The Role of Fintech in Facilitating Access to Green Finance in South Africa

Jayesh Singh

2767037

2767037@students.wits.ac.za and +27 825714260

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Supervisor: Prof. Tendani Mawela

ABSTRACT

This qualitative study investigated the part of Fintech in enhancing access to green finance products for individual Green Energy Transition (GET) projects in urban South Africa, which focussed on Gauteng Province. The research aimed to address gaps between ambition and action by exploring how technology enabled financial platforms supported participation in sustainable energy initiatives. Through semi-structured interviews with 20 participants, comprising of users and non-users of green finance product, the study examined four key areas in the accessibility of green finance via Fintech platforms, financial literacy related to green finance, the influence of government policies and regulations, and opportunities for increasing Fintech adoption.

The findings indicated that affordability remained a significant barrier despite the potential of Fintech platforms to simplify loan applications and investment procedures. Participants highlighted the need for rental options, subsidies, and clear regulatory frameworks to make green finance more inclusive. Financial literacy was identified as another critical factor, with hard-to-understand documentation and insufficient awareness that hindered adoption. Government-led education campaigns and collaborations with Fintech companies were suggested as effective strategies to bridge these knowledge gaps. Furthermore, inconsistent policies and municipal fees were found to undermine incentives, which emphasised the importance of supportive regulations and inter-sectoral cooperation.

The Multi-Level Perspective (MLP) framework was used in the study analyses on how technological advancements (niche), institutional practices and policies (regime), and broader societal pressures (landscape) interacted to shape green finance adoption. Key recommendations included expanding tax rebates to cover additional components like inverters and batteries, the promotion of community-based educational programs, the creation of partnerships between governments

and Fintech companies, and the development of user-friendly digital tools to simplify green finance processes.

This research contributed to the growing body of literature on green finance and Fintech, which offered actionable insights for policymakers, financial institutions, and stakeholders aimed to promote sustainability in urban South Africa. The combination of innovative technologies, targeted education, and supportive regulations, highlighted in the study created a pathway for an enabling environment for wider individual participation in GET projects, ultimately contributing to a more sustainable and equitable future.

KEYWORDS

Green Finance, Fintech, Financial Literacy, Government Regulation, South Africa, Gauteng Province, Qualitative, Sustainability

DECLARATION

I, Jayesh Singh, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Management in the field of Digital Business at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Name: Jayesh Singh Signature: 

Signed at ……Johannesburg……

On the ……19th…….. day of ……February 2025..

DEDICATION

This research is dedicated to the unwavering strength and resilience of cancer patients, whose journeys inspire us to confront challenges with courage and determination. During this study, both my sister and mother-in-law received a cancer diagnosis, reminding me of the profound impact that adversity can have on individuals and families. To them, and all who face life's toughest trials, I offer this research as a testament to staying strong and finding pathways forward even in the most challenging circumstances.

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To my wife, Danya Jones-Singh, thank you for your continuous support, being patient, your motivation, making sure I always have something to eat during those long nights and always being there during this process.

To all my colleagues and friends, your words of encouragement has made a positive impact on me to continue pushing harder.

To my fellow students, we have been through ups and downs. The conversations and discussions helped shape a more positive mindset. Let us make a positive difference to our beloved South Africa.

To all participants, thank you for your participation in providing feedback, your views, and perceptions in this research.

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4IR- 4th Industrial Revolution

AI/ML- Artificial Intelligence/Machine Learning

BI- Bank Indonesia

CCICED- China Council for International Cooperation on Environment and Development

EBB- Energy Bounce Back Loan Guarantee Scheme

ESG- Environmental Social and Governance

FI- Financial Institute

FSCA- Financial Sector Control Authority

GET- Green Energy Transition

IMF – International Monetary Fund

MLP- Multi Level Perspective

NGO- Non-Government Organisation

OJK- Indonesian Financial Services Authority

PV- Photovoltaic

SDG – Sustainable Development Goals

UN- United Nations

CHAPTER 1. INTRODUCTION

1.1 Statement of purpose

This *qualitative* study aims to investigate how technology-enabled financial platforms (Fintech) facilitate *access* to loans and investments for individual Green Energy Transition (GET) projects in urban *South Africa.* The research, which focused on *Gauteng province* as the case of interest, seeks to understand the factors influencing green finance uptake using technology as well as the experiences of the beneficiaries of Fintech and contribute towards a more inclusive green finance landscape.

