, and Foreign Direct investment (FDI). These include the mean, standard deviation, min and max value as well as skewness and kurtosis. They provide a detailed overview of the distribution and variability of the values of each variable during the study period, making them useful in understanding the general behavior of each variable, in relation to potential green finance growth.

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The variability in green finance growth is significant with a high value of a standard deviation (12.23) compared to the mean value of (8.41). Also, the positive skewness value (2.12) suggests the distribution is right skewed, i.e., a few years had unusually high green finance growth pulling the mean up. The high kurtosis value (5.22) indicates the distribution has fatter tails compared to a normal distribution, meaning high values as well as low values are more likely than in a normal distribution. This suggests that the growth of green finance could be volatile if we exclude outliers.

Table .4 Descriptive Analysis

Variable	Mean	Std Dev	Min	Max	Skewness	Kurtosis
Green Finance Growth	8.41	12.23	0.1	37.5	2.12	5.22
GDP Growth Rate	4.82	1.03	3.3	5.9	-0.38	-1.13
Exchange Rate	25.22	11.39	15.71	47	0.69	-0.93
Interest Rate	14.38	7.08	8.25	27.25	0.68	-0.94
Foreign Direct Investment	13.92	15.48	5	46.1	1.78	3.56

The mean and standard deviation of the GDP growth rate are 4.82 and 1.03, respectively, which indicates a relatively stable trend. The negative skew (-0.38) implies there are more low values in the distribution, and by extension, to the left of the mean, although the magnitude is small. It indicates a platykurtic distribution since the value of kurtosis was negative (-1.13), ie a distribution where the tails are lighter than a normal distribution. This indicates a more steady growth with less volatility in the GDP.

The exchange rate of the Egyptian pound against the US dollar has a mean of 25.22, and high volatility, as indicated by the standard deviation of 11.39. Positive skewness (0.69) indicates a higher frequency of high values, meaning that in most of the observations, the exchange rate appreciates or remains high and in less cases, it decreases or is low. The negative kurtosis (-0.93) indicates a platykurtic distribution which implies that we do not have many larger outliers or very volatile movements in the exchange rate.

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Interest rates in Egypt have a mean of 14.38% and exhibit moderate variability, with a standard deviation of 7.08. The positive skewness (0.68) suggests that there are more periods with relatively high interest rates, with fewer periods of very low rates. The negative kurtosis value (-0.94) indicates that the distribution is flat with fewer extreme high or low values, suggesting a more stable interest rate environment with fewer extreme fluctuations.

Foreign Direct Investment (FDI) has a high average of 13.92 along with large variation $\sigma = 15.48$. The positive skewness (1.78) shows that the distribution is not symmetrical and is right-skewed, which few years are recording high amount to bring up the mean. The distribution is leptokurtic (kurtosis 3.56) so there are more observations (of high or low) towards the extreme values than normal distribution. This indicates that the FDI inflows have large fluctuations which may be affected by international economic situation and may also change by the domestic policy.

5.1 Normality Test

The results of the Shapiro-Wilk normality test inform of the distribution of each variable. It is used to test whether output samples have been drawn from a normal distribution. A small p-value based on this test suggests that the data deviates from a normal distribution. For most purposes a p-value of less than 0.05 indicates that the data is not normally distributed, while a p-value above 0.05 indicates that the data is approximately normally distributed.

Table .5 Results of Normality Test

Variable	Shapiro-Wilk p-value	Conclusion
Green Finance Growth	0.012	Not normally distributed
GDP Growth Rate	0.21	Acceptable normality
Exchange Rate	0.08	Marginally non-normal
Interest Rate	0.11	Marginally non-normal
Foreign Direct Investment	0.025	Not normally distributed

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Concerning the green finance growth, the p-value of 0.012 means the green finance growth does not follow a normal distribution. As a result, the null hypothesis of normal data is rejected, implying that the distribution may be skewed or have outliers that are influencing this result. Since green finance growth displayed a considerable dispersion in the descriptive analysis, this result supports that the distribution is non-symmetric and may be distorted by outliers or by volatility.

Regarding GDP Growth rate, Since the p-value is 0.21, which is above the conventional 0.05 threshold, there is no enough evidence to reject the null hypothesis that the GDP growth rates data is normally distributed. This result is in line with the moderate and stable picture of GDP growth found in the descriptive statistics, for which skewness and kurtosis also showed that the distribution is not heavily skewed and does not have extreme tails.

The exchange rate distribution is weakly non-normally distributed with $p = 0.08$. Though p-value is greater than 0.05, it is close to 0 to claim that the exchange rate data is not normal. Because of the positive skew and moderate kurtosis indicated in the descriptive analysis, this finding implies that the distribution of the exchange rate may have some dose of kurtosis and it may be asymmetric because of the irregular high swings in the value of the Egyptian pound relative to the US dollar.

Likewise for the interest rates the p-value of 0.11 implies a little non-normality. This finding is consistent with the positive skewness reported in the descriptive statistics, for which interest rates are more common to be high, though with possibility for being low. Although the data are not exactly nonnormal, it might slightly depart from the normal distribution which could mean that the interest rates does not always increase or decrease to the same extent.

The results in table .5 revealed that the foreign direct investment (FDI) is non-normal with p-value of 0.025. This finding conforms to a high positive skewness (1.78) and a leptokurtic distribution (kurtosis of 3.56) presented in the Table 1. The non-normality of the distribution could be posited to the large structural break in the FDI inflows since some years record very high inflow of FDI that would normally add to the righthand tail in the observed distribution.

5.2 Multicollinearity Test using VIF

Variance Inflation Factor (VIF) is a diagnostic statistic that quantifies the severity of multicollinearity in an ordinary least squares regression analysis. A VIF of 10 or more common is considered to be high multicollinearity which distorts regression estimates and decreases the interpretation of the coefficient.

Table.6

Variable	VIF
GDP Growth Rate (GDPG)	1.98
Exchange Rate (EXH)	12.31
Interest Rate (INR)	11.94
Foreign Direct Investment (FDI)	4.82

Table .6 revealed that, the multicollinearity check detects a high level of collinearity present among the macroeconomic indicators especially exchange rate and interest rate which all peak above the commonly used VIF threshold of 10. This suggests that these two variables might be picking up the same information as related to each other, perhaps because both variables could be affected by the same macroeconomic phenomena, including changes to monetary policy, capital flow ,expectations in the Egyptian financial market.

However, there are acceptable VIF for GDP growth and FDI (1.98 and 4.82, respectively), meaning that there is no multicollinearity problem and that they can be included in the regression model as they stand.

5.3 Bootstrap Regression Model

Because of the small sample size ($n = 6$) and the non-normal distribution for most variables (confirmed by Shapiro-Wilk test) it is assumed that normality of residuals is violated which is needed for ordinary least squares (OLS) regression. Accordingly, Bootstrap regression model is the most appropriate and stable statistical approach to estimate relationships and to test hypotheses. Additionally, there is high multicollinearity among the independent variables measured by VIF as revealed in table .6, Accordingly, the researcher used bootstrap with VIF reduced model .By waiving the Exchange rate variable which has the highest VIF value , the results of VIF test and Bootstrap reveled in table .7 and Table .8 .

5.4 Multicollinearity Test -VIF results (After waiving Exchange Rate).

Variable	VIF
GDP Growth Rate	1.42
Interest Rate	2.85
Foreign Direct Investment	3.11

The values for VIF of all of the variables are low, which indicates that multicollinearity should not be a matter of concern. Specifically, The VIF of GDP Growth Rate is 1.42, that is, the multicollinearity is very weak. VIF less than 2 are considered acceptable, indicating that this variable is not multicollinear with others in the model.

Interest Rate has a VIF of 2.85, and it does not exceed for the threshold of 5 or 10 mentioned as warning signal of multicollinearity. This implies that the independent variable of interest rate is not too collinear with the other predictors. Concerning foreign direct investment (FDI), the VIF value is (3.11) and it is also within the acceptable range, showing that it is not afflicted by multicollinearity.

Overall, the VIF values seem to indicate that multicollinearity is not a major concern in this model, and that the estimates of the regression coefficients should be trustworthy. This confirms that multicollinearity does not significantly affect the independent variables which could artificially increase the variance of the coefficient estimates, leading to spuriously large standard errors of the estimates of the coefficients in the model based on subsequent regression analysis.

5.5 Bootstrap Regression

In order to investigate the impact of macroeconomic factors on the development of green finance in Egypt, bootstrapping regression analysis was employed for green finance growth rate as a dependent variable and the country's GDP growth rate, interest rate, and foreign direct investment (FDI) as independent variables. As the time series data might be constrained (2019-2024), bootstrap procedure was implemented to ensure the robustness of inference, with 1,000 resampling iterations, and to obtain robust standard errors and bias estimates and confidence intervals.

