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MASTER THESIS

FINANSINIŲ TECHNOLOGIJŲ POVEIKIO TVARIAM VYSTYMUISI VERTINIMAS	**FINTECH FOR SUSTAINABLE DEVELOPMENT: ASSESSING ITS IMPLICATIONS**

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GLOSSARY

1. **FinTech (Financial Technology):** Digitalization, connectivity, and automation of financial services and products in terms of digital payments, robo-advice, and blockchain.

2. **Sustainable Development:** Growth that ensures existing needs can be sustainably met without exhausting natural resources and promoting social, economic, and accountability.

3. **Nairobi Stock Exchange (NSE):** The existing market in Kenya where investors can trade in shares, bonds and other securities.

4. **Robo-Advisory:** A fully-automated and algorithm-driven service that offers advice on financial investments and other financial products.

5. **Blockchain Technology:** An open distributed general ledger that enables record-keeping and confirms transactions with efficiency and credibility.

6. **Digital Payment Platforms:** Mobile money and e-wallet applications involved in electronic transactions and payments.

7. **Sustainable Finance:** Portfolio management approaches that consider broader sustainability factors such as environmental, social and governance factors.

8. **Environmental Sustainability:** Efforts to minimize effects on the environment and to maintain the earth's resources for future generations.

9. **Social Sustainability:** Promoting social justice, advancement in the standard of living, and meeting community needs through financial management.

10. **Economic Sustainability:** Consequently, long-term sustainable economic development that considers resource consumption and sound financial state.

LIST OF ABBREVIATIONS AND ACRONYMS

FinTech: Financial Technology

NSE: Nairobi Stock Exchange

ESG: Environmental, Social, and Governance

GDP: Gross Domestic Product

AI: Artificial Intelligence

SDGs: Sustainable Development Goals

UNEP: United Nations Environment Programme

INTRODUCTION

FinTech has established itself as a disruptive innovation in the global financial landscape by providing solutions that incorporate technology and financial services to deliver improved effectiveness, accessibility and sustainability of such services (Arner et al., 2020). NSE was established in the year 1954 and has a great importance to the economic growth of Kenya through mobilization of capital and investment. In this regard, as the financial industry moves forward, the integration of FinTech into the NSE and other institutions is crucial to the progress of the SDGs in terms of access to financial services, economy growth, and environmental protection (Mhlanga, 2024).

However, the direct effects of FinTech on the idea remain uncertain, particularly in developing settings like Kenya despite recent developments. In the future, it is necessary to focus on the research of the interaction of FinTech solutions such as digital payments, robo advisory applications, and blockchain technology with their social, economic, and environmental effects (Bayram et al., 2022; Hoang et al., 2022). Therefore, since the NSE has been highly important to the growth of the economy of the country in the past and occupies a significant position in terms of investment in the present, the opportunity to identify the role of FinTech in the attainment of sustainable development should not be ignored. Therefore, challenging this perspective and recognizing FinTech as part of the solution rather than contributing to the problem, this research aims to reduce the knowledge gap and enrich the discourse on FinTech and sustainability.

Scholars have widely discussed fintech and its impact on the achievement of sustainable development goals which indicates that there is a wide range of exploratory depth in regards to this subject across different contexts. Internationally, Arner et al. (2020) and Micaroni have established that fintech unlocks access to financial services and promotes green finance, placing particular stress on tackling climate change. At the country level, Ali (2023) and Njogu (2020) have also analyzed the effects of Fintech with respect to financial inclusion in the Kenyan context and has thus brought to light the positive influences in the extent of financial access. Building on this, Ahmed (2021) takes this further by reviewing gender insights within the African fintech environment, whereas Hakizimana, Muathe, and Muraguri (2021) examine the innovation processes of fintech startups. Nevertheless, there are still research limitations regarding the

concrete projection of fintech's activities for sustainability within mainstream financial markets such as the NSE (Pawłowska, Staniszewska, & Grzelak, 2022). Other works such as Bayram et al. (2022) and Zhou et al. (2022) discuss fintech in the context of green finance and economic sustainability but fail to elaborate how these concepts relate to the Kenyan capital markets deeper. Thus, these scholarly works show that there is a growing interest in the subject but at the same time, indicate that it can be classified as a field with room for more research.

This Master's thesis is particularly valuable in the existing body of knowledge since it is placed within a relatively unexamined context – the analysis of the role of fintech in the Nairobi Stock Exchange in supporting sustainable development. As much as global studies by Puschmann, Hoffmann, and Khmarskyi (2020) and Hwang, Park, and Shin (2021) investigate the link between fintech and environmental sustainability, this thesis synthesizes such insights within the context of the African capital market. Further, the research combines the theoretical framework, like green fintech and SDGs linkage by Shala & Berisha (2024), with the more specific Kenyan context, as gaps noted in Chomba (2021) and Mwangi (2020). The utilization of outstanding approaches such as big data analysis and the analysis of stakeholder engagement frameworks improves the external validity of the conclusions (Ignatyuk et al. 2020; Ogutu 2024). In addition, by exploring the effects of regulation on fintech's outcomes, this study offers guidelines for governments, filling the gaps in the literature left by previous studies by Tamasiga, Onyeaka, and Ouassou (2022). So, the thesis contributes to building scientific knowledge by applying global findings to a specific context, providing new information and recommendations for implementing fintech to promote sustainable financial development at the NSE.

The study raises the critical question, "In what ways do robo-advisory services, digital payment platforms, and Blockchain technology enhance the sustainable development of the NSE ecosystem?" This issue is linked to the growing popularity of fintech solutions worldwide and the need to assess their impact on emerging markets in terms of increasing financial access, transparency, and sustainability, (Ahmed 2021, Arner *et al.* 2020). Reports suggests that the FinTech industry in Kenya has been growing at over 25% per anum since the year 2020 and especially in capital markets (Mugo, 2023). However, some areas have not been covered in the showing of these technologies alongside with the sustainable development goals (SDGs) in the local stock exchange setting.

The aim of this Master's thesis is to critically analyze the impact of FinTech innovations including robo-advisory services, digital payment platforms, and blockchain technology on sustainable development within the Nairobi Securities Exchange (NSE). As the global economy faces various challenges, such as economic instability, environmental pollution, and social inequality, FinTech offers the means to incorporate EES goals into the activities of financial markets.

The thesis is structured around three primary objectives:

1. To evaluate the role of Robo-Advisory Services in democratizing access to investment opportunities and enhancing financial literacy among participants in the NSE.
2. To assess how Digital Payment Solutions improve operational efficiency, financial inclusion, and the overall accessibility of the NSE ecosystem.
3. To determine the extent to which Blockchain Technology fosters market transparency, reduces transaction costs, and ensures environmentally sustainable operations in the NSE

These objectives were attained using systematic literature review (SLR) method where articles and other sources of data were screened, collected, and assessed from concept, theory, and empirical literature only. This enabled development of specific research questions and a systematic way of making sense of the evidence.

The Study was therefore guided by the following Hypotheses

1. **H_{01}** Robo-advisory services have no significant impact on democratizing access to investment opportunities and enhancing financial literacy among participants in the NSE.
2. **H_{02}** Digital payment solutions do not significantly improve operational efficiency, financial inclusion, or the overall accessibility of the NSE ecosystem.
3. **H_{03}** Blockchain technology does not significantly foster market transparency, reduce transaction costs, or ensure environmentally sustainable operations in the NSE.

The thesis employs a mixed-methods approach, integrating both qualitative and quantitative techniques to achieve its objectives. A systematic review of scientific literature forms the basis for understanding FinTech's theoretical and practical implications. Studies such as those by Baltgailis and Simakhova (2022) provide insights into technological innovations that stabilize financial systems, particularly during crises. Surveying NSE listed firms and FinTech stakeholders to assess the applicability of the examined technologies also involved analysis of data collected

from the companies. Similar techniques are used by Bayram et al. (2022) to discuss the role of FinTech in sustainability and sustainable finance in Turkey. Modern mathematics and analytics software is employed to examine and model patterns and interconnections, as well as the effects of FinTech solutions on the SDG agenda. Wekesa (2023) emphasizes the role of data in analyzing the effects of technological solutions on financial performance in the context of Kenya.

The thesis comprises Three key sections: literature examining the view of different scholars in relation to the study topic. Methodology is defined as the approach used in the studies to gather and analyze data and in measuring the effectiveness of FinTech solutions, it concerns itself with the reliability and validity of the findings. Finally, empirical analysis of the results offer insights into the effects of robo-advisory services and digital payment platforms for sustainable development and implications of the blockchain. Organized using cases and statistics for a holistic comprehension of the subject matter.

1. THEORITICAL AND EMPIRICAL REVIEW OF THE IMPACT OF FINTECH FOR SUSTAINABLE DEVELOPMENT

In this thesis, a review of literature explores the changing dynamics of FinTech innovations, in the form of robo-advisory services, digital payment systems, and blockchain, in supporting sustainable development within the Nairobi Securities Exchange (NSE). This literature review is designed to provide the author with an overview of the current trends, arguments, and knowledge gaps regarding the use of financial technologies to advance the process of sustainable development. Several trends emerge from the review: the importance of democratizing access to investment through robo-advisory services, the role of FinTech in achieving financial inclusion through digital payment solutions, the advantage of using blockchain to address issues of market transparency and opacity in context to Kenyan emerging markets, the social issues of FinTech and its integration, potential environmental implications of the use of FinTech concepts and the urgent need for compliance and regulatory governance on FinTech and its impact. Consequently, this chapter seeks to fill these gaps through reviewing the conceptual frameworks and scholarly literature on these technologies in order to give a systematic and informed examination of how the advancements in these technologies can facilitate the improvement of the execution of the financial markets and foster economic sustainability in the sustainable development context.

These objectives were attained using systematic literature review (SLR) method where articles and other source of data were screened, collected, and assessed from concept, theory, and empirical literature only. This enabled development of specific research questions and a systematic way of making sense of the evidence. The review was in several phases in which the initial one involved conducting a search for papers using tools such as Google Scholar, and Google Search Engine. Specifically, these platforms were selected because they offer a way to get direct access to a vast number of articles that can be of academic interest. Thus, only articles published in Peer-reviewed journals from the beginning of 2020 till 2024 were selected to make a focus on the up-to-date information and its high quality. Of these, 54 articles were finally utilised for the study after applying various filters. Using this SLR approach enabled us to compile a vast pool of information on FinTech and sustainability and ensure that the study goals and objectives are achieved with the best available contemporary knowledge.

Table 1

Search Keywords and Results

Search Keywords	Total Results Found	Peer Reviewed
FinTech and sustainable development	310	90
Robo-advisory and financial inclusion	220	70
Digital payment platforms and economic growth	380	120
Blockchain technology in finance	280	95
Green finance and FinTech	240	85
Blockchain for environmental sustainability	150	50
Financial inclusion through FinTech	270	100
Total	**1, 860**	**510**

Source: Researcher, (2024)

The systematic literature review approach is beneficial for making an organized attempt to incorporate all the available information regarding sustainable financial technologies. Specifying that only articles published between 2020 and 2024 and sourced from peer-reviewed journals were to be included in the study, this approach laid a sound methodological groundwork to meet the research objectives.

1.1. Theoretical Review

The Diffusion of Innovations Theory (Rogers, 1962) and the Triple Bottom Line (TBL) Theory (Elkington, 1994) offer complementary perspectives for analyzing the adoption of FinTech innovations in the Nairobi Securities Exchange (NSE) and their implications for sustainable development. Rogers' theory explains the factors influencing the adoption rate of innovations such as robo-advisory, digital payment platforms, and blockchain, providing insight into their scalability and market penetration in Kenya's capital market. TBL, on the other hand, ensures a multidimensional assessment of these technologies, addressing the broader sustainable development goals (SDGs) that transcend economic gains to include environmental and social equity considerations.

The Diffusion of Innovations Theory contributes to understanding how FinTech innovations can catalyze financial inclusion, market access, and operational efficiency within the NSE. For instance, robo-advisory platforms enhance financial literacy and democratize investment opportunities, resonating with Kenya's need for inclusive economic growth. Similarly, blockchain's transparency mechanisms reduce fraud and operational inefficiencies, contributing to the economic pillar of sustainability. The TBL theory deepens this analysis by integrating the

economic, environmental, and social benefits. It contextualizes FinTech solutions in addressing Kenya's pressing issues, such as energy consumption optimization via blockchain and improved social equity through digital payment platforms.

These theories are particularly justified for this study because of their synergy in addressing the dual concerns of technological adoption and sustainability. The Diffusion of Innovations Theory captures the dynamics of adoption within the NSE, highlighting variables such as innovativeness and observability, critical in a developing economy. Concurrently, the TBL framework ensures the study aligns with global sustainability mandates by evaluating FinTech's economic, environmental, and social impacts. Together, they ensure a holistic approach to understanding FinTech innovations' role in sustainable development.

Despite its widespread application, the Diffusion of Innovations Theory has been critiqued for its overly linear assumptions about the adoption process. Critics argue that it underestimates the complex, iterative nature of technological adoption, particularly in diverse markets such as the NSE, where institutional, cultural, and infrastructural constraints may significantly influence adoption rates. Furthermore, the theory's focus on individual adoption decisions may overlook systemic barriers such as regulatory constraints or insufficient digital infrastructure prevalent in emerging markets.