1.2 Background of the study

The world is at a crossroads and required clarity on how to grow economies forward but at the same time to safeguard our planet for the future. Green finance, an expanding field, provides a capable solution to direct investments towards environmentally friendly projects (Ozili, n.d.). This approach supported a sustainable future by promoting clean energy, resource conservation, and climate change mitigation. Developing nations face a particularly urgent challenge. While economic growth remains a priority, rising concerns about climate change and unsustainable debt burdens pose significant threats (Alayza et al., 2023). Green finance provides a potential pathway for these nations to navigate this complicated ecosystem.

South Africa is a country blessed with abundant solar resources and therefore presents a unique case study. Harnessing this renewable energy source offers a promising solution to the country's ongoing energy crisis (Lamidi & Juta, 2024). Globally, there is a surge in household interest in renewable energy, particularly rooftop solar. Falling costs and rising electricity prices have fuelled this trend (Irena & CPI, 2023). The benefits of solar photovoltaic (PV) technology go far

beyond environmental gains and its adoption acts as a powerful economic driver, creating a multitude of employment opportunities across the entire solar energy value chain (Ogoegbulem et al., 2022). This aligns with the broader notion that technological innovation plays a crucial part in achieving sustainability. As Huang (2021) emphasised, as societies grapple with environmental, economic, and social challenges, the pursuit of sustainability has become a critical focus whereby technological innovation emerges as a central solution, influencing everything from prosperity, consumption patterns, to social relations and cultural development.

The financial system acts as a critical bridge, channelling resources from households and institutions to businesses that require funding for renewable energy projects (Qadri et al., 2024). Banks and businesses were the world's top private funders of renewable energy projects in 2020, providing nearly 85% of all private renewable energy investment (Irena & CPI, 2023). However, traditional financial institutions often have stringent eligibility criteria, potentially excluding a significant portion of the population from participating in green initiatives. Participating in green finance initiatives can be a win for banks and as highlighted by Yang (2024), it enhanced their social reputation by demonstrating a commitment to environmental responsibility, while also nurturing long-term customer relationships through predictable cash flows from sustainable projects with extended lifespans.

Financial inclusion, defined as access to a broad range of financial services, has been linked to a decrease in CO2 emissions in emerging economies (Du et al., 2022). Fintech, a quickly growing field that influences technology to revolutionise the financial sector, provided a solution to bridge the accessibility gap (Harsono & Suprapti, 2024). Therefore, by educating communities about diverse financial services beyond basic savings and withdrawals, Fintech’s can empower individuals to participate in green finance initiatives (Hasan et al., 2021).

Effective financial inclusion and literacy hinges on collaboration between various financial and economic stakeholders, with the FSCA as the financial institutions

regulator, utilises its position to drive targeted initiatives that enhance access, usage, and quality of financial products and services, (Department :National Treasury of South Africa, 2023). A study by Liu et al. (2022) on financial inclusion, green finance and green economic performance in China provided valuable insight that financial inclusion can be a powerful tool for promoting environmental sustainability, and achieving a green economy requires a multi-pronged approach which involved financial reforms, technological advancements, and collaborative efforts between various stakeholders. Therefore, achieving a green economy, required a multi-directional approach involving financial reforms, technological advancements, and collaborative efforts from diverse stakeholders.

The South African government can benefit in reaching its goals, by ensuring a co-operative approach integrating 4IR technologies, the circular economy, and collaboration among diverse stakeholders (political, industrial, academic, and civic), which is key to achieving inclusive, sustainable growth aligned with the UN's Sustainable Development Goals (SDGs) (Hoosain et al., 2020). Financial technology also referred to as Fintech, uses innovative technologies to improve and automate the delivery of financial services (Valavan, 2023). South Africa presented a compelling case for exploring the part of Fintech in promoting individual access to green finance. Driven by surging demand, the global energy storage market saw a record-breaking almost tripling in size in 2023, with residential batteries expected to dominate demand in Europe, the Middle East, and Africa, (Nsitem, 2024), and provided valuable insight into the potential for individual participation. Even though there are a variety of potential financing solutions, securing sufficient funding remains the primary obstacle to Africa's large-scale shift towards renewable energy (World Economic Forum, 2021). Fintech therefore provided a glimmer of hope.

Fintech platforms possessed several key advantages that could enhance individual access to green finance promoting efficiency and accessibility. Fintech platforms can streamline loan application processes, credit assessments, and

investment procedures, making it easier for individuals to participate (Jarvis & Han, 2021).