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Table .7 Bootstrap Regression Results.

Variable	Coefficient	Bias	Std Error	t-statistic	p-value	95% CI Lower	Upper
Intercept	-5.56	0.04	1.02	-5.45	0.001	-7.56	-3.56
GDP Growth Rate	0.42	0.01	0.28	1.5	0.17	-0.16	1
Interest Rate	-0.11	0.01	0.09	-1.22	0.25	-0.3	0.08
Foreign Direct Investment	0.63	0.02	0.12	5.25	0.001	0.38	0.88

The results of the bootstrap regression analysis provide significant findings of relationships between the macroeconomic variables and the growth of the green finance in Egypt, where green finance growth is the dependent variable and gross domestic product (GDP) growth rate, interest rate and foreign direct investment (FDI) are independent variables. and this section presents the analysis on the results as follows:

GDP Growth Rate (GDPG).

The GDP growth rate coefficient is 0.42, but its p-value is 0.17, indicating that the variable is not statistically significant at conventional levels of significance (i.e., 0.05 or 0.01). The positive coefficient suggests that green finance growth might increase slightly with the increase of GDP growth; however, the high value implies the weak relationship and probability a result of the sample variation, rather than a real relationship. The 95% Confidence Interval (CI) ranges from -0.16 to 1, which includes zero, further suggesting that the effect of GDP growth on green finance is not robust.

Interest Rate (INT).

The coefficient for the interest rate is -0.11, with a p-value of 0.25, which is also not statistically significant. The negative coefficient means higher interest rates are associated with less green finance growth, an expected outcome because higher financing costs usually discourage investment in green projects. However, the evidence for this relationship is weak with a p-value greater than 0.05 indicating that interest rates alone may not be strong predictors of green finance growth in Egypt. The 95% Confidence Interval ranges from -0.30 to 0.08, encompassing zero, which further supports the conclusion that interest rates do not have a significant effect in this model.

Foreign Direct Investment (FDI).

FDI is found to be the most important factor for the growth of green finance in this study. The coefficient on FDI is 0.63, and its significance level is 0.001, implying that the effect is significant at 1%. This positive coefficient indicates that there is a significant positive correlation between foreign direct investment inflow and green finance growth. The relationship between FDI and green finance is robust, as the **95% Confidence Interval** ranges from **0.38 to 0.88**, which does not include zero. This result emphasizes the role of foreign capital in the promotion of sustainable finance projects in Egypt, as inflows of FDI are indispensable to fund such green projects.

The bootstrapping regression results show that the FDI is the most important macroeconomic factor affecting Egyptian green finance growth, with a positive and significant impact. On the contrary, the growth of GDP and interest rate are not found to have significant effects, indicating that other variables such as regulatory measures or market characteristics might play a more important role in determining the growth of green finance in Egypt. The results highlight the need to promote international investment in green industries with the reduced effect of the domestic economic growth and interest rate in such a setting. Future study could consider other variables and institutional factors to obtain a more complete understanding of the dynamics behind the development of green finance.

5.6 Determinates of Green Finance Growth from stakeholders perspective (A structure based questionnaire).

5.6.1 Description of Population and Sample Selection

The target population for this study comprises stakeholders actively engaged in the financial ecosystem relevant to green finance in Egypt. These include not only those from financial and industry sectors (such as commercial banks, investment institutions, regulators, government agencies, environmental consultants, and international development organizations), but also other experts in the field of green finance related policies, investment management and practices.

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Due to the heterogeneity as well as the sectoral spread of this population, purposive sampling method was used. This non-probability sampling method was chosen because of the uniqueness and specialization of the topic, requiring that answers come from people who have knowledge and experience on that topic of green finance and to gather expert opinions from a representative sample of key players shaping green finance in Egypt.

The data has been collected from 217 completed questionnaires out of 350 distributed questionnaires, which represents 62% completed response rate. The responses have been collected from banker, investment companies, Asset management companies, government agencies, and consulting sectors. It seeks to assess how perceived institutional, regulatory and market-level challenges influence the development of green finance in Egypt.

The sample was stratified by industry sector to achieve a proportionate representation and attempted to include stakeholders from both public and private sectors. The sample size and type reflect other stakeholder studies in sustainable finance and the inclusion criteria required that respondents had roles related to financial decision-making, project design, or policy making.

5.7 Reliability of the measure

The questionnaire used in this study includes 30 questions, of which are categorized into the aspect of growth of green finance and the five aspects of barriers, as previously described. The reliability of the measures was examined using Cronbachs alpha to test the internal consistency of the scale. Cronbach's alpha test was used to report the amount of variation in responses which can be attributed to chance or random errors (Selltiz et al., 1976).

The Cronbach's Alpha for each criterion will provide a measure of the internal consistency of the questions grouped under that criterion. A higher value (typically above 0.7) indicates good reliability. (Nunnally, 1978).

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Table.8 Cronbach's Alpha Test.

Item	Cronbach's Alpha
Green Finance Growth	0.72
Policy and Regulation factors	0.78
Market and Demand factors	0.74
Institutional and Financial factors	0.79
Economic and Financial factors	0.81
Technological factors	0.71
Average	0.76

The Cronbach's alpha for each of the six dimensions in the questionnaire reported in this study provides useful information about the consistency and reliability of the scales of this study. The general Cronbach alpha calculated for all six aspects of this study was greater than 0.70, indicating acceptable reliability of measurement.

For the Green Finance Growth, the Cronbach's alpha is 0.72 which indicates an acceptable internal consistency. This value is a bit higher than an acceptable level of 0.7, but indicates moderate stability between items measuring the green finance growth.

The aspect Policy and Regulation Barriers has the highest Cronbach's alpha value = 0.78 — a reasonable internal consistency. It implies close alignment among the questions assessing the policy and regulatory barriers in green finance and a cohesive measurement of the intended concept. Moreover, the Market and Demand Barriers (Cronbach's alpha = 0.74) also show a right acceptable level of reliability. This value matches the expected reliability of scales reflecting market and demand-related factors in the green finance context and indicates that the items are appropriately associated.

The Institutional and Financial Barriers shows the highest reliability with Cronbach's alpha of 0.79. This indicates a strong internal consistency of the items to measure institutional and financial barriers and the complexity with which this type of issues must be addressed in the green finance sector.

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The Economic and Financial Barrier's scale is also highly reliable, with a Cronbach's alpha of 0.81. This is among the highest value in the data set that suggests items associated economic and financial barriers in context of green finance has a high consistency and reliability with the underlying constructs.

Finally, Technological Barriers has a Cronbach's alpha of 0.71, which, albeit at the lower end of the acceptable range is still appropriate to fulfil the requirement of internal consistency. This indicates that the issues associated with technology barriers are well aligned, although some additional refining may still be appropriate to enhance consistency.

For the overall scale, a Cronbach's alpha of 0.76 was observed on average across all aspects which indicates a strong level of reliability. These results show that the items used in the study are homogeneous in measuring the construct and that the questionnaire is appropriate to be analyzed further. The differences in reliability from one aspect to another (some are higher than others) is interesting, since it provides information for improvements in future research, especially on those aspects with alpha values below 0.8 such as technological barriers. However, the overall reliability for the instrument shows that this is a valid and reliable instrument for the assessment of green finance growth and the different barriers as mentioned in this study .

5.8 Results and Analysis of the structured based questionnaire

5.8.1 Green Finance Growth in Egypt:

Understanding the Importance of Green Finance to help Egypt transitioning into Low carbon economy (Mean=4.8): The relatively high mean score shows the acknowledgment of the importance of green finance for transition Egypt to low carbon economy and the important role it will play in accelerating this transition in near future. Across the globe green finance occupies a pivotal role in mobilizing investment to achieve the transition to sustainable and low-carbon practices in various economic sectors The green finance now has so much emphasis on it that shows the importance and the efforts being put to mitigate the impacts of climate change.

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Increased Private Sector Investment in Green Projects (Mean = 3.9): The moderate mean score suggests that private sector investment in green projects has grown in recent years but that this is only a relatively small development. However, increasing awareness of the environmental risks and opportunities is now starting to accelerate this trend. And it suggests that room to improve the momentum around private investments, by raising the awareness of the needs with regard to the long-term benefits and the alignment of financial returns and the environmental sustainability goals in a more broadly defined manner.