The TBL Theory, while comprehensive, faces criticism for its vagueness in operationalizing the three sustainability dimensions. For instance, quantifying environmental and social impacts within the NSE context can be challenging, particularly in a data-scarce environment. Additionally, the theory's broad scope may dilute focus, leading to trade-offs among economic, environmental, and social goals, particularly in markets like Kenya's, where economic imperatives often overshadow environmental or social concerns.

Both theories have limitations that must be acknowledged. The Diffusion of Innovations Theory tends to overlook the broader systemic and regulatory environments that influence FinTech adoption, making it less suitable for capturing the complexities of the NSE's ecosystem. The TBL theory, while inclusive, may lack specificity in guiding policy and practice, as the balance among the three dimensions of sustainability can be context-dependent and challenging to achieve in practice.

These theoretical frameworks underline the transformative potential of FinTech innovations in fostering sustainable development within the NSE. By applying the Diffusion of

Innovations Theory, this study identifies pathways to accelerate FinTech adoption, emphasizing the need for policies that address barriers such as financial literacy and digital infrastructure. The TBL theory enriches this perspective by framing FinTech's contributions within Kenya's SDG agenda, offering actionable insights into achieving balanced economic, environmental, and social outcomes. Together, these frameworks not only provide a robust foundation for academic inquiry but also inform practical strategies to harness FinTech for sustainable development in Kenya.

1.2 Empirical Review

The role of FinTech in sustainable development has received much attention from scholars in recent years especially in the context of emerging economies such as Kenya. Nenavath and Mishra, in a study conducted in 2023, showed how green finance and FinTech affect sustainable economic development in India, pointing out that these technologies contribute to environmental and economic sustainability. However, their study fails to explore the relation between green finance as a siloed approach and other FinTech solutions such as blockchain and robo-advisory services in achieving a wider sustainable development agenda. Likewise, Yang, Su, and Yao (2021) established the link between FinTech, green finance, and high-quality economic development in China. However, their context-specific findings do not extend to other markets such as Africa due to vast differences in the financial ecosystems. This void is filled by this study, given its focus on the various types of FinTech innovations and how they fit within the Kenyan NSE in terms of sustainable development comparison.

The application of FinTech challenges traditional financial models by adopting effective instruments that enhance service provision and service provision to customers who have been excluded previously (Ali, 2023; Njogu, 2020). These innovations fall under the umbrella term FinTech, and they range from digital payment methods, robo advisory services, blockchain among others all of which work towards creating financial inclusion and sustainability. For instance, mobile money services facilitate economic transactions, enhancing economic dynamics and minimizing inequalities (Ahmed, 2021; Tidjani & Madouri, 2024). Such platforms have been considered crucial in enhancing the dissemination of financial services in Kenya with more than 80% of adults using mobile money services (Mugo, 2023).

Another beneficial advancement of the digital era is robo-advisory services – affordable, automated investment advisory services for both individual and institutional investors (Pizzi et al., 2021). The NSE can leverage these services to increase the number of investors that the market

attracts, hence improve on market depth and stability. Blockchain technology, on the other hand, ensures the transparency and security in the transactions while dealing with the issue of fraud within the financial systems for a long time (Zhou et al., 2022; Puschmann et al., 2020). This technology is closely related to the SDGs as it leads to increased accountability and builds trust in the financial markets (Macchiavello & Siri, 2022).

Digital payment platforms are widely considered to be at the heart of the FinTech revolution, disrupting various aspects of sustainability at the societal, economic, and environmental levels. In the social aspect, these platforms also improve access to financial services for the previously excluded groups (Mhlanga, 2024). From an economic perspective, they empower micro, small, and medium enterprise (MSMEs) through promoting cashless transactions, thus enhancing efficiency and lowering expenses (Nyabuto, 2023). On the environmental aspect, going cashless leads to a reduction in the use of cash notes and coins thus saving the environment from undue pressure in manufacturing and circulating notes and coins (Shala & Berisha, 2024). In Kenya, for instance, appropriation has seen the development of innovative such as the M-Pesa that would allow over thirty million users to transact seamlessly (Wekesa, 2023). Thus, the NSE can use such platforms to facilitate investors' participation and make the stock market more inclusive and efficient. Research suggests that the use of the digital payments system can cause a rise in the gross domestic product per capita of up to 1%, proving their role in the economy (Pawłowska et al., 2022).

In this regard, robo-advisory services, which leverage AI technologies for investing, are not only relevant but indispensable for the sustainable development of global financial systems (Ahmed, 2021; Baltgailis & Simakhova, 2022). These services remove the obstacles making it easier for the retail investors to enter the financial markets such as the NSE (Chueca Vergara & Ferruz Agudo, 2021). On the economic front, robo-advisors improve the efficiency of the markets for offering data-driven investment solutions and on the social front robo-advisors help in raising people awareness towards better financial decision making (Bayram et al., 2022).

Environmental implications of robo-advisory services include negative impacts on the traditional financial infrastructure, which in turn leads to decreased physical operations that contribute to carbon emissions (Ignatyuk et al., 2020). With the help of robo-advisory platforms integrated into the value chain, the NSE can appeal to wider audiences and incorporate sustainable

practices into its business model, thus reiterating its function as a sustainable development promotion body (Pizzi et al., 2021).

Blockchain technology provides the broadest spectrum of values, including transparency, security, and efficiency, making it the revolutionary innovation for financial markets. Exploring the potential impact of technology in the context of NSE, the following benefits of blockchain have been identified: rise in the reliability of transactions, decrease in settlement time, and reduction in operational expenses (Zhou et al., 2022). In the social perspective, blockchain is useful in establishing trust because it protects data from alteration and minimizes fraud which enhances market confidence (Macchiavello & Siri, 2022). On the economic front, it consolidates activities like clearing and settlement and fosters market stability and development (Hakizimana et al., 2020).

In terms of environment, the decentralized nature of blockchain entails less tangible commodity and physical infrastructures, and thus diminishes the environmental impact of financial transactions (Puschmann et al., 2020). However, the issue arises concerning its high energy consumption, making it necessary to incorporate environmentally friendly blockchain solutions to meet the sustainability agenda (Tamasiga et al., 2022). The use of Blockchain by NSE would further help the exchange to be in line with the sustainable finance and attract investors' both locally and globally, who are interested in investing in transparent and efficient financial markets (Hwang et al., 2021).

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Some of the recent studies include Tao et al. (2022) on the impact of FinTech and the relevancy of blockchain technology in moving to a low carbon economy. Despite uncovering the global trends, the study reveals little about problems associated with emerging markets. However, Tamasiga, Onyeaka, and Ouassou (2022) developed a theoretical framework connecting FinTech to the green economy transition in African nations while emphasizing the opportunities for sustainability. They are mostly theoretical and lack sufficient empirical support, which limits the practical application of their suggestions in specific markets. To address this methodological issue, the current study employs empirical data from the NSE, with a specific focus on market transparency and environmental sustainability of blockchain technology.

Mobile payment systems have received significant attention from scholars mainly focusing on the benefits on financial access and the overall improvement of economic well-being. In another study, Yang and Zhang (2020) established that digital finance positively impacted sustainable

growth of the SMEs in China. However, this work is limited to only small enterprises, without a portrayal of the overall financial system. In the same vein, Maina and Nyamasege (2024) explored the effects of financial technology on financial inclusiveness in Kenya banking industry, highlighting its effectiveness. However, their research did not investigate the sustainability dimension and, thus, left an empirical gap. In doing so, the present research also broadens the context by assessing how the adoption of innovative payment systems can enhance financial inclusion as well as sustainability within the NSE environment.

Robo-advisory services and blockchain technologies are capable of disrupting the financial markets as they currently exist. While Arenas-Parra, Rico-Pérez, and Quiroga-Garcia (2024) focused on the relational aspects of robo-advisory, deeming it effective and inclusive in offering investment solutions. However, it has a few limitations such as the fact that it only considers investment advisory without examining how it could help in improving the aspect of financial literacy. Likewise, Pal, Tiwari, and Behl (2021) only explored the application of blockchain technology in the context of financial services and also no real-world evidence was presented to support the claims of increased transparency and reduced cost. This paper supplements these efforts with an empirical examination of how robo-advisory services and blockchain technology contribute to the NSE's sustainability agenda.

Thus, although a positive impact of FinTech innovations can be identified, numerous studies omit aspects of economic, environmental, and social sustainability in their analysis. For example, Mhlanga (2024) described FinTech as having a positive impact on financial access and development for sustainability, but the author did not elaborate on other trends such as blockchain. Ali (2023) and Chepngeno (2022) examined the Kenyan FinTech industry and established its role in enhancing the country's economic development but failed to assess environmental and social costs. This study addresses these conceptual gaps by examining how FinTech innovations holistically advance the economic, environmental, and social pillars of sustainable development within the NSE framework.

Joshi, Tewari, Kumar, and Singh (2023) systematically reviewed blockchain technology's application in sustainable development, highlighting its potential in improving traceability, reducing fraud, and enhancing environmental accountability. Their findings are particularly relevant to markets with established digital infrastructures. However, the study does not address the specific challenges of adopting blockchain in emerging markets like Kenya, where financial

and technological readiness may lag. This research extends their work by assessing the practical challenges and opportunities for blockchain adoption in Kenya's NSE, addressing infrastructural and regulatory barriers that hinder full implementation.

Salinas (2024) explored investment robo-advisory systems and their efficiency in managing individual portfolios, emphasizing their role in democratizing access to financial planning. The study, however, narrowly focused on developed markets with mature financial ecosystems. Similarly, Al-Qudah, Al-Okaily, and Yadav (2024) investigated the growth of FinTech and blockchain in developing countries, focusing on the UAE, identifying significant adoption enablers like government support. However, these findings may not be generalizable to Kenya, where policy frameworks for FinTech adoption remain underdeveloped. The current study aims to bridge this contextual gap by examining the applicability and scalability of robo-advisory and blockchain technologies within Kenya's unique market conditions.

Faradynawati and Söderberg (2022) surveyed clients of robo-advisors to understand their attitudes toward sustainable investments. This research was made in Sweden, with the focus on the match between the automated financial tools and clients' sustainability goals. The results showed that clients had a preference for investment with sustainability objectives; however, at the same time, they wanted to know how the objectives were attained. One limitation that was found in this study was that the study was carried out in one geographical area only and this may not hold true for other markets such as the Nairobi Stock Exchange (NSE). This research contributes to the knowledge about how various aspects of fintech services, including robo-advisors, may align with sustainability preferences. Its importance is based on the fact that it showcased how such tools could support sustainable development in firms listed in NSE in Kenya. In extending these insights, the current study also integrates other facets of fintech solutions beyond investment and choice, which has been a limitation in the context and the scope of previous works.

Shan et al. (2022) explored the use of robo-advisors in facilitating carbon transitions using automated funds. In the study conducted with data from the United States and Europe, it was revealed that robo-advisors affected investments in low-carbon funds and contributed to the environmental effect. The authors also mentioned a limitation in their failure to consider factors that may differ at the regional level regarding the use of the particular funds. In terms of the contribution made by this research work, the correlation established between robo-advisory services and environmental sustainability is worth acknowledging. From the current findings, there

is strength that the adoption of fintech in the current environment may fuel environmental goals in the firms under NSE. To fill the aforementioned gaps, the study considers Kenya's economic and regulatory context, contributing to the regional context in the existing literature.

Mathew et al. (2024) provided a bibliography, and historical study of robo-advisors focusing on its usage and limitations. Nevertheless, the study pointed out a shift toward augmenting the advisory services with the help of artificial intelligence for making them sustainable and effective. However, the authors admitted that their analysis lacked empirical data from emerging economies. The work adds to the body of knowledge regarding robo-advisory trends by presenting a clear picture of the subject. Their contribution to the current study is based on the fact that they highlighted the lack of empirical data from the developing markets. This research addresses this dearth by zeroing in on fintech solutions relative to Kenya's NSE and their impact on sustainable development.

Kobets et al. (2022) explored clients' behavior when adopting sustainable robo-advisor bots. The survey carried out in several countries showed that clients' beliefs in technology and perceived sustainability effects influenced its use. One limitation was that it constituted results mainly from high-income economies, thus, the results cannot be generalized to low- and middle-income economies. This research also seeks to make a contribution by highlighting trust and sustainability as major determinants of fintech adoption. Hence for Kenya where technology trust could be different from that of developed countries this study call for localized solutions. The current study fills this gap by assessing the fintech adoption in the NSE and offering information on trust and sustainable development.

Yi et al. (2023) focused on the millennial's use of robo-advisory services taking into consideration factors such as trust, usability, and knowledge perception. A research carried out on Malaysian users revealed that trust and perceived usability were key factors that affected the level of adoption. Another weakness was the inherent use of only one type of participants raising the question of generalizability of results. This work benefits by offering a better understanding of the role played by demographics on the use of fintech products. These findings apply in identifying strategies to improve usability and trust of NSE listed firms in Kenya, most of which operate with multiple stakeholders. These considerations are incorporated in the current study, though the number is extended to a larger population to cover for the lack of demographic diversity.

From the reviewed studies, it emerges that innovations such as robo-advisors, which is a type of fintech has the potential of improving sustainable development. Nevertheless, limitations like limited geographical scope, inadequate coverage of emerging economies, and limited demographic decomposition suggest the importance of more localized work. To this end, the current study responds to these concerns by evaluating the effects of Fintech solutions on sustainable development in the context of the Kenyan market, particularly concerning the NSE enlisted firms. By operationalising quantitative data, the paper also contributes to identifying how the implementation of FINTECH can deliver system impacts on economic, social and environmental sustainability, informing policy and decision-making.