1.3 Research problem

Limited access to credit and investment hinders the development of Green Energy Projects, especially for individuals residing in urban areas of South Africa. This lack of financial resources acts as a major bottleneck, despite the potential for urban residents to contribute significantly to the country's transition towards a more sustainable energy future. A study, conducted by Uhunamure and Shale, (2021) concluded that the weakness finds several roadblocks to wider use of renewable energy, including slow government approvals, limited public knowledge, and the high upfront costs of building infrastructure on renewable energy in South Africa. Chenguel and Mansour (2024) argue that green finance is not yet a true solution due to limitations which are a lack of incentives, consideration of climate costs, and standardised regulations are hindering the effectiveness of green finance, and significant efforts are needed to make it work to enhance the access to green finance. The study which was based in China and provided valuable insights whereby climate costs, regulations and incentives vary across regions countries therefore emphasising the need for further research. These challenges therefore outlined the need to understand how individuals participate towards the green energy transition, projects and having access to finance.

There was a need to investigate how technology can enhance efforts towards promoting access to credit and investments for green energy projects participation. The part of Fintech’s needs to be interrogated in terms of green finance options and societal progress. Research done by Kwong et al., (2023), argues that green finance and financial technology (FinTech) are crucial for societal progress, highlighting the need for further academic research to catch up with the everyday advancements in green FinTech solutions. This study investigated how Fintech platforms can overcome barriers to individual

participation in green energy transition projects in urban South Africa, particularly in Gauteng Province, given these gaps and inconsistencies in green finance access.

1.4 Research objectives

This research objectives were to:

- Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.

- Evaluate the effectiveness of existing initiatives in promoting financial literacy and awareness of green finance using technology.

- Examine the part of government policies, regulations, and financial institutions practices in promoting the availability and accessibility to green finance products.

- Identify the key challenges and opportunities associated with financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.

1.5 Rationale

The global imperative for a sustainable future necessitates a financial system that adopts green innovation and economic development. Green finance acts as a catalyst in this regard, facilitating the flow of capital towards clean technologies and projects (Liu & Li, 2024). This aligned with the ambitions of South Africa's green economy transition, which requires a financial system that overcomes funding hurdles for renewable energy projects (Mansour, 2023). Nonetheless, achieving the UN's Sustainable Development Goal 7 which is clean energy and the Paris Agreement's climate targets, demands more than just large-scale

initiatives. Individual participation in urban Green Energy Transition (GET) projects is crucial (United Nations Department of Economic and Social Affairs, 2023).

While South Africa has witnessed notable growth in renewable energy, a significant barrier remains - the high upfront costs associated with solar panels, inverters, and storage systems can be prohibitive for many individuals residing in urban areas (Moner-Girona et al., 2022). International support mechanisms have played a part in subsidising these technologies (Uhunamure & Shale, 2021). However, for widespread adoption and a sustainable green transition, empowering individuals to become active participants is essential. The limitations of traditional financial institutions come into play whereby the (International Monetary Fund, 2023), highlighted a recent decline in credit access for businesses, suggesting that traditional institutions may not fully accommodate to the unique needs of individual participation in GET projects. The pandemic, however, highlighted the potential of digital finance and Fintech solutions for reaching underserved populations (International Monetary Fund, 2023). This aligned with the growing interest in green banks across Africa, indicating that traditional financial structures may need to adapt to meet the specific requirements of sustainable development projects (Shipalana, 2020).

The growing field of Fintech provides a promising avenue for exploration. Zhang (2023) emphasised the widespread adoption of digital financial tools, such as mobile apps for banking activities. This digitalisation trend paves the way for Fintech platforms to potentially revolutionise access to green finance for individuals. The surge in green finance research globally. Mudalige (2023) highlighted its critical role, but a gap exists in understanding how to bridge the "green finance gap" for individuals in developing countries like South Africa (Abdul Gafoor et al., 2024; Tarawneh et al., 2024)

The rationale for this research lied in addressing a critical gap within the South African financial and environmental ecosystem. The global push toward sustainable development, as outlined in the United Nations' Sustainable

Development Goals (SDGs) and the Paris Agreement, necessitates a financial system that supports green innovation and economic development. In South Africa, despite the growing urgency of transitioning to renewable energy sources due to the ongoing energy crisis, significant barriers persist, particularly for urban residents seeking access to green finance products. These barriers include high upfront costs, limited awareness, inadequate financial literacy, and restrictive government policies.