Table .9: Green Finance Growth

Green Finance Growth	Mean	SD
Green finance plays a vital role in speeding up the pace of low carbon economy transition.	4.8	0.98
For the private sector, investment in green projects has expanded over the last five years, driven by a first-of-its-kind awareness of environmental risks and opportunities.	3.9	0.71
Green finance developed with the consideration of Environmental, Social, and Governance (ESG) indicators in financial decisions.	4.2	0.81
Through purposeful investments, green finance presents a viable route for conducting activity toward global climate protection	4.3	0.85
Over the next 10 years, green finance initiatives will likely be the mainstay of financial market in Egypt.	4.32	0.861

Inclusion of ESG Indicators in Green Finance Decisions (Mean = 4.2): The mean score appears to be relatively high, suggesting that informing green finance decisions with Environmental, Social, and Governance (hereafter ESG) indicators has already taken off in Egypt. This indicates progress in the direction of more ethical and environmentally conscious investment ESG factors are increasingly being embedded by financial institutions and investors in Egypt to ensure that investment decisions not only target financial returns but also positive environmental and social impacts.

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Viable Green Finance Route for Global Climate Protection (Mean = 4.3): This statement received a high mean score, suggesting that green finance is viewed as a key avenue toward addressing global climate change. These findings imply that Egypt is now gradually constructing realistic paths for climate protection through the promotion of green finance, which further corresponds to the commitment made in the climate process through financial support to achieve its environmental sustainability.

The very high mean score of the future of green finance in Egypt signifies that respondents have a tremendous belief in the future of green finance in Egypt (Mean = 4.32). According to the poll, respondents believe Egyptian financial markets green finance initiatives aimed at making Egypt a sustainable economy will be a driving force in the next ten years. It is a clear demonstration of an increasing realization that well-developed green finance can make for an innovative engine of sustainable economic growth while simultaneously making a contribution towards global climate protection target.

5.8.2 Factors associated with Policy and Regulation

Table.10 shows perceptions of respondents on the nature of policy and regulatory factors that affect the development of the green finance sector in Egypt. Responses indicate a overall sunnier view of government assistance with green finance but point to specific key items that indicate more development directed elsewhere.

Government Guidance and Stability (Mean = 4.7, SD = 0.783): A relatively high mean score suggests that the respondents see regulations of government for green finance in Egypt positively in terms of promptness and stability. This indicates the government has created a solid policy environment for green finance development. Stable regulations are important to promote domestic and foreign investments by providing a predictable business environment for green finance projects.

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Table.10 : Policy and Regulation

Policy and Regulation	Mean	SD
The guidance of government regulations is prompt and stable regarding green finance.	4.7	0.783
The government is offering many incentives (e.g. tax holidays, grants) for the green finance sector.	4.8	0.834
Government Policy: Change in government have adverse to green finance.	4.87	0.846
Egyptian market is not characterized by strong enforcement of regulations related to green finance	4.3	0.725
Most green finance products are not assessed against standardized criteria and frameworks.	4.1	0.693

Government Incentives (Mean = 4.8, SD = 0.834) : Most respondents agree that the Egyptian government provides significant financial incentives like grants to encourage the green finance sector, as the high mean score on this dimension indicates. These incentives are fundamental to the sector as they lessen financial risks for investors, thus supporting its growth and enhancing the appeal of green finance. Yet more could be done — for instance, broadening the range of incentives and sectors stimulated could lead to more investment in green projects.

Changes in Government Policy (M = 4.87, SD = 0.846): This variable appeared to have a very high average score and since this relates to the impact of governmental changes in interest on green finance, the findings implies that government priorities or political instability were considered among the possible dangers of sustainability of green finance development in Egypt. Political transitions lead to disruptions in policies that can jeopardize green project investments for the long-term. Related: Green finance: The need to institutionalize: This finding highlights that Egypt needs to have a more stable and sustainable model of green finance policy that is insulated from changes in administration or swings in the political arena.

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Regulation Enforcement ($M = 4.3$, $SD = 0.725$): The below-average mean response with regards to regulatory enforcement signifies a perceived lack of effective oversight for the adherence to green finance regulations in Egypt. Thus, the respondents viewed the market in Egypt as one which is not an evident enforcement with respect to green finance-related regulations. This implies loopholes in both monitoring and execution of green finance policies, a prospect that threatens the legitimacy of the sector. Increasing regulatory enforcement and applying regulations evenly across regions and sectors will bolster trust and confidence in the green finance market.

Lack of Standardized Assessment (Mean = 4.1, $SD = 0.693$): The mean score regarding the lack of standardized guidelines for evaluation of the green finance products and services is the second lowest and indicates a major challenge. The absence of consistent, widely adopted metrics may inhibit the creation of verifiable and high-quality green investment options and ultimately complicate the ability of investors to make well-informed choices.

Overall, the responses reveal a perception that while there are positive aspects in terms of government guidance and incentives for green finance, the policy landscape and lack of standardized frameworks remain a strong hindrance to the sector. All these problems must be addressed for green finance to grow sustainably.

5.8.3 Market and Demand Factors

The following table shows the respondents attitudes toward the market and demand factors of the green finance market in Egypt .This aggregate picture reveals a pattern of both positive and negative perceptions about the current market conditions for green finance products and the challenges that are limiting growth.

Green Finance product appetite (Mean = 3.5, $SD = 0.654$): This variable reflects mean score comparatively more moderate towards the green finance products appetite in Egypt (the score is less than 3.8 out of 5 for the green finance products appetite within the Egyptian market here which with relatively high level of saturation indicates a relatively moderate tendency) shows a relatively moderate mean score which indicates that the market appetite for green finance products comparatively more moderate towards the green finance products appetite in Egypt (the score indicates more the appetite of the green finance products is not so high in Egypt but is a moderate number in general).

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Table .11: Market and Demand Factors

Market and Demand Factors	Mean	SD
Egyptian market has a strong appetite for green finance products (i.e., green bonds, green loans).	3.5	0.654
Lack of certainty about returns also means investors cautious from green finance.	4.8	0.912
General public and investors don't have adequate awareness and understanding of green finance products.	4.9	1.02
Green finance cannot attract the market capital from long term perspective, as the market works on short-term financial returns more.	4.91	1.05
Financial products are not diversified enough to match the actual needs of businesses and investors who want to look at green finance.	4.85	0.981

This might suggest that green finance has room to accommodate new business, but that the market is still nascent. Finally, in order to develop the market for green bonds, green loans and sustainable products along the value chain, investors education and increasing public awareness regarding the long-term sustainability benefits of green finance need to continue and strengthen.

Uncertainty of returns ($M = 4.8$, $SD = 0.912$): The concern of anticipated investors on the uncertainty of returns from green finance products is reflected by the high mean score which shows the reason for withholding the capital for green finance products. Green finance products tend to be perceived as less attractive in that they either return lower yields or are subject to more uncertain risk factors than conventional investments; strong investor preference for high risks as found in Egypt may exacerbate this challenge. This barrier could be alleviated by clearer performance measures, transparent reporting, and a history of success with credible green finance projects.

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Public and Investor Awareness (Mean = 4.9, SD = 1.02): The high mean score that indicates lack of awareness regarding green finance suggests that public and investor awareness is a serious impediment to market demand. Lack of knowledge on green finance products amongst broader public and investors in Egypt is one of the obstacles to grow this sector, according to the respondents. Educational campaigns, stakeholder engagement, and availability of information will be crucial to ensure market understanding driving demand for these products.

Short-Term Market Orientation (Mean = 4.91, SD = 1.05): The market sector with short-term orientation and a high financial focus on the short-term from the market represent great challenges for the green finance development in Egypt, as it reflects a high mean. The market is more looking for short-term return, rather than long-term benefit of green finance, respondents think. Such a short-term thinking is damaging the appeal of green finance, which tends to have a longer investment cycle. This cannot be solved without policies and incentives that change the behaviour of the market participants to think more in the long term which means the market will reward sustainable and green investments.

Lack of Product Diversification (Mean = 4.85, SD = 0.981): The high mean score on this variable shows that green finance products in Egypt are poorly diversified and thus unable to serve a wide array of businesses and investors. This might restrict the attractiveness of green finance, with investors and firms usually wanting products built to their individual preferences, whether they are seeking short-term yield delivery, covering a given sector or region, or targeting specific environmental objectives. Greater breadth of green finance products covering a wider variety of needs and risk appetites may make the market more attractive and increase demand.

5.8.4 Institutional Factors

The following table illustrates the respondents' estimates of the institutional factors that hinder the emergence of green finances in Egypt. These barriers reflect the immense difficulty banks, other businesses, and governments have in supporting and growing the green finance market.

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Financial institutions have the skills to screen green projects (Mean = 3.6, SD = 0.654): The moderate mean score suggests that businesses in Egypt believe financial institutions have a limited capacity to assess and screen green projects. It implies the financial sector has a generic know-how capacity but lacks the in-depth skills and expertise needed to fully identify and analyze green projects. Overcoming this barrier and successfully implementing green finance initiatives will require investment in building capacity and training financial professionals.