Bai, Quayson, and Sarkis (2021) explore the effects of digitisation during COVID-19 on MSEs' sustainable development. Taken in multiple countries, the study demonstrated that the pandemic increases the digital intensity, improving the economy and targeting social inequality among MSEs. However, the study acknowledged the fact that the expansion of these technologies was constrained by the lack of basic digital platforms in many developing countries. This research therefore is useful in advancing knowledge on how digital solutions to overcome the aforementioned constraints of sustainability. In relation to the current study, these findings are useful in establishing how fintech solutions can foster sustainability for Kenyan firms. In this respect, extending the analysis to the listed firms in the NSE, the study provides more nuanced insights into the digitization theme in the context of a corporate rather than revealing its general scope and various effects related to large-scale operations.

Jiao and Sun (2021) explored the relationship between digital economic development and economic growth in China, focusing on sustainability. The study revealed that digital transformation significantly enhanced economic growth while fostering sustainable practices, such as reduced carbon footprints. The authors acknowledged limitations in assessing the social dimensions of sustainability. This research contributes by demonstrating how digital economic development aligns with sustainability goals. The current study builds on these findings by examining how fintech solutions impact sustainable economic growth in the NSE while considering the social and environmental contexts to respond to the previously mentioned gaps.

Qin, Wu, and Li (2022) examined the impact of digital finance on household carbon emissions in China. According to their research, the results indicated that higher levels of digital fintech lowered carbon emissions through energy efficient consumers' consumption habits. For

instance, its targeted viewers was the households' segment, and it overlooked the corporate market. The research is relevant for the analysis of consequences in the field of digitization of financial services. In the current research, these are important findings that assist in analysing the environmental impact of fintech solutions within Kenyan firms. The choice of firms improves the relevance of the study because it provides an insight into the corporate level impacts on sustainability.

Kshetri (2021) explored the possibility of blockchain to improve the sustainable supply chain practice in developing nations. As evidenced in the cases, the research pointed to the increase of transparency, combating of waste, and enhancement of ethical sourcing through blockchain. Nonetheless, there were some concerns raised including high costs of implementing the same and scarcity of technical knowhow in the developing world. This work also seeks to contribute by describing how blockchain is going to support the idea of sustainability. Hence, the current study adopts these insights in investigating the operationalization of blockchain in Kenyan NSE-listed firms, research questions that relate to large-scale adoption and the interactions of blockchain fintech solutions.

Khanfar et al. (2021) reviewed the literature on blockchain applications in sustainable manufacturing and supply chain context. From the study, it was established that blockchain improves traceability, eliminates inefficiencies and boosts circular economy efforts. The only weakness that was noted in the study was that the authors did not offer empirical validations of the discussed theoretical frameworks. This research benefits by offering a baseline study of sustainability in the context of blockchain. Towards the current study, these outcomes underscore blockchain's applicability to firms in Kenya listed on the NSE. The study addresses a gap in the empirical literature concerning the applicability of blockchain in these organizations.

Paul et al. (2021) focused on the use of blockchain technology in tea supply chain considering sustainable performance aspect. The survey was conducted in India and revealed positive impacts of blockchain in the supply chain in terms of transparency and operational issues. However, the study was done with one agricultural product as the subject which was a source of bias. This research makes a contribution by showing that blockchain has sustainability impacts in a specific industry. In contrast, the current study enriches this knowledge by investigating the use of blockchain in various industries within the NSE, thus offering a more holistic view of blockchain's effects on sustainability.

Thus, the reviewed literature points to the fact that the implementation of fintech solutions and the application of blockchain technologies have all the potential to contribute to the achievement of sustainable development goals. However, there are still some limitations, including a lack of empirical data from corporate sectors, analyzing narrower geographical areas, and exploring fewer aspects of sustainability. The current study seeks to overcome such limitations by analyzing the effects of fintech solutions on sustainable development among the NSE-listed companies in Kenya. Encompassing environmental, social, and economic approaches, the work provides guidelines for future developments in southeastern European countries.

The empirical review also illustrates the growing application of FinTech for sustainable development across the world and its potential to build a positive impact in the context of sustainability, such as in terms of improving access to financial service, combating climate change, and boosting economic performance. However, the limited adoption of key FinTech solutions like blockchain and robo-advisory in Kenya's NSE reveals notable empirical, methodological, and contextual gaps. Previous studies primarily focus on developed and select emerging markets, leaving Kenya's unique challenges and opportunities unexplored. Consequently, this study aims to fill these gaps through exploring the factors that facilitate the adoption of FinTech innovations in the NSE in concerns to the infrastructural readiness, polices, and sustainability alignment related to FinTech to effectively contribute in the debate on how the innovation Marker can foster sustainable development in the emerging economies.

Table 2

Summary of the Empirical Literature Review

Author(s)	Focus of the Study	Key Findings	Relevance to Current Study	Limitations	Emerging Gaps	Contribution of Current Study
Yang & Zhang (2020)	Studied digital financial inclusion and its effect on SMEs' growth in China.	Found that digital financial inclusion significantly enhances SME growth by providing credit access and cost efficiencies.	Provides insights into how digital finance impacts enterprise growth.	Focused on SMEs, with no data on investment or trading sectors.	Neglects the role of digital financial inclusion in Kenya's NSE ecosystem.	Assess the impact of digital financial inclusion on NSE Kenya's performance.
Pal *et al.* (2021)	A comprehensive review of blockchain technology applications in financial services.	Highlighted that blockchain increases transparency, reduces fraud, and enhances operational efficiency in financial services.	Relevant to understanding how blockchain enhances financial services.	Focus on theoretical insights without empirical data in Kenyan markets.	Limited examination of blockchain's adoption in Kenya's investment sector.	Investigate blockchain's role in improving transparency and efficiency in NSE Kenya.
Yang, Su, & Yao (2021)	Explored the nexus between green finance, FinTech, and high-quality economic development in China.	Found that FinTech drives high-quality economic development by improving financial efficiency and promoting green finance initiatives.	Provides insights into how FinTech can drive economic development sustainably.	Empirical gap: Lack of data from emerging markets like Kenya.	No direct link to the performance and adoption of FinTech in financial trading contexts like NSE.	Explore the practical role of FinTech in enhancing NSE's economic contributions to Kenya.
Chepngeno (2022)	Examined the effect of financial technology on Kenya's economic growth.	Established that FinTech enhances financial accessibility and contributes to economic growth	Highlights FinTech's contribution to Kenya's overall economic growth.	Focus on macroeconomic outcomes without sectoral analysis.	No focus on FinTech's role within specific sectors like NSE.	Analyze FinTech's sector-specific contributions to NSE Kenya.

		through efficient digital platforms.				
Tao et al. (2022)	Studied FinTech's potential to foster low-carbon economies from a global perspective.	Demonstrated that FinTech significantly supports the transition to low-carbon economies by improving resource allocation for green projects.	Relevant to understanding FinTech's environmental impact on Kenya's green agenda.	Broad global perspective lacks localized evidence for Kenya.	Absence of localized analysis of FinTech's role in achieving low-carbon economies in Kenya.	Provide localized evidence on how FinTech aligns with Kenya's sustainable development goals.
Tamasiga et al. (2022)	Analyzed how FinTech enables sustainability in African countries through an integrated framework.	Found that FinTech promotes financial inclusion, innovation, and environmental sustainability across Africa.	Highlights the importance of FinTech for sustainable development in Africa.	Empirical gap: General focus on Africa without specific Kenya data.	No evidence on FinTech's role in financial trading and investments in Kenya.	Examine how FinTech can drive sustainability within NSE Kenya.
Pawłowska et al. (2022)	Evaluated FinTech's impact on sustainable development, focusing on European markets.	Revealed that FinTech drives economic growth while promoting sustainability through innovative financial services.	Insights on FinTech's sustainable impact are transferable to emerging economies.	Contextual gap: Focused on Europe, limiting relevance to Kenya.	Limited examination of FinTech's application in less developed financial markets like NSE Kenya.	Assess FinTech's role in promoting sustainability within Kenya's NSE.
Ali (2023)	Investigated the impact of FinTech strategies on financial inclusion in Kenya.	Concluded that FinTech strategies significantly improve financial accessibility and inclusion in Kenya's	Provides valuable local context on the role of FinTech in Kenya.	Narrow focus on financial inclusion; excludes NSE-specific data.	No investigation into how financial inclusion strategies can	Assess FinTech's contribution to financial inclusion and sustainable development in NSE Kenya.

		underserved populations.			be expanded to financial markets.	
Joshi et al. (2023)	Reviewed blockchain technology for sustainable development, focusing on traceability and fraud reduction.	Identified blockchain as a tool for achieving sustainability by improving operational transparency and reducing fraud.	Highlights blockchain's transformative potential in sustainability.	Focuses on theoretical applications without empirical validation in Kenya.	Lack of implementation-focused research in financial trading ecosystems like NSE.	Investigate blockchain's adoption and its potential in NSE for sustainability.
Nenavath & Mishra (2023)	Examined the impact of green finance and FinTech on sustainable economic growth in India.	Found that integrating green finance with FinTech accelerates sustainable economic development and reduces carbon footprints.	Highlights the integration of green finance and FinTech; relevant for understanding sustainability.	Contextual gap: Focused on India, limiting applicability to Kenya and NSE.	Lack of examination of FinTech's scalability in developing financial markets.	Assess the adaptability of green finance-driven FinTech solutions in Kenya's NSE.
Mhlanga (2024)	Investigated the interplay between FinTech, financial inclusion, and sustainable development globally.	Concluded that FinTech drives financial inclusion, especially in underserved communities, while promoting sustainable growth.	Relevant for understanding how FinTech fosters financial inclusion.	Broad scope lacks Kenya-specific data.	Limited exploration of FinTech's impact on financial inclusion in NSE Kenya.	Provide localized insights into FinTech's impact on NSE Kenya and financial inclusion.
Sreenu (2024)	Investigated FinTech, financial knowledge, and financial accessibility as mediators for sustainable business success in India.	Demonstrated that financial knowledge and accessibility mediate the positive impact of FinTech on business sustainability.	Explores mediating factors for sustainability, useful for identifying key enablers.	Narrow scope on financial accessibility and knowledge without broader systemic analysis.	Limited focus on FinTech's role in the investment sector, such as NSE.	Analyze how financial knowledge and accessibility impact FinTech adoption in NSE Kenya.

Mani (2024)	Reviewed contemporary trends in finance research, including FinTech innovations.	Identified FinTech innovations such as blockchain and robo-advisors as pivotal trends in the financial sector.	Relevant to understanding evolving FinTech trends globally and their potential in Kenya.	Theoretical approach with limited empirical evidence specific to Kenya.	Absence of real-world application data in NSE and Kenya.	Provide empirical insights on FinTech adoption and its impact on NSE Kenya.
Al-Qudah et al. (2024)	Explored the growth of FinTech and blockchain technology in developing countries using UAE as a case study.	Found that blockchain adoption enhances efficiency and transparency in developing financial markets.	Relevant for comparative insights on FinTech growth in developing markets.	Contextual gap: Limited to UAE, excluding African contexts.	Lack of research on blockchain and FinTech growth in Kenya's financial sector.	Examine the interplay of FinTech and blockchain in enhancing NSE operations in Kenya.
Salinas (2024)	Assessed the efficiency of investment robo-advisory services in developed financial markets.	Concluded that robo-advisors enhance decision-making efficiency in investment portfolios.	Relevant for understanding robo-advisory systems' role in financial decision-making.	Contextual gap: Lack of evidence in emerging markets like Kenya.	No data on how robo-advisors could be integrated into Kenya's NSE ecosystem.	Explore the potential for robo-advisors in investment strategies within NSE Kenya.
Arenas-Parra et al. (2024)	Analyzed the emerging field of robo-advisors with a relational approach.	Found that robo-advisors facilitate personalized investment strategies and improve user satisfaction.	Highlights new trends in automated financial advisory systems.	Focused on global markets; lacks empirical data from Kenya.	Absence of localized studies on robo-advisors in Kenyan financial markets.	Assess the adoption and relevance of robo-advisors within NSE Kenya.
Maina & Nyamas	Explored FinTech's role in financial	Established that FinTech tools increase	Relevant to understanding	Industry-specific gap: Limited to	Neglects how NSE can	Expand the scope to include NSE's

ege (2024)	inclusion in Kenya's banking industry.	access to financial services for underserved populations in Kenya.	FinTech's local implementation.	banking; excludes NSE adoption.	leverage FinTech for financial inclusion and development.	potential in leveraging FinTech for sustainable development.
Faradyn awati & Söderbe rg (2022)	Sustainable investment preferences among robo-advisor clients.	Robo-advisors promote sustainable investments by aligning with client preferences.	Highlights the role of fintech in sustainable investments for NSE-listed firms.	Focused on individual investors; lacks corporate perspective.	Absence of insights on institutional-level adoption.	Explores corporate adoption of fintech for sustainability in Kenya.
Shan, Umar, & Mirza (2022)	Role of robo-advisors in facilitating carbon transitions.	Automated funds promote carbon-neutral investments.	Shows the environmental benefits of fintech solutions in Kenya's corporate sector.	Focused on environmental aspects; limited social and economic sustainability.	Lack of a comprehensi ve sustainability framework.	Examines a multidimensional approach to fintech and sustainability.
Mathew et al. (2024)	Bibliometric review of robo-advisors.	Traces the evolution and adoption of robo-advisors in financial technology.	Provides a foundation for understanding the scope of fintech solutions in the NSE.	Theoretical review; lacks empirical validation.	Lack of regional case studies and firm-level analysis.	Contextualizes fintech adoption in NSE-listed firms.
Kobets, Petrov, & Koval (2022)	Behavior and adoption of sustainable robo-advisors.	Adoption driven by trust and behavioral factors.	Relevant for understanding adoption challenges of fintech in Kenya.	Focused on user behavior; lacks market or institutional insights.	Absence of corporate sustainability measures.	Investigates adoption within Kenya's institutional setting.
Yi et al. (2023)	Robo-advisory adoption among millennials.	Trust and usability are critical adoption factors.	Highlights factors influencing fintech adoption in Kenyan firms.	Focused on individual consumers; excludes organizational adoption.	Organization al trust and usability remain unexplored.	Studies organizational adoption of fintech for sustainability.