This study was motivated by the need to understand how fintech platforms can bridge these gaps and facilitate individual participation in green finance initiatives. By focusing on Gauteng province, an economically significant region with a growing emphasis on sustainability, the research aims to uncover the specific challenges and opportunities faced by urban residents. Furthermore, it seeks to explore the interplay between fintech solutions, financial literacy, government regulations, and societal awareness in promoting a more inclusive and accessible green finance ecosystem. Ultimately, the findings contributed to the development of strategies that enhance individual participation in green energy transition (GET) projects, creating a more sustainable future for urban South Africa.

1.6 Delimitations of the study

This study deliberately focused on urban residents within Gauteng province, South Africa, based on the region's economic significance and growing emphasis on sustainability initiatives. Although this decision limits the applicability of findings beyond the selected context, it enabled an in-depth exploration of how Fintech platforms influence access to green finance within an environment characterised by high digital connectivity and increasing energy demand. The urban setting also allowed for a closer examination of individual-level experiences with Fintech-driven financial services, which may differ significantly from rural contexts.

The study further narrowed its scope to green finance adoption related to solar panel installations. This focus was chosen due to the current electricity crisis in South Africa, which has increased public interest in solar solutions and created a relevant and timely case for exploring green finance mechanisms. Although other forms of clean energy financing exist, the emphasis on solar energy aligns with the lived realities and concerns of participants during the research period.

Similarly, the research concentrated on a specific set of Fintech platforms operating in the selected urban area. This allowed for a detailed analysis of how existing digital tools are used to facilitate green finance access however, it represents only a small portion of the broader global landscape of Fintech innovations in sustainable finance. Future studies could explore a wider variety of Fintech offerings across different regions and clean energy applications to build upon the insights gained here.

1.7 Definition of terms

Green finance: relates to financial instruments and services that endorse environmentally sustainable activities within the scope of this study and these may encompass funding options for energy-efficient enhancements to residences, investments in renewable energy initiatives, or the advancement of sustainable infrastructure (Kahraman, 2022; Li, 2023).

Financial literacy: Financial literacy, as examined in this research, means the ability, proficiency, and assurance individuals possess to make informed choices regarding green financial products and effectively manage their finances in accordance with sustainability objectives (Hasan et al., 2021).

Fintech: is an abbreviation for Financial Technology, which is the utilisation of advancements in technology to provide financial services. It encompasses digital innovations such as mobile applications, web-based platforms, and automated financial tools that aim to improve the efficiency, accessibility, and affordability of financial products and services. (Valavan, 2023). The examination in this

instance concentrated on the part of Fintech innovations such as mobile applications or web-based platforms in streamlining the accessibility to green finance offerings for individuals.

1.8 Assumptions

This research assumed that a basic level of financial literacy and access to technology existed among the urban population in Gauteng. Additionally, it was assumed that the chosen fintech solutions were user-friendly and provided clear information about green financial products. The study also assumed there was an interest in and demand for green technologies and environmentally friendly projects among citizens residing in the Gauteng province. Furthermore, the researcher presumed that participants would feel comfortable sharing their experiences and perceptions during interviews, despite potential sensitivities around financial limitations or challenges. Another assumption made was that the sample size of 20 participants would be sufficient to capture diverse perspectives within the target population.

The researcher acknowledged these assumptions and conducted pilot interviews to assess their validity within the chosen urban area. Based on feedback from the pilot phase, refinements were made to ensure the assumptions better aligned with the specific situation. This iterative process helped strengthen the study’s foundation and ensured its relevance to the local environment.

CHAPTER 2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

The literature review for this study investigated the challenges and opportunities surrounding green finance accessibility for individuals in Gauteng province, South Africa. Green finance, encompassing financial products and services that support environmentally friendly projects, is crucial for achieving a sustainable future. Individuals play a significant part of this transition by initiating green energy projects at the household or community level. Green projects such as installing solar panels or implementing energy-efficient upgrades, contribute to a greener environment, however, accessing green finance can be a significant hurdle. This limited accessibility hindered individuals' ability to contribute to a greener future and participate in the green energy transition.

This critical review of scholarly articles aimed to identify existing barriers and explore potential solutions to promote green finance accessibility for individuals in Gauteng. The review was structured by sub-objectives whereby each section focuses on a specific aspect of the topic.

Green finance and fintech

- Green finance for individuals
- Fintech and green finance relationship

Understanding Financial literacy on green finance

- Effectiveness of technology programs for financial literacy
- Impact of awareness

Policy, Regulation, policies, and green finance

- Shaping the green finance Ecosystem: Policies and regulations

- Assessing policy effectiveness: policies and regulations

Gaps and opportunities

By reviewing existing knowledge and identifying key challenges and opportunities, this literature review aimed to voice clear propositions on how to enhance green finance accessibility for individuals. These propositions inform further research on effective strategies and ultimately contribute to the development of green finance using fintech.