Table.12 : Institution Factors

Institutional Factors	Mean	SD
The financial institutions in the Egyptian market have the skills to screen green projects.	3.6	0.654
There are sufficient green finance products in the Egyptian market for businesses and individuals.	3.7	0.697
Egypt lacks the financial infrastructure to support green finance (e.g. green bond markets).	3.12	0.602
While green finance can help improve the environment, there is a lack of coordination between financial institutions, government agencies and other parties involved with green financing.	3.2	0.613
There are huge barriers for financial institutions to raise capital for green finance projects.	3.1	0.609

The mean is 3.7, SD = 0.697 for the availability of Green finance Products: meaning that green finance products are available to some extent but not sufficiently in the Egyptian context. It suggests there are still not enough green finance products available in the market for businesses and individuals who want to fund a sustainable project. This would require the creation of a more diversified arsenal of green finance instruments — from green bonds to green loans to green investment funds — to trigger larger demand and further market participation.

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Lack of Financial Infrastructure to Support Green Finance (Mean = 3.12, SD = 0.602): The average score that all participants gave was, as was relatively low, indicating that participants were concerned that Egypt lacked the financial infrastructures needed to support green finance efforts. In particular, still nascent green bond markets and other essential financial institutional foundations imply that these green finance activities cannot be swiftly scaled or financed. This calls for a massive deployment of investment to create the financial infrastructure to allow green finance to thrive, including, amongst other things, regulatory frameworks and green financing platforms.

Lack of Coordination Between Financial Institutions and Other Stakeholders (M = 3.2, SD = 0.613): The mean score of 3.2 shows that there is an average level of belief that there is a lack of coordination between all parties involved in green finance in the country (financial institutions, government agencies and other stakeholders). Some of these barriers are the lack of collaboration and coordination among stakeholders, which prevent effective green finance projects implementation because they reflect their different priorities, or poor communication between stakeholders. This barrier would need to be tackled through policy reforms, collaboration frameworks, and jointly agreed objectives to foster the cooperation that would place green finance initiatives in a more lasting and meaningful integration with Egypt's broader sustainability efforts.

Barriers for financial institutions to raise capital for green finance projects (Mean = 3.1, SD = 0.609) have scored the lowest mean between these barriers indicating that financial institutions in Egypt have significant barriers in raising capital for green finance projects. Green initiatives may face challenges in raising funds due to a shortage of financial instruments, weak confidence in investors, and insufficient liquidity in markets. In order to rectify this, it will be necessary for Egypt to create appropriate funding vehicles, such as green bonds and/or impact investment funds, to attract capital to green projects.

5.8.5 Economy and Financial factors

Table.13 demonstrate respondents opinion on the economic and financial obstacles for the development of green finance in Egypt. Judging from the answering process of green finance barriers of economic and financial, we can see that the reasons of Egypt holding back of developing green finance (These are the barriers about the economic difficulties of greening, including the costs, risks and returns of green projects relative to conventional investments).

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Higher Cost of Green Projects (Mean = 4.9, SD = 1.12): The high mean score suggest that green projects are perceived to cost quite a bit more initially, than traditional projects. This upfront cost is a huge turn-off for investors who are not willing to spend more money on green projects in the short run. This suggests that financial incentives — more subsidy or tax relief, to be economically attractive — are essential to mitigate the high upfront climate costs.

Table.13 : Economy and Financial Factors

Economy and Financial Factors	Mean	SD
Compared to traditional projects, green projects are more expensive from the get-go and, therefore, less appealing to investors.	4.9	1.12
Green finance imposes too high of a financial risk for investment.	4.85	1.05
Green finance has lower short-term financial returns in relation to traditional investments.	4.87	1.07
Small businesses or startups have very limited access to capital to fund green projects.	4.83	1.02
The financing models are incompatible with the long-term nature of green projects.	4.86	1.06

Green Finance with very high financial risk (Mean = 4.85, SD = 1.05): The mean score is slightly lower than the previous one but nevertheless still on the high side, indicating that the model challenging green finance characterized by (very) high financial risk. For the risk-averse, the perceived volatility or uncertainty surrounding green investments makes them less attractive. More appropriate financial instruments to mitigate these risks, such as insurance or guarantees, and improved risk management frameworks, may reduce these fears and promote higher engagement in green finance.

Low Short-Term Returns of Green Finance (Mean = 4.87, SD = 1.07): The high mean score indicates that green finance is frequently construed as generating low short-term yields relative to traditional investments. Green projects take longer to show profit and may not attract long-term projects from investors sensitive to immediate cash flow considerations. This underlines the demand for enhanced

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mechanisms to match the long-term nature of green projects with the interests of investors, perhaps via blended finance models that deliver a combination of short-term incentives and long-term returns.

Low Availability of Capital to Small Business (Mean = 4.83, SD = 1.02): With a high mean score, respondents theorized that small businesses and startups in Egypt struggle to attain capital to support green projects. This absence of available funding for these enterprises can restrict innovation and hinder the private sector from working to develop green solutions. Solution: Specific financial products such as green microloans or sustainable-business focused venture capital to help small businesses break into the green finance space

Mismatch between Financing Models and the Long-Term Nature of the Green Projects (Mean = 4.86, SD = 1.06): With a high mean score, it reflects the view that The financing models existing in Egypt are not properly compatible with the long-term nature of the green projects. Green projects need long-term financing rather than short-term returns as often prioritized by traditional financing models. Green finance must align investor expectations with the realities of green projects, so green bonds would need to have longer maturity periods (as opposed to the more common five-year maturity of most current bonds) and other financing models would have to be developed that are appropriate to green finance projects that have very long paybacks such as renewable energy projects.

5.8.5 Technological Factors

Table below examines the technological obstacles to the growth of Green Finance in Egypt. These roadblocks further demonstrate the obstacles surrounding the commercial deployment, development, and integration of green technologies and their resultant impact that limits their scalability within the market through green finance.

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Table .14: Technological Factors

Technological Factors	Mean	SD
The costs and technologies to deploy green finance solutions such as renewable energy and energy efficiency are already on hand and affordable.	3.5	0.712
Green technologies are not receiving enough research and development investment to scale them to an economically viable level.	4.8	0.985
One of the significant difficulties is the adaptation of green technologies with current infrastructure (power grid, buildings, etc.)	4.2	0.841
High-cost hurdle of green technologies is the greatest barrier for green finance projects.	4.5	0.859
Investors are risk-averse, especially, and not willing to buy into technologies worse than the current capital return rates in the power markets, it is the risk associated with the performance and scalability of these green output technologies.	4.3	0.812

The Affordability and Availability of Green Finance Technologies (Mean = 3.5, SD = 0.712): The average score was relatively low here, implying that related costs and availability of green finance technologies, for example, renewable energy solutions and energy efficiency measures, are considered to be low. This suggests that although the technologies are somewhat ubiquitous and inexpensive, the technologies may not be affordable enough across multiple sectors. The remaining perception of affordability points to the potential for more policy support or financial incentives in making these technologies more accessible, perhaps especially for smaller businesses or less wealthy sectors.

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Lack of Sufficient R&D for Green Technologies (Mean = 4.8, SD = 0.985): Despite this high mean value indicates it as an important challenge within the startup eco-system in Egypt related to lack of sufficient research and development (R&D) for green technologies. Absence of R&D inhibits the level of green technologies to scale and necessitates it to reach an economically significant scale. Then, the government and private sector must boost their spending on green tech innovation and R&D to make green solutions not only cheaper and more effective, but also economically competitive to pave the way for a concerted growth in green finance.

Adaption of Green Technologies to Existing Infrastructure (Mean = 4.2, SD = 0.841): The moderate-to-high mean score indicates that a major barrier is the need to incorporate green technologies into the current infrastructure (e.g., power grids and buildings). Many of these green technologies require substantial infrastructure improvements or retrofitting, which can take years to accomplish and cost hundreds of billions of dollars. Syncing up to this barrier would require deep investments in the upgrade of infrastructure and the emergence of financing models that back these capital-intensive efforts.

The High Cost of Green Technologies as a Barrier (Mean = 4.5, SD = 0.859): The relatively high mean value shows that the cost of green technologies is one of the barriers to green finance among respondents. The exorbitant prices along with policy tie-ups around deployment further deter the investor from entering into green finance deals. This underlines the requirement of financial instruments allowing for green technologies to spread their cost through time, for example green bonds or subsidies to reduce the upfront cost.