Bai, Quayson, & Sarkis (2021)	Pandemic-driven digitization and sustainable development for MSEs.	Digitization promotes resilience and sustainability in MSEs.	Relevant for understanding how digitization fosters sustainability.	Limited to MSEs; lacks applicability to large firms.	Gaps in corporate-level digitization for sustainability.	Examines digitization's impact on NSE-listed firms.
Jiao & Sun (2021)	Digital economy and economic growth with sustainability focus.	Digital transformation enhances growth and sustainability.	Shows the economic benefits of fintech in corporate settings.	Limited assessment of social dimensions of sustainability.	Gaps in addressing social sustainability at the firm level.	Analyzes comprehensive sustainability dimensions in Kenya.
Qin, Wu, & Li (2022)	Digital finance and household carbon emissions.	Digital financial inclusion reduces carbon emissions.	Shows environmental benefits applicable to firms.	Household-centric; lacks corporate sector focus.	Environmental impacts of fintech adoption in firms remain unexamined.	Extends findings to corporate-level carbon reductions.
Kshetri (2021)	Blockchain for sustainable supply chain management.	Blockchain enhances transparency and ethical practices.	Relevant for analyzing blockchain's role in NSE-listed firms.	High costs and technical expertise challenges.	Large-scale blockchain adoption remains underexplored.	Investigates blockchain scalability in Kenya’s NSE firms.
Khanfar et al. (2021)	Blockchain applications in sustainable manufacturing and supply chains.	Blockchain supports traceability and the circular economy.	Highlights blockchain’s sustainability potential in Kenyan firms.	Theoretical; lacks empirical data.	Gaps in practical blockchain implementation.	Provides empirical insights on blockchain use in NSE-listed firms.
Paul et al. (2021)	Blockchain impact on tea supply chains	Blockchain improves supply chain	Demonstrates blockchain’s	Focused on a single agricultural product.	Lack of cross-sectoral	Expands blockchain applications to

	and sustainable performance.	transparency and efficiency.	potential across Kenyan sectors.		blockchain insights.	diverse NSE sectors.

Source: Researcher,2024

1.3. Conceptual Framework

The conceptual framework below analyses the subject of how FinTech solutions (the independent variable) influence sustainable development (the dependent variable). FinTech is implemented through robo-advisory and digital payment platforms while sustainable development is assessed qualitatively through social and economic parameters. Blockchain technology is also integrated to study its impact on the environmental sustainability aspect as well. There is no exact framework to outline how and in what ways FinTech innovations help to achieve sustainable development in its multiple aspects and how they are intertwined in NSE.

Figure 1.

Conceptual Framework

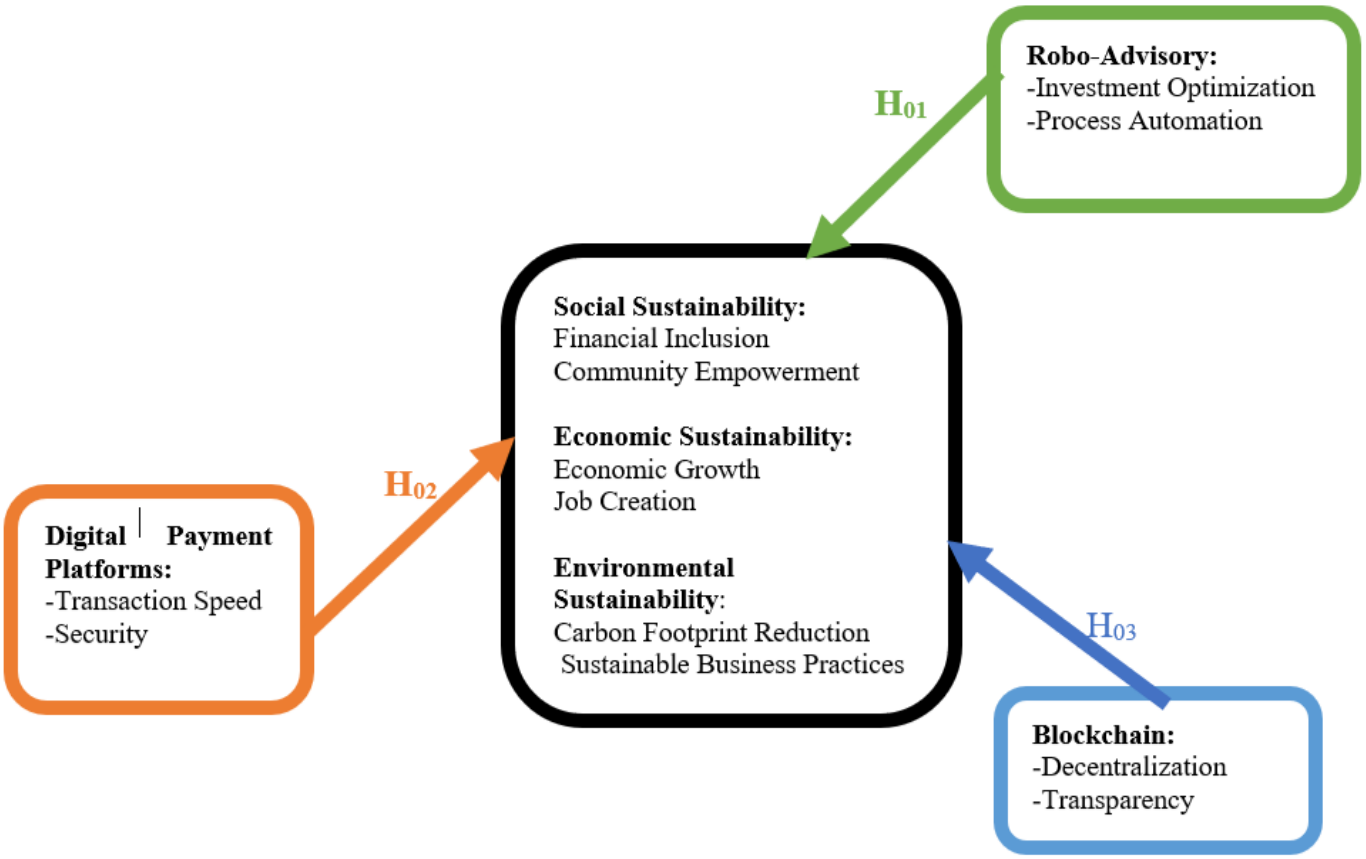

Figure: 1 **Sources:** Researcher 2024

The conceptual framework highlights the interplay between FinTech innovations—specifically robo-advisory services, digital payment platforms, and blockchain technology—and sustainable development, focusing on their social, economic, and environmental dimensions. Robo-advisory platforms enhance financial literacy and inclusion by enabling broader market access and democratizing investment opportunities. Similarly, digital payment platforms improve financial access and inclusion, particularly for vulnerable and underserved groups, thereby fostering social sustainability. Together, these innovations drive economic sustainability by improving operational efficiency, reducing transaction costs, and broadening participation in financial markets such as the Nairobi Securities Exchange (NSE).

Blockchain technology further complements this framework by addressing environmental sustainability. By promoting energy efficiency, reducing waste in financial transactions, and enhancing transparency, blockchain aligns FinTech innovations with sustainable development goals. This integration demonstrates how digital financial services can contribute to societal well-being and environmental stewardship. The proposed framework underscores the transformative potential of FinTech in achieving a balanced approach to sustainable development, emphasizing the importance of leveraging technological advancements to drive progress across social, economic, and environmental domains.

2. METHODOLOGY FOR RESEARCHING THE IMPACT OF FINTECH FOR SUSTAINABLE DEVELOPMENT

The section describes how the research problem was tackled through the collection and analysis of primary data. With regard to the objectives of the study, the methods of data collection were both quantitative and qualitative. Al though the specified approach enables analysis of the research questions from various perspectives in the effort to have overall understanding of the subject matter under discussion. The reason for using the methodology is in the pragmatism philosophy, which is an emergent and cultural paradigm which accommodates various methods aimed at responding to the research questions (Morgan, 2014). This part provides the research justification for the empirical analysis, the justification for selecting the chosen methodology, the variables of interest in the analysis, and methods of data collection as well as data analysis. It also points out why this methodology will be used according to the research endeavors and discoveries of other scholars who have worked on similar lines of research (Shields, 1998; Hall, 2013). Consequently, the application of empirical approach gives realism to the research process and make sure that the finding which claimed to solve the specific research objectives can actually achieve the research objectives.

2.1. Research Philosophy and Design

The method used to conduct the current study is pragmatism which is a mix between both qualitative and quantitative methods in order to answer the research questions. According to Morgan (2014), pragmatism focuses on the use of research findings and adopts techniques that are most appropriate for the given problem. This approach makes it possible for the researcher to use multiple sources to arrive at a consensus, thus offering the researcher deeper insight into the subject matter (Hall, 2013). Regarding this, closed questionnaires were employed to gather data that enabled the researcher to capture both quantitative and qualitative results (Parvez et al., 2016). Google Forms made it easier and more convenient as well as the help from the research assistant via drop-and-pick procedure where responses were easily and conveniently collected from employees at the NSE and other listed companies thus providing a diverse and comprehensive data set (Marshall, 2005).

2.2. Study Target Population and Sampling Technique

The target population of this study comprises of employees in NSE and the 66 listed firms whereby the unit of observation originates from four significant functional departments of every firm. This process is explained thoroughly by Singh et al. (1996), to mean that the sampling method and sample size was planned and chose in a very systematic and precise way, with the aim of ensuring that the sample was truly representative of the population. Following the census approach, one employee in these functional units was included, thus undertaking a broad analysis of the research problem. While identifying the target population for a study regarding money choices towards fintech in the NSE and listed firms, it is vital to match the respondents with processes that are core to fintech decision-making. Fintech decisions including the use of electronic trading platforms or the application of big data analyses, among others, are usually within the purview of the regulatory authorities like the NSE or the management of the listed companies.

From Gakeri (2012), the NSE exercises a central regulatory and supervisory authority as a stock exchange in the Kenyan securities market with supervision and compliance being undertaken by the Capital Markets Authority (CMA, 2020). While the NSE's top management may guide overarching policy frameworks, the actual implementation and operational decisions often rest with the listed companies. These firms have unique financial strategies and operational frameworks, making their senior management teams, particularly in finance, IT, strategy, and operations, integral to understanding fintech adoption dynamics. Using employees from the listed companies as respondents is justifiable because they operate at the nexus of implementation. Moturi, Kwanya, and Chebon (2020) emphasize the critical role of state corporations and listed entities in Kenya’s financial sector, asserting that they drive technological advancements in line with regulatory expectations. Moreover, Ondiba Ochenge et al. (2020) highlight that market liquidity and foreign equity flows are shaped significantly by listed companies' strategic decisions.

The structured questionnaires delivered to top management of these companies, ensuring that the study gets data from decision-makers concerning fintech adoption. This view is consistent with the samples suggested by Singh et al. (1996) and Kuno (1976) that calls for representativeness that mirrors the organizational structure. Consequently, it is the member companies’ top employees that provide a realistic perspective on fintech adoption so that the research findings are thorough and applicable to the NSE’s management, which also guides policy. The use of a multi-stage sampling approach, as recommended by Kuno (1976), ensured that the chosen sample

yielded a representative portion of the organizational sample within the NSE, thereby increasing the external validity of the study's results. The sample size was taken in proportion to the number of functional units within the listed companies, and every unit responded from a different organization to minimize the bias arising from the subjectivity of respondents on the issues under consideration (Robertson, 1969).

The Taro Yamane formula is given by:

$$n=N/1+N(e^2)$$

Where:

n = Sample size

N = Population size

e = Margin of error (0.05 for a 95% confidence level)

For the 66 listed companies, with one respondent from the three functional units per company), the sample size is n=198.

Table 3

Sample Distribution

Functional Unit	No.of Companies	Respondents per Company	Total Respondents
Finance	66	1	66
IT	66	1	66
Strategy & operations	66	1	66
Total	**66**	**3**	**198**

Source: Researcher, 2024

To meet the specific requirement of including all functional units (Finance, IT, Strategy, and Operations), each functional unit will have one respondent per company. Therefore, the study sample size is 198 respondents.