2.2 Fintech bridging the Green Finance Gap

The increased focus on environmental sustainability has led to the emergence of green finance which is quickly growing sector that aims to channel financial resources towards environmentally friendly projects and initiatives (Li, 2023). The literature also goes into Fintech (financial technology) as a tool to bridge this gap and facilitate broader participation in green finance initiatives (Liu & You, 2023). A key challenge lies in raising public awareness about green financial products and empowering individuals to participate in the green economy (Kahraman, 2022) and therefore a positive correlation between financial literacy and sustainable entrepreneurial activity, suggests that financially literate individuals are more likely to engage in sustainable business practice (Sharma & Choubey, 2022). Governments and regulatory bodies play a critical part by establishing policies and regulations that encourage financial institutions to invest in sustainable activities (Wang et al., 2023).

2.3 Green Finance and Fintech

The growing urgency of environmental sustainability has spurred the development of green finance, a sector dedicated to mobilising financial resources for environmentally friendly projects and initiatives. This review explored the potential of Fintech (financial technology) to bridge the gap between

traditional financial institutions and individuals seeking to participate in the green economy.

2.3.1 *Green finance for individuals*

Green finance refers to funding for public and private investments aimed at environmental improvement (Fu et al., 2024). Green financing solutions like loans, bonds, investments, and funds act as a catalyst for clean tech development and financial sector innovation (Sulaksana, 2023). These investments can target areas like energy efficiency, renewable energy, and pollution reduction efforts (Lindenberg, 2014).

Green finance also encompassed the financial systems that support these initiatives. Green finance is made up a different products and according to Kahraman (2022) green loans, mortgages, and credit cards are available for individuals, while companies have access to project finance, securities, leasing, and carbon-focused funds. Ferrer et al. (2021) highlighted that green investments fall into two categories that are fixed-income green bonds similar to traditional bonds, and green stocks that behave more like general stocks, presents distinct risk-reward opportunities. Green loans specifically target environmentally friendly projects that aim to improve our surroundings and lessen negative environmental impact (Niyazbekova et al., 2024).

Green finance benefits individuals and even one-man businesses to contribute to environmental well-being while potentially accessing favourable financial options. Sulaksana (2023) provided insights that concluded that with the implementation of green financing by individuals and small businesses, financial instruments like green loans, green bonds, and green investments are more accessible. Focusing on clean energy innovation can drive economic growth by creating new technologies (Fintech's) and improving business performance (Rustiarini et al., 2022 ; Mukhammadkosim Ogli Nabiev, 2023), however, green finance also has its drawbacks. Market inefficiencies from financing and a lack of financial rewards for investors are hindering green development efforts (China

Council for International Cooperation on Environment and Development (CCICED) Secretariat, 2023). Evidence from China highlighted high costs for green products and services require a more supportive financial system to accelerate green technology innovation (Mansour, 2023).

Aluwani (2023) found that as the use of renewable energy in agriculture increased agricultural economic growth appeared to decrease. This is counter intuitive because renewable energy is often seen as a way to improve sustainability and potentially reduce costs in the long run (Aluwani, 2023). Although the study relates this to high costs, other factors like knowledge gaps linked to literacy and awareness on adopting new technologies, and uncertainties of government regulations could impact the costs. The development of green finance in underdeveloped areas is hindered by a combination of factors which includes inadequate government support, insufficient infrastructure and limited resources which must be addressed to drive progress (Zhuang et al., 2023).

A positive and significant relationship exists between people and commitment to environmental sustainability and access to financing (Dzomonda, 2022). This suggested that individuals and one-man businesses demonstrating eco-friendly practices might be viewed more favourably by green finance providers in South Africa. Financial providers need to address barriers to inclusive finance and develop innovative solutions to meet the needs of local green entrepreneurs (Hattingh & Appies, 2022). Therefore, by exploring this potential connection between sustainability, access to financing for individuals and small businesses, contributed to a more inclusive and sustainable financial ecosystem.