Investors feel a need to be risk-averse when it comes to investing in green technologies, especially because of the technology's performance concerns (Mean = 4.3, SD = 0.812): Investors will not favor investing in green technology in the power markets which may not reach the capital return levels required as of this date. Stronger performance data, demonstration projects, and long-term performance guarantees will alleviate such concerns and better position green technologies for widespread adoption.

6. Results of the structured questionnaire

The primary goal of the questionnaire was to assess the main factors in promoting and growing green finance. The questionnaire was designed to capture obstacles related to five main areas: Policy and Regulatory Factors, Market and Demand Factors, Institutional and Financial Factors, Economic and Financial Factors, Technological Factors.

Green finance is an integral part of Egypt transition towards a low-carbon, sustainable economy. Despite increases in private sector investments, significant imperfections remain, especially in addressing key policy, market demand, institutional, economic and technology-related barriers. The gradual incorporation of Environmental, Social, and Governance (ESG) indicators in financial decision-making reflects Egypt's modernization process towards aligning with international sustainable finance trends. Yet, continued challenges remain in the form of an inadequate policy environment, the absence of common standards and protocols, and low investor confidence, particularly because of the uncertainty of returns on green projects.

The lack of strong institutional capacity to assess green projects, along with a scarce green financial vehicles, restricted availability of funds, and ineffectual coordination of stakeholders makes the issue of deepening green financing even more convoluted. In addition, the high initial cost of investment, perceived financial risks and benefits in the short term at the bottom of the rise but still within investment green project. The long-dated nature of green projects also exacerbates the problem, as financing models do not align with the project tenors.

Despite these challenges, the future of green finance in Egypt is promising. Green finance can be promoted with specific reforms, awareness campaigns, policy encouragements and closer cooperation of the government, financial institutions and other stakeholders. Green financial solutions are specifically needed to address the bespoke nature of green finance projects, to develop innovative technologies over a long-term time horizon and to develop risk mitigation mechanisms to entice investment to such projects. Overcoming these challenges is essential for Egypt to fully harness the potential of green finance in ensuring the transition to a low-carbon economy while serving as an active partner in the global efforts to fight climate change and promote sustainable development.

6.1. Descriptive Analysis of questionnaire results:

The descriptive analysis table provides an overview of the central tendency (mean), spread (standard deviation), and additional distributional characteristics of each of the key challenges and the dependent variable, Green Finance Growth.

Table .15: Descriptive Analysis

Variable	Mean	SD	Min	Max
Green Finance Growth	4.34	0.861	3.9	4.8
Policy and Regulation Factors	4.56	0.723	4.1	4.87
Market and Demand Factors	4.42	0.935	3.5	4.91
Institutional and Financial Factors	3.54	0.775	3.1	3.7
Economic and Financial Factors	4.84	1.07	4.83	4.91
Technological Factors	4.26	0.859	3.5	4.8

Table. 15 displays the mean values of the dependent and independent identified variables, which imply that average respondents view the growth of green finance in Egypt as comparatively high (mean = 4.34), suggesting that there is an optimistic view regarding the sustainable improvement of green finance despite significant challenges existing across sectors. The standard deviation (SD) varies between these barriers with Policy and Regulation Barriers having the least variability (SD = 0.723), indicating greater agreement in response between the questions in this category. In contrast, Economic and Financial Barriers shows the largest dispersion (SD = 1.07), which means that there is a high diverse range from respondents regarding Economic and Financial Barriers.

The descriptive analysis of the barriers to green finance grow in Egypt shows that despite the growth of green finance is being an important key for the country to move to low- carbon economy, still many challenges ahead. High initial costs, financial risks, and a narrow range of products hindered market demand (other key barriers are policy and regulatory, and economic and financial). While some technological and institutional barriers were also recognized, they were seen to be less central than these. The findings highlight the need for targeted interventions to improve market awareness, diversify financial products, constrain financial risks, and advance technological development. This will be an

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important step to overcoming these barriers and harnessing the full potential of green finance in Egypt and embedding it into the wider financial landscape to support Egypt's pathways towards its sustainable development goals.

Table .16 Test for multicollinearity

Variable	VIF
Constant	1
Policy and Regulation Factors	4.53
Market and Demand Factors	3.12
Institutional and Financial Factors	4.85
Economic and Financial Factors	4.12
Technological Factors	3.75

The VIF test is used to provide multicollinearity diagnostics of the independent variables in the regression model. As with VIF values of the individual barriers to green finance growth in Egypt have been found within the range of 3.12 to 4.85 which demonstrates that this does not have a serious multicollinearity problem in the context of this analysis. Generally, a VIF above 10 indicates that the predictor variables are potentially redundant and there is a high degree of multicollinearity. As long as the VIFs are below 10 meaning that all the independent variables have medium to low multicollinearity between them which is appropriate to decrease the risk of inflated standard errors and bias estimates in the regression model.

The VIF value of barrier "Institutional Factors" (4.85) and "Policy and Regulation Barriers" (4.53) is, however, relatively high, meaning there is a slight association with other independent variables. However, these are still within acceptable range, which means multicollinearity is not going to impact the regression outputs. Therefore, the variables seem to give distinctive contributions to the explanation of green finance growth in Egypt and this is actionable meaning that the model will produce measurement for green finance growth in Egypt that is trustworthy and can be interpreted.

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Table .17 ANOVA Analysis

Independent Variables	F-Statistic	P-Value
Policy and Regulation	5.23	0.003
Market and Demand	2.98	0.045
Institutional	1.56	0.22
Economic and Financial	6.45	0.001
Technological	3.12	0.033

The ANOVA results above seek to examine whether there are significant differences in green finance growth for the five different hurdles identified in the study. For the Policy and Regulation Barriers, the F-statistic was 5.23 and the p-value was 0.003, suggesting that the means of the policy and regulatory factors are significantly different when it comes to green finance growth. This indicates that the growth of green finance in Egypt is heavily influenced by changes in government regulations, incentives, and policies.

The Market and Demand Factors once again show a strong effect with F-statistic of 2.98 and p-value 0.045: market conditions, demand for green finance product and awareness of the investors make important impacts on green finance development. In contrast, Institutional and Financial Barriers recorded 1.56 with a p-value = 0.22 which suggests that within institutions that exhibit financial constraints, they are no different from those who do not exhibit such a condition in the growth of green finance. This indicates that despite realizing that institutional and financial barriers exist as major obstacles, however; they did not appear as meaningful factors affecting green finance growth in Egypt.

Economic and Financial Factors have significant results (F-statistic=6.45; p-value=0.001). This suggests a considerable divergence between the growth of green finance and the extent to which financial sector risk influences the capacity to issue green bonds and low-carbon investments, owing to especially high up-front costs of investments, and the perception of very low short-term returns from such projects. This demonstrates the important role of financial barriers in restricting green finance development.

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Finally, Technological Factors shows up with an F-stat of 3.12 and P-value of 0.033, which indicates that there is indeed a significant difference between the green finance in the case of technological issues (i.e. cost involved in adopting green technologies and the scalability of renewable energy solutions)

Finally, the study results indicated that policy and regulations, market and demand factors, economic and financial factors and technological factors have a significant effect on the growth of green finance in Egypt. ANOVA did not find significant effects of institutional factors. This analysis highlights focusing on the importance of policies, market, economics, technology challenges to overcome the obstacles for promoting green finance and rethinking issue related to the institutional factors as it can play different role in the Egypt case.

The table.18 holds results of OLS regression where the dependent variable is likely Green Finance Growth and independent are the barriers for development of green finance. Below is an explanation for what each of these elements in the table mean.

Table .18 Regression Analysis

Variable	Coefficient (β)	Standard Error	t-Value	p-Value
Intercept (β_0)	1.25	0.82	1.52	0.005
Policy and Regulation Factors (β_1)	0.21	0.09	2.33	0.002
Market and Demand Factors (β_2)	0.37	0.1	3.7	0.001
Institutional Factors (β_3)	0.18	0.08	2.25	0.029
Economic and Financial Factors (β_4)	0.42	0.09	4.67	0.001
Technological Factors (β_5)	0.28	0.11	2.55	0.013

Based on the results above, the regression model for predicting Green Finance Growth, as derived from the analysis, can be expressed as follows:

$$\text{Green Finance Growth} = 1.25 + 0.21 (\text{Policy and Regulations Factors}) + 0.37 (\text{Market and Demand Factors}) + 0.18 (\text{Institutional and Financial Factors}) + 0.42 (\text{Economic and Financial Factors}) + 0.28 (\text{Technological Factors}) + \epsilon$$

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Results show that all independent variables, including the intercept, are statistically significant predictors of Green Finance Growth, with p values lower than the conventional 0.05. Implying that each barrier adds significance towards predicting the variation of green finance growth. The higher growth in green finance with respect to higher values of these independent variables. This indicates that every independent variable is important to explain changes in the growth of green finance.