The study adopted a multi-stage sampling technique, which is particularly effective when the population is distributed across multiple hierarchical or functional layers. As noted by Kuno (1976), multi-stage sampling allows for systematic representation while minimizing logistical challenges. The first stage involved purposively selecting the 66 listed companies, ensuring they represent the financial, technological, and operational diversity within the Nairobi Securities Exchange (NSE). The second part consisted of the division of work teams by functional area (Finance, Information Technology, Strategy, and Operations).

Within each functional unit, a censuses technique was done where only one person was selected, and the person is usually a manager or a decision-maker. This helped in making sure that the data collected were in a way that was informed enough to analyze fintech decisions. The structured approach corresponds to Robertson's (1969) suggestion of utilizing stratified samples to increase external validity. This way, the application of these techniques guaranteed that the study was representative and accurate while being feasible.

2.3. Aspects of Research Analysis and Scope of the Study

Research method in this study uses both quantitative and qualitative data combining the two in form of mixed method analysis to offer exhaustive study on the research focus. The quantitative data was analyzed using the SPSS software statistical tool used in testing the patterns, relationship and the level of detection of the research hypotheses and question to show the level of consistency and reliability (Robertson, 1969). Quantitative data was analyzed by use of quantitative analytical tools while the qualitative data was analyzed by use of thematic content analysis that seeks to unlock deeper meaning beyond the actual words formulated by the respondents as supported by the pragmatic paradigm posited by different scholars (Morgan, 2014, Kwamboka & Sang, 2019). This is helpful in achieving triangulation of results that makes them valid and reliable to a certain extent (Parvez et al., 2016). Measurement instruments used also include descriptive and inferential statistics including correlation and regression analyses to evaluate on the effects of fintech within functional areas of the organization such as; Finance, IT, Strategy and Operations as highlighted by Moturi, Kwanya, and Chebon (2020). The use of these techniques makes the outcome usable and valuable to the stakeholders of the listed companies and the NSE.

The subject of investigation lies in the fintech adoption and decision-making among the NSE as well as the 66 firms it comprises. It specifically targets employees in key functional units: Finance, IT, Strategy, and Operations because these departments have significant roles in the process of integrating fintech and making strategic decisions (Authority, 2020). Reflecting on these functional units of analysis, the study captures the main agenternic touch-points of fintech adoption, thus providing a snapshot of its operational and strategic complexities. Although the NSE plays a key role in overseeing the implementation of fintech, it is listed companies that offer the working environment since they serve as the major agents of change. This is because there are

strong links between policy and practice within the financial sector, as identified by Gakeri (2012) and Ondiba Ochenge et al. (2020).

Geographical and sectoral coverage ensures that research is applicable to Kenya's capital markets and has implications for other emergent markets. The conceptual approach is rooted in systems theory, enabling an exploration of interdependencies between functional units such as Finance, IT, Strategy, and Operations within the NSE and listed companies. This framework aligns with the dynamic nature of fintech implementation, offering a holistic understanding of its impacts across multiple organizational layers (Moturi, Kwanya, & Chebon, 2020).

2.4. Data Collection Instruments, procedure and Analysis

Data collection involved the use of structured questionnaires comprising of closed-ended questions, ensuring a balanced standardized responses and nuanced insights (Marshall, 2005). The closed-ended questions aimed at capturing quantitative evidence on the use of fintech and decision-making, while the open-ended questions sought to understand the contextual and strategic issues arising in specific functional specialties (Mazhar et al., 2021). The questionnaire was completed using Google Forms, accessible online with a drop-and-pick option for participants who did not own or prefer using electronic devices, making it possible to reach participants from various geographic locations and the information obtained more reliable and valid. This distribution of the questionnaires through online and physical formats boosted the response rate while effectively capturing the diverseness of the responding employees from the targeted units.

Quantitative analysis included both descriptive and inferential statistics, while qualitative data included thematic analysis (Parvez et al., 2016). Hypothesis testing, regression analysis and correlation analysis were used on quantitative data to establish the relationship between the efficiency levels in the NSE and the listed firms, and the fintech adoption. To carry out the analysis, codes were given to the words and the words were grouped in a way that would enable the identification of patterns and trends in the quantitative data in a bid to make the interpretation of the data richer and more sensitive (Morgan, 2014). These findings of the study are therefore both empirically grounded and contextually situated thereby reinforcing the methodology's validity and relevance within Kenyan capital markets policy and practice (Gakeri, 2012).

The analysis of the collected data was done using the Statistical Package for Social Sciences software (SPSS), which is one of the best and frequently used software in empirical

research (Mazhar et al., 2021). The quantitative data analysis methods used included descriptive statistics such as measures of central tendencies in relation to the different variables and other inferential procedures like ANOVA, coefficient of determination and the R-squared (Musoffan, Qamariyah, & Syarif, 2024). The use of these statistical methods aligns with Grozdanovski's (2024) proposal of applying quantitative techniques for definitive and actionable results. This research strategy provides a good background for responding to the research questions and provides both statistical reliability and realism.

2.5. Research Location and Data Analysis Methods

The study took place in Nairobi Kenya focusing on the NSE and the 66 companies listed on this exchange because Nairobi is the financial hub in the country (Authority, 2020). As the leading market in which securities are sold and bought, NSE is a crucial organization for studying the uptake of Fintech and decision making. The chosen target organisation falls into different industries thereby providing variety of diverse perspectives by functional areas such as finance, IT, strategy and operational functions. The extent of focus on the listed companies aligns with prior research on capital market movements including Ondiba et al., (2020) that identified Nairobi's position in foreign equity and liquidity analysis.

Quantitative and qualitative methods were employed because these were perceived to provide comprehensive insight into the results of data analysis (Morgan, 2014). Quantitative data were collected through structured questionnaires and the main analysis included the use of multiple regression descriptive analyses and Hypothesis testing through the use of tools such as the SPSS. For example, through regression analysis, the authors showed that the use of fintech leads to a decrease in operational expenses and an increase in productivity. The data collected by the open-ended questions in the questionnaires were syntactically analyzed and categorized into themes. Quantitative and qualitative analysis gave the study internal and external validity, so increasing the study's dependability and generalisability (Parvez et al., 2016; Mazhar et al., 2021).

Operationalization of Study Variables

The following table outlines the definitions of the study variables, the objectives of the variables and the Measurement indicators of the independent and dependent variables.

Table 4

Indicators and Measurement for Variables

Variable	Specific Objective	Indicators	Indicators
Independent Variable: Fintech	To examine the role of fintech solutions in sustainable development.	Robo-Advisory	Efficiency: Speed of financial advice generation (Scale: Very Slow to Very Fast). Accuracy: Percentage of error-free recommendations.
		Digital Payments	Transaction Volume: Number of digital transactions per month. User Accessibility: Proportion of users with access to digital payment systems.
		Blockchain	Transparency: Rate of transaction disputes resolved through blockchain. Data Security: Number of reported security breaches annually.
Dependent Variable: Sustainable Development	To assess the impact of fintech adoption on sustainable development.	Social Sustainability	Community Inclusion: Proportion of underserved groups using fintech services. Customer Satisfaction: Average satisfaction score (Scale: 1 to 5).
		Economic Sustainability	Cost Reduction: Percentage decrease in transaction costs. Revenue Growth: Annual growth rate attributed to fintech innovations.
		Environmental Sustainability	Resource Efficiency: Reduction in physical paperwork usage (measured in kilograms). Energy Efficiency: Reduction in energy use (measured in kWh).

Source: Researcher, 2024

This table demonstrates how the study's variables and objectives align, with clear indicators and quantifiable measures ensuring an objective analysis of the research goals.

Validity and Reliability of Data Collection Instrument

The validity and reliability of the data collection instrument are critical in ensuring the accuracy and consistency of research outcomes. In this study, the instrument was rigorously tested for reliability using Cronbach's alpha coefficient, with a threshold of 0.7, which is commonly regarded as acceptable for ensuring internal consistency (Sürücü & Maslakci, 2020). Cronbach's alpha provides a measure of how closely related a set of items are as a group, and a value above 0.7 indicates that the instrument has sufficient reliability to produce stable and consistent results

(Taherdoost, 2021). A pilot testing of the instrument was conducted on a sample of respondents, and feedback was acquired in order to improve the reliability of the instrument among the target population for the general study.

In addition to reliability, validity was also maintained throughout the study by following certain procedures and validation. Finally, the instrument was subjected to content validation where the items were scrutinized and checked to ensure they fairly captured the research variables and the objectives of the study (Kwamboka & Sang, 2019). The last internal validity was the construct validity that was checked by comparing the relationships between the indicators and the pertaining theoretical constructs. This process ensures the data collection tool reflects the concept under consideration enhances the validity of the findings (Nassaji, 2020). These validation and reliability measures make certain that the data collection instrument used in the study is both reliable and valid hence yielding reliable and generalized results. The result of the reliability test was presented in the table below which is Table 5

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Table 5
Reliability Test

Variable	No. of Items	Cronbach's Alpha Coefficient
Robo Advisory	5	0.83
Digital Payment	4	0.78
Blockchain	6	0.80
Social Sustainability	5	0.79
Economic Sustainability	6	0.82
Environmental Sustainability	4	0.75

Source: Researcher, 2024

The Cronbach's alpha coefficients are greater than 0.7, as it can be seen in the table below, which makes the used data collection instrument reliable because internal consistency for each of the variables has been confirmed (Sürücü & Maslakci, 2020). The reliability of the instrument was also verified by computing the Cronbach alpha coefficient for all the variables that had been used and the scores obtained were within the acceptable reliability coefficient for valid statistics.

2.6. Empirical Model

The empirical model in this study employs the independent variables: The Robo Advisory (RA), Digital Payment (DP), and Blockchain (BC) can be used to assess the Sustainable Development (SD). The regression equation can be written as:

$$SD=\beta_0+\beta_1 RA+\beta_2 DP+\beta_3 BC+\epsilon \ldots\ldots\ldots\ldots\ldots\ldots \text{Model 1}$$

By applying the above model, it becomes feasible to quantify the level of impact RA, DP and BC in the social, economic and environmental fibre of sustainable development. Here β0 is the intercept, whereas β1, β2 and β3 are coefficients that indicate the impact of independent variables on SD and ϵ as the error term. Both technological and advisory aspects are pivotal to the creation of sustainable development solutions and such a model would help in defining relationships between the two arenas (Anderson et al., 2020).

This model utilises multiple linear regression analysis to analyse collectively and singularly, RA, DP and BC on sustainable development. As Kokubun (2022) described, it leads to a quantitative presentation of the relation between the independent factors to SD, which will support policymakers and organizations making more effective decisions. The empirical approach also makes it easier in the improvement of understandings of the dynamics that dictate sustainable development across different cultures, environments and scenarios.

Diagnostic Test

Consequently, diagnostic tests are essential in determining whether certain assumptions vital to conduct a regression analysis do not hold true. The normality of the data was checked to see if the residuals were normally distributed because the non-normal distribution could affect parameters' estimation or inference. The assumption of linearity checked if the relationship between independent and dependent variables was linear which a key assumption of the regression analysis was. The results indicated that linearity was present and that the use of the regression framework was appropriate. Furthermore, multi-collinearity was examined using variance inflation factors (VIFs) to increase independent variables' independence as high multi-collinearity can lead to high standard errors and therefore low interpretability of coefficients. Al Haddad (2022) posited on such diagnostic considerations to improve the predictive accuracy of statistical models in technical disciplines. In the same regard, Berk et al. (2021) highlighted the importance of internal inspection to reduce dependency on powerful assumptions to yield better and more solid models.

Homoscedasticity, which refers to equal variance in all levels of the predictors was checked through the use of diagnostic tests. The test results showed that the standard deviation of the residuals was constant, which confirmed that this assumption was met. In particular, it will provide insights into whether heteroscedasticity is present in the data, which, if the case, affects the efficiency of estimate and can bias the test statistics, thus invalidating the regression analysis. These outcomes echo the guidelines posted by Al Haddad (2022) when diagnosing in engineering contexts whereby diagnosing maintains the sustainment of analytic estimates. Berk et al. (2021) similarly highlighted the importance of assumption-lean approaches, noting that effective diagnostic testing improves the reliability of regression results. These stringent diagnostics affirm the viability of the regression analysis, thus allowing for its valid use on the data as well as strengthening the study's conclusions.

Ethical Consideration

This paper aims to analyze the principles of ethical conduct in research and the importance of their adherence in relation to the quality of research. To practice ethical considerations to the participant, I ensured that before being asked to participate in the study, they were informed of the purpose of the study and their roles as well as the fact that they were free to participate. Informed consent from the participants was obtained, and the identity and data of the respondents were not disclosed throughout the research. Not less significant was the matter of ethics concerning data, and thus, it was treated with a certain degree of careful obligation, was secured from unauthorized access, and was employed solely for the purposes of the study. Adhering to ethical guidelines helps not only the participants themselves but also the validity and reliability of the outcome (Sürücü & Maslakci, 2020).