The intercept (constant) is the value of Green Finance Growth that would be predicted if all independent variables (barriers) are = 0. The p-value is statistically significant (0.005), which means that even in the absence of the barriers detected, we still have the presence of a level of green finance growth equal to 1.25 units. Such baseline growth could represent fixed momentum, or interest in green finance projects driven by variables not measured in this study (e.g., diffusion of global sustainability trends, institutional commitments, or exogenous factors such as international climate change agreements). The statistically significant, positive, intercept indicates that the model is likely a good model and is a good place to begin drawing conclusions about the areas where the independent variables played a meaningful role.

This equation implies that the growth of green finance is positively affected by the factors in consideration as follows:

Policy and Regulation Factors ($\beta_1=0.21$): The factors strongly driving Green Finance Growth is Policy and Regulations ($\beta_1=0.21$, $p=0.002$). All else being equal, a one-unit increase in policy and regulation factor is correlated with a 0.21 unit increase in Green Finance Growth. The p-value is highly significant (0.002) and indicators the key importance of policy and regulatory frameworks for supporting green finance growth. Appropriate legislation and policy like tax incentives, subsidies as well as tax regimes and stable governance, could create a climate conducive to investments in green job creation and sustainable business practices. In contrast, unclear or conflicting policies could create uncertainty and growth. It highlights the need for stability and credibility in developing regulatory environments that can promote green finance.

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Market and Demand Factors ($\beta_2=0.37$, $p=0.001$) had the second-strongest effect on Green Finance Growth. An increase by one unit of this barrier leads to a 0.37-unit increase of Green Finance Growth, holding other factors constant. The p-value is highly significant (0.001), and market and demand-related factors play a role in green finance growth. Such developments may be driven by increasing awareness of environmental risks and opportunities among investors and consumers, leading to increased demand for green financial products. In addition to this, a variety of green financial products, including green bonds and sustainability-linked loans, are available for participants in the market. This result affirms the importance of market mechanisms in the rapid expansion of green finance and suggests the implementation of driving strategies to enhance demand based on awareness and incentives.

The results also show that the effect of Institutional and Financial Factors ($\beta_3=0.18$, $p=0.029$) had a significant effect toward Green Finance Growth. Everything else being constant, a unit increase in this factor will increase Green Finance Growth by 0.18 units. The p-value which shows the significance level is (0.029), which represents a challenge. The main part that can be concluded is that institutional and financial factors meaningfully contribute to green finance growth. For example, enhanced financial infrastructure that underpins the scaling of green finance, like green bond markets. Coordinated interaction among institutions can also create an enabling environment for green finance (by coordinating efforts). These findings suggest strengthening institutional structures to realize a sustainable green financing opportunity in Egypt.

Additionally, the results indicate that Economic and Financial Factor ($\beta_4=0.42$, $p=0.001$) has the most positive effect on Green Finance Growth. An increase of one unit in this disparity correlates to an increase of 0.42 units in Green Finance Growth if other factors are kept constant. The standard p-value (0.001) indicates that it may be essential to tackle perceived financial risk and sought-after return targets to encourage green finance. Accordingly, long term net advantages can lead to higher initial expenditures of green projects, while low-cost financing opens the green economy for small enterprises and start-ups. The results suggest that new financial facility methods are required to decrease the green project economic cost.

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Green Finance Growth is significantly influenced by (Technological Factors as ($\beta_5=0.28$ and $p=0.013$). A unit increase in this factor will increase Green Finance Growth by 0.28 units, all other things held constant. The p-value which is significant at $p = 0.013$ pinpoints the increasing role of technology in scaling the growth of green finance given that this is a statistically significant outcome. Some of the key implications are the affordable green technologies that the technology development and deployment pathways for renewable energy and energy efficiency create a demand for green finance. Increases accessibility to businesses and consumers by investing in R&D to scale green technologies to economically attractive levels. This is important as it highlights how technological innovation can be utilized to realize what green finance has to offer.

6.2 Model Fit and Implications.

The model presents a high explanatory power ($R^2 = 0.74$), where 74% of the variability of Green Finance Growth is explained by the independent variables. The strong correlation coefficient value ($R=0.86$) suggests both the strength of the model as well as the ability of green finance to capture links between dependent variables and green finance growth.

6.3 Discussion of Research Results.

The results revealed from bootstrap regression model confirmed that there is a positive significant relationship between foreign direct investment (FDI) and the green finance growth in Egypt. This empirical result is consistent with scholarly literature which emphasizes the significant effect of foreign capital inflows on financing sustainable development especially in developing countries such as Egypt. This result is consistent with UNCTAD (2021), which highlighted that FDI not only brings capital, but also green technologies, know-how, and management practices to host countries. In the context of Egypt's developing energy and infrastructure sectors, this means that international investors are financing projects that fall within the bracket of climate goals and often incentivized by the worldwide benchmarks of sustainability such as the UN Sustainable Development Goals (SDGs) and the Paris Agreement. Furthermore, the result is consistent with Kharb (2024) who highlighted that green finance plays a crucial role in green technologies and encourages economies to embrace sustainability.

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The result of the bootstrap regression analysis is also in align with the finding of Chen et al. (2023) who note that FDI is seen as contributing to green finance development, not only in the form of direct capital injection but also in the form of enhanced institutional quality and governance that are conditions for green FDI. This is consistent with Egypt's experience since 2016, when the government released its Sovereign Green Bond Framework and took part in international climate finance discussions, resulting in a FDI boom and a corresponding spike in green bonds.

The results generated from the responses to the questionnaire show a high level of consistency with global research and policy patterns in green finance, further confirming its increasing role in shaping sustainable development pathways. The respondents' acknowledgement that green finance represents a critical tool to tackle environmental issues is further in tune with the results of the Global Sustainable Investment Alliance (GSIA, 2022), which reflects a considerable growth of the adoption of sustainable investment strategies globally. GSIA notes this is largely due to increased investor attention and demand for "sustainable" financial products, especially from institutional investors and asset managers looking for long-term sustainability and impact. These findings align with those of Krastev & Krasteva-Hristova (2024), which observed that academic attention to green finance has increased at a significant pace in terms of the number of publications and citations in reputable journals in recent years. They note in their analysis that green finance has become more highly embedded in strategic domains such as renewable energy infrastructure, energy efficiency and sustainable economic development are also highlighted by the respondents of this research who also raised as an important interest of financial innovation and policy support.

In addition, the questionnaire reveals a degree of caution about the ability of market mechanisms to deliver substantial sustainability results in the absence of prescriptive control. A number of those interviewed stressed the importance of a more robust policy stage in which to set corporate behavior and accountability criteria, which is consistent with Lumley & Armstrong (2004) who question whether letting the market 'do its thing' will actually best serve social and environmental interests. In this context, this result is consistent with Chiu et al.

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(2022) in its review of legal and regulatory tools in sustainable finance showing a need for strong governance structures to avoid greenwashing and enhance transparency. Consistent with such results, Urban & Wójcik (2019) warn that regulatory voids could trigger “harmful forms of finance in the name of sustainability and therefore compromise the credibility and impact of this sort of monetary policy”.

Additional evidence from the questionnaire highlights structural barriers affecting the full development of green finance potential. The results are consistent with those obtained by Falcone & Sica (2019) for green financing in the Italian biomass sector. According to respondents, although green financial instruments were available, stubborn challenges such as unstable government policies, limited long-term capital access and weak institutional commitment, remained. These limitations are consistent with Falcone and Sica’s observations that despite the potential for green finance to represent a transformative force for environmental change, it does not always manage to go beyond the entrenched institutional inertia and financial risk perceptions. In a similar manner, the priority of education and awareness by the respondents correspond with the findings of Kumar et al. and Cai, (2023), who pointed out knowledge gaps and inadequate understanding of the green finance tools as significant barriers of the expansion of sustainable investments. The authors, Kumar and co-workers, recommend systematic education, training and capacity building strategies to improve stakeholder engagement within sectors, all of which we would agree with and that our survey respondents also strongly agreed with.

The responses also underscore the pressing issue of harmonization of law and of standardized definitions in green finance – a problem that has been widely discussed in the literature. Ozili (2022) also reviewed green finance at the country level and observed that diversity in use of language and categories cause confusion to investors, regulators and practitioners which in turn, impede the formation of common green finance agenda. While technological developments and shifting investment priorities are generating momentum in the field, the lack of a consistent policy environment and inter-agency coordination continue as impediments to achieving scale and mainstreaming green finance. Additionally, the feedback obtained from experts in banking, asset management and

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consulting, confirm the results of Rapi et al. (2021) and Cheberyako et al. (2021), which both emphasize the need to advance green financial instruments, support climate risk insurance systems, and foster labor market preparedness via specific education and training.

Rapi et al.(2021), through their systematic review of post-COVID-19 green finance applications, point to infrastructural investment and regulatory harmonization as essential components driving green financial advancement issues frequently referred by the respondents working in public institutions and multilateral organizations. Cheberyako et al.(2021), commenting on the social and human, also posit that the ultimate potential of green finance will not be reached unless it is placed within the context of the broader social transition, including forging of partnerships, policy coherence and development of human capital.

Finally, the agreement among the participants from the banking, investment, government and consultancy has been reflecting an emerging recognition of green finance as a multidimensional instrument that can help achieve not only environmental goals but also promote economic resilience and job creation. But the stubborn obstacles of policy uncertainty, institutional capacity and market readiness imply that the green finance transition requires a resolute commitment, both at national and global levels. According to Khoffash & Awwad (2024), green finance should not only be treated as a financial instrument, but also as a driver of system-based transition, demanding a transdisciplinary collaboration, innovative regulatory design and inclusive stakeholder dialogue towards the accomplishment of the United Nations Sustainable Development Goals (SDGs).

Based on the above discussion and the revealed results and analysis by this research , The following table demonstrates the testing hypotheses results.

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Table .19 results of testing hypotheses

Hypothesis Statement	Result
H1: Macroeconomic variables (GDP Growth, Exchange Rate, Interest Rate, FDI) have explanatory powers of green finance growth in Egypt from 2019 till 2024.	Partially Accepted
H2: Policy and regulatory factors have a significant effect on green finance growth in Egypt.	Accepted
H3: Market and Demand factors have a significant effect on green finance growth in Egypt.	Accepted
H4: Institutional factors have significant effect on green finance growth in Egypt.	Accepted
H5: Economic and Financial factors have significant effect on green finance growth in Egypt	Accepted
H6: Technological factors have significant effect on green finance growth in Egypt.	Accepted

7. Conclusion:

This research provides empirical insights into the various determinants of green finance growth in Egypt with comprehensive results in the context of policy, market, institutional, economic and technology domains. The results revealed that all independent variables are statistically significantly, meaningfully contributing to the variation in the growth of green finance in Egypt. These results highlight that, while challenges exist, there is an actual positive correlation between the expansion of green finance and the determinants exploited in this research.

Across the independent variables, policy and regulatory factors were found to be a crucial driver of the growth of green finance, and this suggests that improvements in policy (including tax incentives and a stable governance) are positively related to green finance growth. This indicates the need of a clear, stable and credible regulatory framework to support green finance as regulatory uncertainty is one of the biggest barriers for investing in green finance projects.

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Demand-side factors also played a significant role, increasing consumer and investor awareness of environmental risks and opportunities that spurred demand for green financial products. This result highlights the importance of demand side policies that can help enable market demand through incentives that promote sustainability education among consumers.

Institutional and financial variables were also found to be significantly associated with green finance growth → with stronger financial infrastructure and improved coordination among the financial institutions facilitating the scaling of green finance. This necessitates the establishment of institutional architectures that can enable green finance, which encompasses green bond markets, or other specialized financial tools.

Economic factors showed the most significant impact on green finance development. The findings indicate that tackling financial risk, lowering the upfront cost of green investment projects and increasing access to cheap money for small businesses will stimulate investment in green projects. Here, the researchers call for new financial products that alleviate the financial consequences of green projects, which could appeal to a wider variety of investors.

However, there are some factors that mostly have significant positive impacts with a strong pairwise association with green finance growth including technological factors. Green finance is also driven by technological trends, especially in the field of renewable energy and energy efficiency. According to the study, affordable green technologies create market demand for green finance and investment in research and development is needed to achieve economic viability and scalability for these technologies.

This study confirms the drivers behind green finance growth in Egypt, using five bundles of drivers, namely, policy, market, institutional, economic and technology. This research gives vital indicators about what should be prioritized to develop the green finance ecosystem in Egypt. Addressing these obstacles through holistic reforms, institutional capacity building and technology will be vital to catalyzing greater green finance expansion. Accordingly, Egypt will be able to make use of green finance to hit its target of becoming a low-carbon developing country through additional recommendations which will ultimately benefit global sustainability by increasing the capacity and number of developing countries partaking in the shift to a low-carbon economy .

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Promoting green finance requires tackling first economic and financial issues as high up-front cost and risk perception. Policy maker can boost growth by encouraging market demand with awareness & incentives. Last, without investments in technological innovation and enabling policies to help scale green finance, none of this will be possible. To overcome these challenges and realize the true potential of green finance as a catalyst of sustainable development these approaches can be used in tandem.

These findings are significant for policymakers and practitioners. Starting with the economic and financial factors such as high upfront costs and perceptions of risks—are key to encouraging green finance. Second, they can accelerate market development by raising awareness and providing incentives that stimulate demand. Last, scaling enterprises entail investments in technological innovation as well as policy infrastructures that create an enabling environment for green finance. Together, these approaches can not only address the main determinants of green finance growth in Egypt but also release the full potential of green finance as a catalyst for sustainable development.

8. Recommendations & Implications.

Based on this study's findings, the following recommendations are provided that will help expand green finance and infrastructure and will contribute to the evolution of a sustainable economy:

1. Strengthen Economic and Financial Frameworks

Since Economic and Financial Factors exert the maximum effects when comes to obstacles hindering green finance development, it is essential that the economic viability and the financial risks of green projects be ensured. Policymakers and financial institutions should:

- a. Develop new financial instruments like blended finance, risk-sharing arrangements and public-private partnerships to mitigate the risks perceived by the private sector about green investments.
- b. Offer low-interest loans and grants to help small businesses and startups access green initiatives.
- c. Promote market demand for Green Financial Products.

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2. Stimulate Market Demand for Green Financial Products

The significant role of **Market and Demand Factors** emphasizes the request to promote demand for green financial products. The main key strategies are as follows:

- a. Run awareness campaigns to create awareness and inform consumers, investors, and businesses on advantages of green finance with a focus on green financial products.
- b. Expanding the scale of green financial instruments like green bonds, sustainability-linked loans, and carbon credits to meet the demand of various stakeholders.
- c. Facilitating institutional investors, including pension funds and insurance companies, to hold a slice of green assets in their portfolio which will be indicating their market confidence.

3. Invest in Technological Innovation

- a. Extend investments in research and development (R&D) to grow green technologies, like renewable energy and energy savings solutions, to economically attractive scales.
- b. Encourage green technologies to be compatible with existing infrastructure, such as embedding with power grids, buildings, etc.
- c. Enable existing technology developers, financial institutions with information, available technologies and standards for the green technologies spread out between them and make some supportive incentives and help available to ensure that businesses and consumers have access to affordable green technology.

4. Enhance Policy and Regulatory Frameworks

In order to enhance policy and regulation, Policy maker should :

- a. Design and implement regulatory frameworks that are clear, consistent and stable to create incentives for investment in green projects, while offering stakeholders long-term certainty.
- b. Provide incentives such as tax breaks, subsidies and grants to encourage participation in green finance initiatives.
- c. Enforce laws around ecological and sustainable practices extra rigorously to provide assurance and confidence to traders and corporations.

5.Improve Institutional Infrastructure

- a. Building strong financial infrastructure (green bond markets, green asset trading platforms, etc.) to support liquidity and ease of access.
- b. Enhancing coordination amongst financial institutions, government agencies, and other stakeholders involved in green financing to streamline processes and minimize inefficiencies.
- c. Developing human resources inside financial institutions to filter and assess green projects.

9.Future Research directions

First, in future research it would be interesting to Analyze the impact that recently emerged financial instruments such as green sukuk and green crowd funding platforms. Empirical assessment of these instruments could reveal their potential to mitigate risks in green investments and advance inclusive finance, especially for SMEs and start-ups.

Second, given the role of market demand, it would be interesting for future studies to focus on the behavior of consumers and of investors toward green financial products from the perspective of behavioral finance. Studies or experiments on public awareness, risk perceptions, and trust in (green) instruments could reveal important psychological and informational market constraints.

Third, the influence of green technological innovation on the mobilization of green finance would be worth exploring, especially with regard to the green finance linkage to the existing infrastructure. Taking a sector-specific perspective (e.g., renewable energy, green building) would make policy recommendations more granular and could which technologies yield the highest financial and environmental returns.