3. IMPACT OF FINTECH FOR SUSTAINABLE DEVELOPMENT IN COMPANIES LISTED IN THE NAIROBI SECURITIES EXCHANGE (NSE)

3.1. Response Rate

The research sought to establish the impact of Fintech solutions for sustainable development with respondents from 66 companies listed in the Nairobi Securities Exchange (NSE). The sample size included 198 respondents, distributed across three key functional units in each company: These are the primary functions known as Finance, IT, and Strategy and Operation. There was one respondent per company per functional unit to provide a variety of responses from the three central departments. Response rate on administered and returned questionnaires are as shown below:

Table 6

Response Rate

Response	Frequency	Percentage %
Properly filled and returned questionnaires	154	78
Rejected and unreturned questionnaires	44	22
Total distributed questionnaires	**198**	**100**

Source: Survey Data (2024)

From the distributed questionnaires, 154 respondents completed and returned the questionnaires, giving a response rate 78%. Fourty-four questionnaires (22%) were not returned or were incomplete and therefore cannot be used again for analysis. The response rate 78% is acceptable for this kind of study to ensure that the results are reliable and the sample is representative. In the views of Babbie (2020), a response rate of more than 70% is acceptable for research in the social sciences in order to achieve sufficient statistical reliability. The achieved response rate shows the respondents' interest and availability to participate in the study. The high response rate can be attributed to several factors, including:

Strategic Engagement: Personal communication with the top management of the listed firms, upon seeking consent from them about the research study.

Efficient Follow-Up Mechanisms: Phone calls and emails to those participants to ensure that they had filled out the questionnaires and returned them.

Findings on the Response Rate analyzed based on the returned questionnaires indicate relative equal distribution across the functional units. This balance is important for evaluating the multifaceted nature of fintech in sustainable development from the financial, technological and strategic angle. The research outcomes should therefore provide a broad outlook of the integration of Fintech in these firms. The high response rate minimizes bias arising from non-respondents hence improving the generalization of the results to similar environments within fintech and sustainable development domains in Nairobi and other parts of the world.

3.2. Respondents Demographic Characteristics

The demographic information of the respondents used in this study gives a descriptive analysis of the sample in this study, given it was derived from 154 employees from Nairobi Securities Exchange. These characteristics were evaluated by age, gender, level of education, position/title, and years of experience, providing a strong reference framework for the analysis of fintech solutions and sustainable development indicators. This shows respondents represent a workforce of productive age, with more response constituting 29-38 years (35.7%) and 39-48 years (32.5%) group. These findings indicate an appropriate age combination of young dynamics and experienced wisdom needed to explain the attitudes toward as well as the implementation of innovations in the fintech industry.

As for gender distribution the sample consists of 59.1% of male and 40.9% of female respondents, while traditional nature of the sector has put more focus on employing male staff, the tendency was reviewed recently, therefore the distribution of questions is also fairly representative of the current situation, as pointed by various authors, including Nassr & Wehinger (2022). To achieve a form of gender diverseness of participants such opinion increases the reliability of the study given divergent perception of implementing fintech.

Table 7

Respondents' Demographic Characteristics

Demographic Characteristic	Frequency (N=154)	Percentage (%)
Age		
18-28 years	25	16.2
29-38 years	55	35.7
39-48 years	50	32.5
49+ years	24	15.6
Gender		
Male	91	59.1
Female	63	40.9
Level of Education		
High School	5	3.2
Undergraduate Degree	85	55.2
Postgraduate	58	37.7
Any other	6	3.9
Position/Title in the Company		
Manager	60	39.0
Supervisor	48	31.2
Coordinator	46	29.9
Function within the Department		
Finance	52	33.8
IT	51	33.1
Strategy/Operations	51	33.1
Years of Experience		
Less than 5 years	30	19.5
5-10 years	60	39.0
11-15 years	44	28.6
16+ years	20	13.0

Source: Survey Data (2024)

The educational background of the respondents shows that the sample is more educated with the majority of respondents having completed an undergraduate degree 55.2% and postgraduate qualification 37.7%. This level of education is consistent with the technical skill that can be used to assess fintech solutions; this is consistent with findings made by Rashid and Singh (2023) who found that education enhances the understanding and use of digital solutions.

In terms of occupations, managers 39.0%, supervisors 31.2%, and coordinators 29.9% comprised the party of respondents, which allows receiving information from individuals involved in making strategic decisions and controlling the outcomes. This approach enhances the validity of the study because it provides both the strategic and functional views of the organization.

In terms of the number of respondents, all three functional units are evenly represented, which corresponds to the study's conceptual framework. Furthermore, the years of experience data indicate that 39.0% of the survey participants have 5-10 years of experience and 28.6% have 11-15 years of experience in their profession; such professionals should be capable of providing informed responses about the fintech adoption that affect sustainability.

The demographic characteristics further enhance the reliability of the study in terms of age, gender, education, professional position and experience. These characteristics promote a solid base for conducting the assessment of the influence of fintech solutions on sustainable development together with the information from prior studies published in various journals (e.g., Nassr & Wehinger, 2022; Rashid & Singh, 2023) that connect heterogeneous and variety samples to actual research findings. The study's findings are therefore set to provide plausible information on links between fintech innovations and sustainability of Nairobi's listed firms.

3.3 Descriptive Statistics on Fintech Solutions

The descriptive statistics for the solutions brought out the respondents' understanding of Robo-Advisory, Digital Payment Platforms, and Blockchain in enhancing sustainable development aligned to the aggravating context in the conceptual frame. The scales used for the items were on a Likert scale ranging from 1 to 5 with mean and standard deviation as the measurements of the variables.

The mean scores have revealed a fairly positive attitude towards the use of fintech solutions for sustainable development where Digital Payment Platforms received the highest mean score ($M = 4.50$, $SD = 0.72$). This examines the centrality of transaction speed and security in financial systems as supported by previous empirical analysis including Nassr & Wehinger (2022) who affirmed that the existence and efficiency of secure payment systems are the key enablers of financial liberalization and economic stability.

Robo-Advisory scored a mean of 4.30 ($SD = 0.85$), thus signaling the respondents' awareness of the future ability of optimizing and automating investment processes. This finding is in support of theoretical postulations on efficiency improvement and cost cutting measures of robo-advisory systems as postulated by FinTech Adoption Theory (Davis, 1989). But the difference is small and Blockchain's slightly smaller standard deviation implies that respondents are more consistent in their answers.

Blockchain has been moderately strongly perceived with a mean score of 4.10 (SD = 0.95) for decentralization and transparency. Still, the positive score should be treated with a pinch of salt since the standard deviation is slightly higher, implying that respondents had differing views. This may be indicative of obstacles such as regulatory issues and implementation barriers as pointed out by Mhlanga (2022) who noted that the usage of blockchain technologies is not consistent among developing nations.

Table 8

Descriptive Statistics on Fintech Solutions

Statement	N	Mean	SD
Robo-Advisory	154	4.30	0.85
Digital Payment	154	4.50	0.72
Blockchain	154	4.10	0.95
Aggregate		**4.30**	**0.84**

Source: Survey Data (2024)

The mean score of all the eight items was 4.30 (SD = 0.85) indicating a positive perception about the role of fintech solutions to support sustainable development. The alignment to these factors strengthens the theoretical foundations of acknowledging that fintech innovations support economic growth, environmental conservation, and social integration. These insights support previous conversations concerning the effectiveness of the advancement in providing fintech solutions in the achievement of sustainable development goals.

For example, a high score for Digital Payment Platforms is consistent with prior empirical evidence that showed their importance in increasing the efficiency and security of transactions (Rashid & Singh, 2023). Robo-Advisory's generally favorable response supports the theoretical positioning of the approach alongside sustainability initiatives such as effective financial planning and execution through the use of robotics. Blockchain's lower score, relative to other solutions, is consistent with challenges noted in previous studies (Mhlanga, 2022) regarding the slow pace of adoption in resource-constrained settings.

However, the findings also reveal slight contradictions. For example, the theoretical literature suggests blockchain's decentralization capabilities should make it more favorably rated. The variations could suggest that even if respondents agree with it, there still could be barriers to the applicability of the practices. Descriptive statistics reveal significant support for the use of fintech solutions in the promotion of sustainable development; nevertheless, DP has the highest support due to its practical implementation and positive impacts. As for Robo-Advisory and

Blockchain, they also get positive feedback from SMEs, but its usage can be affected by factors such as regulating conditions and users' awareness. Thus, these findings serve as the basis for further research to improve the effectiveness of fintech interventions and increase the extent of sustainable development activities.

3.4. Descriptive Statistics on Sustainable Development

The descriptive statistics provide insights into the dependent variable, Sustainable Development, measured using indicators of Social, Economic, and Environmental Sustainability. Many of these indicators are directly aligned with the conceptual framework that enshrines the objectives of financial inclusion, economic development, employment generation, and environmental conservation. The highest mean score was obtained for the SS indicator (M = 4.60, SD = 0.70), reflecting the participants' relatively high consensus on the perceived positive effects of fintech solutions on improving the financial position of clients and promoting community welfare. These insights are in concordance with other empirical works, including Karim and Ahmed (2023), who ascertained that financial innovations decrease access constraints for targeted vulnerable communities, thus enhancing their inclusion and socioeconomic advancement.

Another significant value identified was Economic Sustainability, which also received a relatively high mean rating of 4.50 and standard deviance of 0.75, indicating that fintech solutions have a major positive impact on boosting economy's and creating jobs. This is in tandem with theoretical frameworks like Sustainable Development Theory (Brundtland, 1987), where the key themes of innovation and economic enfranchisement are canvassed for sustainable development purposes. Respondents' positive evaluation may be attributable to the evident effects of digital financial solutions on enhancing entrepreneurship and economic growth in developing countries as established by Nganga et al. (2022).

However, Environmental Sustainability was somewhat less favored, indicated by the mean score of 4.20 out of 5 (SD = 0.85). Although respondents agree with the concept that fintech will promote carbon footprint reduction and sustainable business practices, there is a slightly higher standard deviation, meaning some degree of variation in their views. These findings align with the literature, pointing to issues like the slow pace in which green financial technology is adopted, and the lack of awareness concerning their advantages (Mhlanga, 2022). Moreover, the presence of this effect underlines the necessity of developing targeted measures to enhance the environmental effects of fintech products.

Table 9

Descriptive Statistics on Sustainable Development

Statement	N	Mean	SD
Social Sustainability	154	4.60	0.70
Economic Sustainability	154	4.50	0.75
Environmental Sustainability	154	4.20	0.85
Aggregate		**4.43**	**0.77**

Source: Survey Data (2024)

The aggregate mean score of 4.43 (SD = 0.77) implies that there is a positive perception of fintech solutions in attaining the three sustainability dimensions. This discovery relates to the study's problem statement that highlighted the significance of fintech in solving various social, economic, and ecological issues. The results align with earlier discourses regarding the use of fintech in attaining the sustainable development objectives.

The dominant concern for Social Sustainability corresponds to prior research suggesting the effectiveness of financial inclusion technologies in improving the standards of living of disadvantaged groups (Rashid and Singh, 2023). Therefore, the ranking of Economic Sustainability supports the notion that fintech fosters economic growth and employment, as previous research has suggested (Nganga et al., 2022).

The slightly lower score for Environmental Sustainability is reasonable when considering the issues that have been noted in relation to incorporating fintech for environmental conservation as discussed in Mhlanga (2022). However, an issue of conflict with theoretical assumptions may be identified here. Sustainable Development Theory emphasizes that the objectives of social, economic, and environmental solutions are to be of the equal value. The lower score in terms of environmental sustainability, therefore, implies a relative lack of integration of fintech activities with environmentally friendly procedures.

The results also highlight the significant significance of Fintech solutions in achieving the sustainable development goals with particular sustainability in financial and economic sectors. However, the relatively lower perception of environmental sustainability highlights the need for targeted strategies to enhance the environmental impact of fintech innovations. These insights contribute to addressing the research problem by affirming the multi-dimensional benefits of fintech in fostering sustainable development while identifying areas requiring further intervention.

3.5. Inferential Analysis

The study employed multiple regression analysis to examine the relationship between fintech solutions measured with robo-advisory, digital payments, and blockchain and sustainable goals in the NSE (Nairobi Securities Exchange). The results of the Model Summary, ANOVA, and Coefficients analysis are presented as shown in Tables below.

Table 10

Regression Analysis Output

Model Summary					
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	.75[a]	.563	.514	4.471	1.546

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	71.59	2	35.795	354.406	.000[b]
Residual	15.38	152	0.101		
Total	86.97	154			

Coefficients						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	13.356	1.695		7.742	0.000
	Robo-Advisory	2.485	0.321	0.462	7.312	0.000
	Digital Payment	1.864	0.291	0.423	6.405	0.000
	Blockchain	1.206	0.375	0.289	3.216	0.002

Source: Survey Data (2024)

3.5.1. Model Summary

The regression analysis output indicates a strong positive relationship between fintech solutions (robo-advisory, digital payment, and blockchain) and sustainable development goals (R = 0.750), with 56.3% of the variance in sustainable goals being explained by these independent variables ($R^2 = 0.563$). This aligns with the findings of Pawłowska, Staniszewska, and Grzelak (2022), who observed that fintech plays a critical role in driving sustainable development by

enhancing financial inclusion and facilitating eco-friendly financial practices. The relatively high R^2 value indicates that the model successfully captures key aspects of how fintech innovations contribute to sustainability, while also acknowledging that other external factors, not included in the analysis, influence the outcomes.

The Adjusted R^2 value of 0.514 reinforces the robustness of the model by accounting for the number of predictors used. This result is consistent with studies like those by Pizzi, Corbo, and Caputo (2021), who suggest that fintech, particularly in areas like digital payments and blockchain, is central to the transition toward sustainable business models. These outcomes suggest that although fintech offers a massive opportunity for driving change and improve sustainability in the banking industry, there are external factors that need to be discussed more, including regional policies and markets.

The Durbin-Watson statistic of 1.546 indicates that residuals possess little to no auto correlation, thus justifying the model and the reliability of the regression analysis. This is in concurrence with the observation made by Tamasiga, Onyeaka, and Ouassou (2022), who posit that to have sound and highly effective and adaptable financial models, some degree of residual independence needs to be taken into consideration and incorporated to make the model more adaptable to varying circumstances.

3.5.2. Analysis of Variance (ANOVA)

The ANOVA table generates a very high F-statistic (354.406, $p < 0.001$), therefore ascertaining the overall statistical significance of the model being tested. This finding is in concordance with the theoretical context of Sustainable Development which holds that innovations such as fintech herald progress in social, economic, and environmental domains (Elkington, 1994). The positive outcome reaffirms the study by Zhou, Zhu, and Luo (2022), who established that digital payment systems and blockchain enhance economic growth and environmental development through financial inclusion.

Although the model shows statistical significance, the low coefficient of determination ($R^2 = 0.563$) indicates that the quadruple helix model can only partially explain the extent of factors affecting sustainability goals. For example, variables including regional economic policies, availability and utilization of digital platforms as keys to access finances, and financial literacy, which plays a crucial role in influencing the use of fintech, are excluded from this research. Similar

to Tidjani and Madouri (2024), this critique suggests that the ability of fintech to enhance the sustainable development of African markets depends on other socioeconomic factors, including education gaps and infrastructural constraints.

3.5.3. Coefficient Correlation Test

The coefficient correlation test can be described as a statistical technique used to analyze the relationship between several independent variables and a dependent variable. Within the framework of this study, the model should identify the impact that factors such as Robo-Advisory, Digital Payment, and Blockchain have on sustainable logistics solutions. The coefficient table below shows the findings from the multiple regression analysis, which offer insight into the strength and significance of the predictor variables.

In the table, both the raw and standardized coefficients for each variable are provided. The standard error represents the extent to which the dependent variable is expected to change should there be a change in the respective independent variable, with all other independent variables constant. On the other hand, the standardized coefficients (Beta) allow one to consider the relative role of the entire set of predictors, indicating the effect measured in standard deviations. Multiple regression model requirement for analysis as illustrated below:

$$SD = 13.356 + 2.485RA + 1.864DP + 1.206BC + \varepsilon \quad \text{.....3.1}$$

Thus, the coefficients suggest the role of each predictor in accounting for fluctuations in the level of sustainable goal, while the unstandardized and standardized coefficients provide information about the relative importance and impact of each predictor.

Objective One on Robo-Advisory: The regression coefficient for robo-advisory ($B = 2.485$, $p < 0.000$) shows that robo-advisory has a strong positive correlation with sustainable goals, and by offering affordable and efficient solutions, robo-advisory solutions are playing a crucial role in facilitating the financial inclusion process. This finding aligns with the work of Shala and Berisha (2024), who argued that through the use of robo-advisory, there would be the enhancement of social sustainability through provision of tailored financial advice to individuals and companies. Other works, such as Karim and Ahmed (2023), also suggest that robo-advisory offers a significant sustainable influence through Artificial Intelligence to promote social welfare by making financial services more accessible.

Hence, robo- advisory's crucial contribution towards enhancing sustainability means it has the capacity to foster financial inclusion, decrease economic inequality, and increase economic access. However, it appears that while the benefits are clear, the drawbacks, especially in terms of the digital divide and especially in developing economies, may pose a problem for higher adoption levels. This limitation is discussed by Ugochukwu et al. (2024) who posit that although emerging fintech solutions are promising to transform our future, the equal access to digital literacy as well as the internet in the regions remains a pressing issue to ensure the applications will significantly contribute as a sustainable solution.

Objective Two on Digital Payment: The fact that digital payment systems have a positive effect on achieving sustainable goals with $B = 1.864$, $p < 0.000$ confirms that digital transactions help to promote economic engagement and environmental responsibility due to reduced transaction costs and paperless systems. This conclusion is consistent with the observation made by Ratnawati and Soelton (2022), who emphasized that the use of digital payments increases economic well-being by making financial transactions more efficient and environmental by minimizing the use of papers and cards in logistics systems. It is also in tandem with the assertion made by Yang, Su, and Yao (2021) that digital payment systems enhance the development of SMEs by availing financial services to the segment. An area of concern, however, is that although the use of digital payments is positively accepted in developed countries, hurdles such as low literacy levels and inadequate access to digital payment facilities are some of the reasons why some countries have not embraced the system wholly. For example, Mhlanga (2024) has pointed out that while digital payments enhance economic participation, poor education and flawed infrastructure can hinder digital payments' positive impact on the sustainable development agenda.

Objective Three on Blockchain: While it is significant ($B = 1.206$, $p = 0.002$), the Beta of blockchain at 0.289 indicates that it is not as powerful as robo-advisory and digital payments for sustainability goals. This finding aligns with the critique by Mhlanga (2022) which noted barriers such as high costs and complexities in the implementation of blockchain; more so in developing nations. However, the ability of blockchain to facilitate transparency, proper traceability and accountability of various supply chains and financial transactions is still a noble pursuit towards sustainability. This is in line with the study conducted by Zhou et al. (2022), where blockchain was identified as playing an important role in enhancing green finance and sustainable economic development through enhancing transparency in financial and supply chain processes. However,

the technology faces major technical and regulatory constraints, which Al-Qudah, Al-Okaily, and Yadav (2024) note as including regulatory ambiguity and high implementation costs, which may slow down its mainstream use in sustainability initiatives.

The conclusion based on the findings of this study reveals that there is evidence of a positive impact towards robo-advisory systems and digital payment platforms on achieving the sustainable development goal among others. However, the findings are optimistic and they also suggest the need to understand the factors that limit the use of these solutions provided by fintech includes digital inclusion, financial literacy, and policies/ regulations. Therefore, the significant impacts generated by robo-advisory and digital payment systems suggest that they are suitable approaches to apply in financial inclusion and economic development challenges, which are crucial parts of sustainable development. The conclusions drawn in this study are similar to those of Tidjani and Madouri (2024) regarding the role of financial inclusion in ensuring sustainable economic growth in African countries through the use of fintech solutions. Nonetheless, the lesser effect of blockchain indicates that there is a need to invest more in infrastructure and regulation in order tap the benefits that blockchain offers in promoting sustainability.

In terms of practical implications, the study highlights the significance of non-neutral policy measures in the development of the fintech, especially in the less developed countries. The following policy recommendations have been developed for policymakers: upgrade digital environment, increase financial literacy, and search for removal of regulatory hurdles for fintech sustainable development. However, more studies should be conducted on the effects of fintech solutions in different SES settings especially in SSA since fintech has the potential to enhance FI and sustainability. In sum, this study offers theoretical and methodological lessons on how to study the relationship between fintech and sustainable development for future research and policymaking efforts that seek to unlock the potential of fintech to support the United Nations' Sustainable Development Goals (SDGs).

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary of the research findings on the use of FinTech solutions in enhancing the attainment of SDGs with a focus on the NSE. The study specifically assessed the implications of three FinTech solutions: the impact of robo-advisory services, digital payment platforms, and blockchain technology in the realization of the triple bottom line. This chapter gives the conclusions of the study outlined in the previous chapters, the recommendations for any stakeholders, and research implications associated with the conclusions made.

Conclusion

The study concludes that FinTech innovations significantly contribute to sustainable development within the Nairobi Securities Exchange (NSE) ecosystem across economic, social, and environmental dimensions.

1. **Role of Robo-Advisory Services:** Robo-advisory services have democratized access to investment opportunities, particularly for underserved populations, enhancing financial literacy and inclusivity. These services empower individuals to make informed investment decisions, including in sustainable and socially responsible investment (SRI) products, aligning with economic sustainability goals.
2. **Impact of Digital Payment Platforms:** Digital payment solutions improve operational efficiency, accessibility, and financial inclusion within the NSE ecosystem. These platforms have significantly benefited SMEs by enabling seamless transactions and promoting economic activity, thereby advancing social sustainability.
3. **Blockchain Technology's Contribution:** Blockchain fosters transparency, accountability, and environmental sustainability. Its ability to minimize carbon footprints and support green finance initiatives exemplifies its role in sustainable development. Blockchain's verification mechanisms further enhance supply chain sustainability, aligning with global environmental goals.

Recommendations

To leverage FinTech for sustainable development in the NSE, the following recommendations are proposed:

1. **Robo-Advisory Services:**
    i. **Encourage Sustainable Investment Options:** FinTech providers should expand the range of ethical and green investment options available through robo-advisory

services. Emphasizing investments in climate-friendly and socially responsible initiatives will drive both financial literacy and sustainable economic development.

ii. **Regulatory Frameworks for Inclusivity:** Policymakers should establish frameworks that encourage innovation while ensuring inclusivity and protection for all investors, particularly marginalized groups.

2. **Digital Payment Platforms:**
    i. **Enhance Financial Literacy:** Stakeholders should implement educational campaigns to increase awareness and understanding of digital payment platforms. This can foster wider adoption, particularly among underserved communities, enhancing financial inclusion and social sustainability.
    ii. **Facilitate SME Access to FinTech Solutions:** Financial institutions should develop tailored digital payment solutions that address the unique challenges faced by SMEs, further boosting operational efficiency and economic growth.
3. **Blockchain Technology:**
    i. **Promote Green FinTech Innovations:** Institutions should integrate blockchain technology into green finance initiatives, leveraging its transparency and accountability features to minimize environmental impacts. This includes supporting decentralized finance (DeFi) developments that adhere to sustainability principles.
    ii. **Strengthen Policy and Governance:** Governments and regulatory bodies should enact policies that encourage the adoption of blockchain for sustainable practices. These policies should include standards for verifying environmentally friendly transactions and promoting energy-efficient blockchain applications.

By addressing these recommendations, stakeholders can harness the transformative potential of FinTech innovations to drive sustainable development within the NSE and beyond.

Suggestions for Future Research

While this study provides valuable insights into the role of FinTech in promoting sustainable development, several avenues for future research remain:

1. **Longitudinal Studies**: Further studies can look into the effects of FinTech solutions on sustainability in the long run, especially in emerging economies where FinTech implementation is not as developed.
2. **Sector-Specific Impact**: Future works can expand on how FinTech solutions are adopted in certain sectors like the agricultural or energy sectors to measure their impact in achieving sustainability objectives.
3. **Comparative Analysis**: More specifically, future studies could look into the effectiveness of FinTech solutions in two distinct continents such as Africa and Asia to get insights into how geographical location and culture affect the implementation of these technologies.

Therefore, it can be concluded that this work attests to the importance of digital innovations in achieving sustainable development goals. By understanding the importance of robo-advisory services, digital payment solutions, and blockchain technology, it can be gathered that FinTech plays a crucial role in supporting economic, social and sustainability goals especially in developing markets such as Kenya.

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FINTECH FOR SUSTAINABLE DEVELOPMENT: ASSESSING ITS IMPLICATIONS

Grace Kambua, Muthusi

Master Thesis

Finance and Banking Master Programme

Faculty of Economics and Business Administration, Vilnius University

Supervisor Prof. Dr. Alfreda Šapkauskienė, Vilnius 2024

SUMMARY

73 Pages, 1 figure, 10 tables, 85 references.

This master thesis sought to explore how FinTech solutions can contribute to enhancing the achievement of sustainable development goals (SDGs) within the NSE. Based on three primary goals, the work considers the positive effects of robo-advisory services on the increased investment accessibility and financial literacy and the positive effects of the digital payment platforms on developing financial inclusiveness and business effectiveness, as well as the positive effects of the blockchain technology on making markets more transparent and environmentally friendly.

This research uses pragmatism as its paradigm and makes use of both quantitative and qualitative data. Both descriptive and exploratory statistical analyses were done on data that was collected through structured questionnaires from 154 respondents from NSE listed companies. This research employs both the Diffusion of Innovations Theory by Rogers (1962) and the Triple Bottom Line model from Elkington (1994) to categorize economic, social, and environmental effects.

Key findings reveal

Robo-Advisory Services: These tools enhance financial inclusion and enable tailored investment solutions that support green and socially responsible investments. ***Digital Payment Platforms:*** These systems boost accessibility, operational efficiency, and social inclusivity while supporting SME growth. ***Blockchain Technology:*** It promotes transparency, reduces transaction costs, and facilitates eco-friendly financial practices through decentralized finance applications.

The study concludes that FinTech solutions are pivotal in achieving SDGs by empowering underserved populations, promoting sustainable investment practices, and enhancing environmental accountability. Recommendations include developing supportive policies for green FinTech, encouraging the creation of inclusive financial products, and raising public awareness about the benefits of these technologies.

The findings have implications for stakeholders in the finance field, including policymakers, financial institutions, and technology developers. This study contributes to the academic and practical discourse on sustainable finance, with potential applications in advancing economic, social, and environmental goals.