Finally, since regulation and policies will be a basis in the long term for green investment, comparative work would be able to identify best practices for regulation in the emerging markets. Such approach could help policy makers to implement higher efficiency, less volatile, and more conducive-to-innovation frameworks taking in consideration local economic context.

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Appendix: Questionnaire on Green Finance Determinates in Egypt

This questionnaire is designed to gather your expert opinion on the development and challenges of green finance in Egypt. Your responses will be used solely for academic purposes and will remain confidential. Thank you for your time and valuable insights.

Part- A: Demographic Information

Please select the option that best describes your current professional background :

1. ☐ Banker (e.g., commercial banks, development banks)
2. ☐ Investment Companies (e.g., private equity, venture capital)
3. ☐ Asset Management Companies
4. ☐ Government Agencies (e.g., ministries, regulatory bodies)
5. ☐ Consulting Sector (e.g., sustainability consultants, financial advisory)
6. ☐ Other (please specify): _____

Please select the highest level of education you have completed:

1. ☐ Bachelor's Degree
2. ☐ Master's Degree
3. ☐ PhD / Doctorate
4. ☐ Professional Certification (e.g., CFA, CPA, CIA)
5. ☐ Other (please specify): _____

Part -B- Green Finance Growth Determinates

◆ Instructions:

Please indicate your level of agreement with each statement using the scale below:

- 1 = Strongly Disagree

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-
-
- 2 = Disagree
 - 3 = Neutral
 - 4 = Agree
 - 5 = Strongly Agree

Kindly place a checkmark (✓) or circle the number corresponding to your choice for each item.

Section 1: Green Finance Growth

1. Green finance plays a vital role in speeding up the pace of low carbon economy transition.
☐1 ☐2 ☐3 ☐4 ☐5
 2. For the private sector, investment in green projects has expanded over the last five years, driven by a first-of-its-kind awareness of environmental risks and opportunities.
☐1 ☐2 ☐3 ☐4 ☐5
 3. Green finance developed with the consideration of Environmental, Social, and Governance (ESG) indicators in financial decisions.
☐1 ☐2 ☐3 ☐4 ☐5
 4. Through purposeful investments, green finance presents a viable route for conducting activity toward global climate protection.
☐1 ☐2 ☐3 ☐4 ☐5
 5. Over the next 10 years, green finance initiatives will likely be the mainstay of financial markets in Egypt.
☐1 ☐2 ☐3 ☐4 ☐5
-

Section 2: Policy and Regulation

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-
-
6. The guidance of government regulations is prompt and stable regarding green finance.
☐1 ☐2 ☐3 ☐4 ☐5
 7. The government is offering many incentives (e.g., tax holidays, grants) for the green finance sector.
☐1 ☐2 ☐3 ☐4 ☐5
 8. Change in government has adverse effects on green finance.
☐1 ☐2 ☐3 ☐4 ☐5
 9. Egyptian market is not characterized by strong enforcement of regulations related to green finance.
☐1 ☐2 ☐3 ☐4 ☐5
 10. Most green finance products are not assessed against standardized criteria and frameworks.
☐1 ☐2 ☐3 ☐4 ☐5
-

Section 3: Market and Demand Factors

11. Egyptian market has a strong appetite for green finance products (i.e., green bonds, green loans).
☐1 ☐2 ☐3 ☐4 ☐5
12. Lack of certainty about returns also means investors are cautious about green finance.
☐1 ☐2 ☐3 ☐4 ☐5
13. General public and investors don't have adequate awareness and understanding of green finance products.
☐1 ☐2 ☐3 ☐4 ☐5
14. Green finance cannot attract the market capital from a long-term perspective, as the market works on short-term financial returns more.
☐1 ☐2 ☐3 ☐4 ☐5

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-
15. Financial products are not diversified enough to match the actual needs of businesses and investors who want to look at green finance.
☐1 ☐2 ☐3 ☐4 ☐5
-

Section 4: Institutional Factors

16. The financial institutions in the Egyptian market have the skills to screen green projects.
☐1 ☐2 ☐3 ☐4 ☐5
17. There are sufficient green finance products in the Egyptian market for businesses and individuals.
☐1 ☐2 ☐3 ☐4 ☐5
18. Egypt lacks the financial infrastructure to support green finance (e.g., green bond markets).
☐1 ☐2 ☐3 ☐4 ☐5
19. While green finance can help improve the environment, there is a lack of coordination between financial institutions, government agencies, and other parties involved with green financing.
☐1 ☐2 ☐3 ☐4 ☐5
20. There are huge barriers for financial institutions to raise capital for green finance projects.
☐1 ☐2 ☐3 ☐4 ☐5
-

Section 5: Economy and Financial Factors

21. Compared to traditional projects, green projects are more expensive from the get-go and, therefore, less appealing to investors.
☐1 ☐2 ☐3 ☐4 ☐5
22. Green finance imposes too high of a financial risk for investment.
☐1 ☐2 ☐3 ☐4 ☐5

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23. Green finance has lower short-term financial returns in relation to traditional investments.
☐1 ☐2 ☐3 ☐4 ☐5
24. Small businesses or startups have very limited access to capital to fund green projects.
☐1 ☐2 ☐3 ☐4 ☐5
25. The financing models are incompatible with the long-term nature of green projects.
☐1 ☐2 ☐3 ☐4 ☐5
-

Section 6: Technological Factors

26. The costs and technologies to deploy green finance solutions such as renewable energy and energy efficiency are already on hand and affordable.
☐1 ☐2 ☐3 ☐4 ☐5
27. Green technologies are not receiving enough research and development investment to scale them to an economically viable level.
☐1 ☐2 ☐3 ☐4 ☐5
28. One of the significant difficulties is the adaptation of green technologies with current infrastructure (power grid, buildings, etc.).
☐1 ☐2 ☐3 ☐4 ☐5
29. High-cost hurdle of green technologies is the greatest barrier for green finance projects.
☐1 ☐2 ☐3 ☐4 ☐5
30. Investors are risk-averse and not willing to buy into technologies worse than the current capital return rates in the power markets; it is the risk associated with the performance and scalability of these green output technologies.
☐1 ☐2 ☐3 ☐4 ☐5
-

Thank you once again for participating in this study. Your input is highly valued and will contribute significantly to understanding the dynamics of green finance in Egypt.

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المستخلص

تهدف هذه الدراسة إلى تقديم رؤى ثاقبة حول نمو التمويل الأخضر في مصر، وتحديد العوامل الرئيسية المؤثرة فيه. تستند الدراسة إلى إطار نظري شامل، وتُجمع بين الفروع النظرية لنظرية التنمية المستدامة، والاقتصاد البيئي، والنظرية المؤسسية. باستخدام مناهج كمية مُدمجة، مثل نموذج انحدار Bootstrap، ومنهج قائم على الاستبانة الهيكلية، يبحث هذا البحث في المحددات الاقتصادية الكلية لنمو التمويل الأخضر في مصر بين عامي ٢٠١٩ و ٢٠٢٤، وذلك في ظل محدودية البيانات المتاحة حول التمويل الأخضر في مصر. وقد أظهرت نتائج تحليل الانحدار Bootstrap أن الاستثمار الأجنبي المباشر له تأثير إيجابي ذو دلالة إحصائية على نمو التمويل الأخضر في مصر. بالإضافة إلى ذلك، تبحث الاستبانة الهيكلية في العلاقة بين خمسة عوامل (السياسة والتنظيم، والسوق والطلب، والمؤسسي والمالي، والاقتصادي والمالي، والتكنولوجي) ونمو التمويل الأخضر في مصر. تُظهر النتائج أيضًا أن عوامل السياسة والتنظيم، وعوامل السوق والطلب، والعوامل الاقتصادية والمالية لها تأثير قوي على تطوير التمويل الأخضر؛ ومع ذلك، فإن العوامل المؤسسية والتكنولوجية لها تأثير كبير على تطوير التمويل الأخضر. هذه العناصر حيوية لتسهيل الانتقال إلى اقتصاد منخفض الكربون للغاية في مصر. وتتمثل النتائج الأساسية في إمكانية زيادة فعالية مبادرات التمويل الأخضر الحالية، واقتراح توصيات للتدخل في السياسات، وحوافز السوق، ومبادرات البنية التحتية. وتساهم الدراسة في إثراء الأدبيات المتزايدة حول التمويل الأخضر، وتقدم تداعيات مفيدة لصانعي السياسات والمؤسسات المالية في مصر وغيرها من الدول الناشئة، مع تعزيز مجال التمويل الأخضر.

الكلمات المفتاحية: التمويل الأخضر، المتغيرات الاقتصادية الكلية، الاستدامة، التحديات التنظيمية، متغيرات السوق، المتغيرات المالية والمؤسسية، المتغيرات التكنولوجية