FINANSINIŲ TECHNOLOGIJŲ POVEIKIO TVARIAM VYSTYMUISI VERTINIMAS

Grace Kambua, Muthusi

Magistro darbas

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Vadovas Prof. Dr. Alfreda Šapkauskienė, Vilniaus 2024

SANTRAUKA

73 Puslapiai, 1 paveikslai, 10 lentelės,85 nuorodos.
Šiuo magistro baigiamuoju darbu buvo siekiama išsiaiškinti, kaip FinTech sprendimai gali prisidėti prie darnaus vystymosi tikslų (DVT) siekimo NSE. Remiantis trimis pagrindiniais tikslais, darbe nagrinėjamas teigiamas robokonsultavimo paslaugų poveikis didesniam investicijų prieinamumui ir finansiniam raštingumui bei teigiamas skaitmeninių mokėjimo platformų poveikis finansinio įtraukumo ir verslo efektyvumo ugdymui, taip pat teigiamas blokų grandinės technologijos poveikis didinant rinkų skaidrumą ir ekologiškumą.
Šiame tyrime kaip paradigma naudojamas pragmatizmas ir naudojami tiek kiekybiniai, tiek kokybiniai duomenys. Tiek aprašomoji, tiek tiriamoji statistinė analizė buvo atlikta remiantis duomenimis, kurie buvo surinkti naudojant struktūrizuotus klausimynus iš 154 respondentų iš NSE biržoje kotiruojamų bendrovių. Šiame tyrime naudojamas Rogerso (1962) inovacijų sklaidos teorija ir Elkingtono (1994) "Triple Bottom Line" modelis, siekiant suskirstyti ekonominį, socialinį ir aplinkosauginį poveikį.
Pagrindinės išvados atskleidžia
Robo konsultavimo paslaugos: šios priemonės didina finansinę įtrauktį ir įgalina pritaikytus investavimo sprendimus, kurie remia žaliąsias ir socialiai atsakingas investicijas.***Skaitmeninės mokėjimo platformos:*** šios sistemos didina prieinamumą, veiklos efektyvumą ir socialinį įtraukumą, kartu remdamos MVĮ augimą.***Blokų grandinės technologija***: Tai skatina skaidrumą, sumažina sandorių išlaidas ir palengvina ekologišką finansinę praktiką naudojant decentralizuotas finansų programas.

Tyrime daroma išvada, kad "FinTech" sprendimai yra labai svarbūs siekiant DVT, suteikiant galių nepakankamai aprūpintiems gyventojams, skatinant tvarią investavimo praktiką ir didinant atskaitomybę aplinkos atžvilgiu. Be kita ko, rekomenduojama plėtoti žaliosioms "FinTech" skirtas paramos politikos priemones, skatinti kurti įtraukius finansinius produktus ir didinti visuomenės informuotumą apie šių technologijų naudą.

Išvados turi įtakos finansų srities suinteresuotiesiems subjektams, įskaitant politikos formuotojus, finansų įstaigas ir technologijų kūrėjus. Šis tyrimas prisideda prie akademinio ir praktinio diskurso apie tvarius finansus, kurį galima pritaikyti siekiant ekonominių, socialinių ir aplinkosaugos tikslų.

ANNEXES

Annex 1. Letter of Introduction

27th September 2024

Grace Kambua Muthusi
Contact: +254 716 790 325
Vilnius - Lithuania

Dear Sir/Madam,

RE: RESEARCH STUDY PARTICIPATION REQUEST

The above refers.

I am a Master's degree student at Vilnius University pursuing Finance and Banking. My research focuses on *FinTech Solutions and Sustainable Development: Assessing the Implications in the Nairobi Securities Exchange (NSE)* within the Kenyan Setting. The purpose of this study is to establish how FinTech innovations, for instance, robo-advisory services, digital payment systems, the blockchain, among other advances are aiding the advancement of the sustainable development goals of the companies on the NSE.

In a bid to accomplish the research goals and objectives outlined above, I humbly appeal to you to complete a research questionnaire. This survey aims to establish pertinent information on the uptake, integration, and impact of sustainability of FinTech practices among the NSE-listed organizations practicing sustainable development.

This research will greatly benefit from your support and noteworthy input. I appreciate your time and effort in advance.

Yours faithfully,

GKM
Grace Kambua Muthusi

Annex 2. Research Questionnaire

This is a purely academic data collection questionnaire aimed at examining the effects of FinTech Solutions and Sustainable Goals: Evaluating the Implication in the NSE. The gathered information will be processed for research purposes only and is expected to enhance the understanding of the study theme.

The information that shall be requested from the respondents will strictly be kept confidential and there is no need to fill in identifiable information. It is requested that the respondents complete the questionnaire accurately and honestly by selecting the appropriate options. Your cooperation is highly valued and will play a decisive role in the achievement of this research objective.

PART A: - INFORMATION ON DEMOGRAPHICS

1. Age:

18-28 { }
29-38 { }
39-48 { }
Above 49 { }

2. Gender:

Male { }
Female { }
Other { }

3. Education Level:

High School { }
Undergraduate { }
Postgraduate { }
Any Other { }

4.Position/Title in the Company

Manager { }
Supervisor { }
Coordinator { }

5. Function within the Department

Finance { }
IT { }
Strategy/Operations { }

6.Years of Experience

Less than 5 years { }

5-10 years { }
11-15 years { }
16+ years { }

PART B: - FINTECH SOLUTIONS

The following are some of the statements concerning available FinTech solutions that can help firms in the NSE to champion sustainable development. Regarding the Robo-Advisory Services, the Digital Payment Platforms, and Blockchain Technology, it is required to indicate the extent of implementation of the listed company measures for each solution. Use a scale from 1 to 5, where:1 = Not at all; 2 = Slight extent; 3 = Moderate extent; 4 = High extent; 5 = Very high extent.

Please answer these questions based on your organization's implementation and adoption of FinTech solutions, particularly those aimed at sustainable development.:-	**1**	**2**	**3**	**4**	**5**
We have implemented robo-advisory solutions to provide personalized, automated investment advice to retail investors, thus expanding access to investment opportunities in the NSE.					
Our company has integrated robo-advisory tools that focus on sustainable and socially responsible investment options to promote financial literacy and sustainable investing					
We have offered customized robo-advisory services that support small investors in accessing diversified and environmentally responsible investment products.					
Our robo-advisory platform has been developed to increase participation in socially impactful investments, aligning with the Sustainable Development Goals (SDGs) for economic sustainability.					
Our robo-advisory solutions actively contribute to the democratization of wealth management by offering low-cost investment services to previously underserved populations.					
We have adopted digital payment systems that facilitate seamless transactions for both large and small enterprises, contributing to operational efficiency in the NSE ecosystem.					

Our digital payment platform supports financial inclusion by providing easy access to secure financial services for previously underserved populations.					
We have integrated mobile-based payment solutions that ensure accessibility and convenience, particularly during critical times such as the COVID-19 pandemic, thereby promoting social sustainability.					
Our company has introduced digital payment systems that enable faster transactions and reduce operational costs, which are essential for enhancing the accessibility and efficiency of the NSE ecosystem.					
We have integrated blockchain technology to enhance transparency and reduce fraud in financial transactions within the NSE, ensuring fair and reliable trading practices					
Our company uses blockchain technology to promote environmentally sustainable operations by supporting the traceability of eco-friendly supply chains and carbon footprint reduction.					
Blockchain technology is utilized to enable decentralized finance (DeFi) solutions that lower transaction costs and promote financial inclusivity for all investors in the NSE.					
We have leveraged blockchain technology to improve the efficiency of financial services, ensuring greater accountability and promoting sustainable economic practices					
Our company employs blockchain to verify transactions in a secure and eco-friendly manner, contributing to global efforts in achieving environmental sustainability goals.					
We have implemented blockchain technology to enhance the efficiency and transparency of corporate governance processes, fostering trust and encouraging long-term sustainable investments.					

PART C: - SUSTAINABLE DEVELOPMENT

Please specify the extent to which you agree or disagree with the following statements regarding Sustainable Development in your company, categorized by Social, Economic, and Environmental factors. For each statement, tick the appropriate option using the scale:1 = Strongly Disagree, 2 = Disagree, 3 = Somewhat Agree, 4 = Agree, 5 = Strongly Agree.

Tick the appropriate option Statements on Sustainable Development	1	2	3	4	5
Our company actively promotes social inclusion by supporting policies that ensure equal opportunities for all employees, regardless of gender, race, or socioeconomic background					
We prioritize employee well-being through offering health programs, work-life balance initiatives, and safe working conditions to ensure a socially sustainable workforce.					
Our company invests in community development programs that address the needs of local populations, thereby fostering long-term social sustainability.					
We support educational and skill development programs for employees and the broader community to enhance social mobility and inclusion.					
Our company encourages diversity and cultural sensitivity in our business practices and corporate culture, fostering a socially inclusive environment.					
Our company has adopted strategies to improve the economic stability of the organization, ensuring long-term profitability while balancing sustainability goals.					
We prioritize investments that support sustainable economic growth, such as eco-friendly technologies and innovative financial models for long-term financial success.					
Our company provides financial products and services that support economic empowerment and accessibility for underserved populations.					
We promote the use of sustainable business practices that not only improve our financial performance but also contribute positively to the broader economy.					
Our company actively seeks to minimize economic risks by diversifying revenue streams and fostering partnerships that support sustainable business practices.					

We have set clear economic sustainability targets, such as reducing costs, improving operational efficiency, and ensuring economic resilience in the face of global challenges					
Our company has implemented energy-efficient practices and reduced resource consumption to minimize our environmental impact and promote sustainability.					
We are committed to reducing our carbon footprint through the adoption of renewable energy sources and sustainable operational practices.					
Our company actively participates in environmental conservation initiatives, such as tree planting and waste reduction, to support sustainable ecosystems.					
We ensure that our products and services are designed and delivered in an environmentally responsible manner, focusing on sustainability throughout their lifecycle.					

!! !! Thank you for your participation !! !!

Annex 3. Companies Listed in NSE

S/NO.	NAME OF CAMPANY	SECTOR
1	Eaagads Ltd.	Agricultural
2	Kapchorua Tea Kenya Plc.	Agricultural
3	Kakuzi Plc	Agricultural
4	Limuru Tea Co. Ltd.	Agricultural
5	Sasini Plc	Agricultural
6	Williamson Tea Kenya Plc.	Agricultural
7	Car & General (K) Ltd.	Automobiles & Accessories
8	ABSA Bank Kenya Plc.	Banking
9	Stanbic Holdings Ltd.	Banking
10	I & M Holdings Plc.	Banking
11	Diamond Trust Bank Kenya Ltd	Banking
12	HF Group Plc.	Banking
13	KCB Group Plc.	Banking
14	NCBA Group Plc.	Banking
15	Standard Chartered Bank Kenya Ltd.	Banking
16	Equity Group Holdings Plc.	Banking
17	The Co-operative Bank of Kenya Ltd.	Banking
18	Express Kenya Ltd	Commercial & Services
19	Hutchings Biemer Ltd	Commercial & Services
20	Kenya Airways Ltd	Commercial & Services
21	Longhorn Kenya Ltd	Commercial & Services
22	Nation Media Group Ltd	Commercial & Services
23	Scangroup Ltd	Commercial & Services
24	Eveready East Africa Ltd	Commercial & Services
25	Standard Group Ltd	Commercial & Services
26	TPS Eastern Africa Ltd	Commercial & Services
27	WPP Scan Group Plc	Commercial & Services
28	Uchumi Supermarket Ltd	Commercial & Services

29	Deacons East Africa Plc	Commercial & Services
30	Sameer Africa Plc	Commercial & Services
31	Nairobi Business Ventures	Commercial & Services
32	Homeboyz Entertainment Plc	Commercial & Services
33	ARM Cement Ltd	Construction & Allied
34	Bamburi Cement Ltd	Construction & Allied
35	Crown Paints Kenya Ltd	Construction & Allied
36	E.A. Cables Ltd	Construction & Allied
37	E.A. Portland Cement Co. Ltd	Construction & Allied
38	Total Kenya Ltd.	Energy & Petroleum
39	KenGen Plc	Energy & Petroleum
40	Kenya Power & Lighting Plc.	Energy & Petroleum
41	Umeme Ltd	Energy & Petroleum
42	Jubilee Holdings Ltd	Insurance
43	Sanlam Kenya Plc.	Insurance
44	Kenya Re - Insurance Corporation Ltd.	Insurance
45	Liberty Kenya Holdings	Insurance
46	Britam Holdings Plc.	Insurance
47	CIC Insurance Group Ltd.	Insurance
48	Centum Investment Company Ltd	Investment
49	Olympia Capital Holdings Ltd	Investment
50	Trans-Century Ltd	Investment
51	Home Afrika Ltd	Investment
52	KurwituVentures Ltd	Investment
53	Bamburi Cement Ltd	Manufacturing & Allied
54	Crown Paints Kenya Ltd	Manufacturing & Allied
55	E.A. Breweries	Manufacturing & Allied
56	Kenya Orchard Ltd	Manufacturing & Allied
57	BOC Kenya Plc	Manufacturing & Allied
58	Unga Group Ltd	Manufacturing & Allied

59	British American Tobacco Ltd	Manufacturing & Allied
60	Safaricom PLC	Telecommunications
61	ILAM Fahari I-REIT	Real Estate Investment Trust
62	Stanlib Fahari I-REIT	Real Estate Investment Trust
63	Uchumi Supermarket Ltd	Retail
64	Kenya Airways Ltd	Transport
65	Sameer Africa PLC	Diversified Holdings
66	Nation Media Group Ltd	Media