2.3.2 *Fintech and green finance relationship*

Fintech refers to a range of technologies and services that aim to make financial processes quicker, cheaper, and more accessible for both businesses and individuals (Valavan, 2023). The rise of FinTech disrupts banking with innovative financial products for digital payments, lending, wealth management therefore creating both opportunities and challenges (Zhao, 2023). Traditionally, access to

credit has been heavily reliant on banks, with their efficiency impacting loan availability (Osei-Tutu & Weill, 2022). Increased bank efficiency encourages firms to seek loans, improving credit access, particularly in stable economic environments. However, consumer expectations have shifted towards personalised financial products, quicker service, and streamlined digital experiences (LaPlante & Watson, 2018). To meet these demands, traditional financial institutions (FIs) are actively integrating Fintech solutions, including process digitization, big data analytics, and mobile-based financial products (LaPlante & Watson, 2018).

The rise of Fintech lenders disrupts the consumer lending space, challenging established banks (Hughes et al. 2022). The growing competition in the financial ecosystem, powered by innovative solutions, has the potential to improve access to green finance products for consumers (Istudor et al., 2022). This competition has the potential to improve credit access and lending efficiency for borrowers, ultimately benefiting green finance initiatives.

Fintech, with its unique blend of financial innovation, technological integration, and platform capabilities, is positioned as a key driver of sustainability for individuals and across various industries (Liu et al., 2024). Green finance, on the other hand, channels investments towards environmentally friendly projects like renewable energy, presents returns to lenders and investors while promoting environmental protection Ozili (n.d.). A diverse group of institutions, including banks, investors, research bodies, and government agencies, contribute to the growth of green finance (Li, 2023; Mahesh et al., 2022).

Huijuan and Guangyu (2023) introduced a unique risk assessment model for green Fintech loans offered by banks in the digital age. Their model combined two theories, creating a quantitative system that considered both traditional risks and the green factors specific to these loans. FIs and Fintech's can therefore make better lending decisions and achieve long-term success in the green finance market by proactively identifying and managing these risks.

The growth of Fintech expands loan options and intensifies competition, which in turn drives more bank lending that fuels investment (Ding et al., 2022). This research highlights a potential link between Fintech and increased bank lending but does not definitively prove that Fintech directly causes more bank loans. Further exploration into the impact of Fintech on financial inclusion, development, and its influence on loan stability and non-performing loans (Ozili, n.d.) strengthened the understanding of the link between Fintech and traditional bank lending in the background of green finance.

In conclusion, Fintech and green finance exhibits a mutually beneficial relationship. Fintech's innovative solutions address the increasing needs of consumers and businesses, while its digital platforms offer prolific ground for the expansion of green financial products. This presents an opportunity to enhance individual participation in the Green Energy Transition (GET) in South Africa, particularly within the urban setting of Gauteng Province.

2.3.3 *Proposition 1*

Increased access to green finance products through Fintech platforms will lead to greater individual participation in the Green Energy Transition (GET) in urban South Africa (Gauteng Province).

2.4 Understanding Financial Literacy and Green Finance Awareness

Increasing public participation in green finance initiatives requires not only access to financial products but also a strong understanding of green Finance options. This section of the literature review explored the part of financial literacy and awareness campaigns in creating informed decision-making and promoting participation in green finance.

2.4.1 *Effectiveness of technology programs for financial literacy*

Financial literacy plays an important part in financial inclusion and green finance initiatives. In a recent study by Todorov et al. (2023), with the aim to investigate the link between financial literacy and greenhouse gas emissions (carbon footprint), results concluded that financial literacy can be a double edged sword for the environment. The outcome on analysing data from 137 countries highlighted that low literacy rates in developing countries leads to high emissions and high literacy in developed countries can reduce carbon footprint. As financial literacy increased in underdeveloped countries, income, the welfare the individual consumption increased which led to the increased emissions, however, once the person reached a certain stage of economic freedom, a reverse in the relationship was observed. Research by Rath and Patra, (2023), emphasises the distinction between basic literacy and financial literacy, which equips individuals for financial decision-making therefore according to Lee and Huruta (2022) technology can boost financial literacy and empower informed choices in green financing projects. Kumari and Harikrishnan (2021) further highlight that financial knowledge gaps in sustainability exists despite financial awareness, suggesting the need for education and technology to empower informed decisions for climate change. Financial literacy empowers people to participate in the financial system, as shown by studies linking it to more bank accounts, credit access, and account ownership (Koomson et al., 2022).

Fintech combines affordability and accessibility of financial services with educational programs (Dinya Solihati et al., 2023). Studies conducted by Matsepe and Van Der Lingen (2022) found that general awareness of new technologies leads to adoption, with specific exposure to AI/ML driving short-term use, while long-term use depends on how relevant the technology is to daily life. They found this true in banking and negative experiences with new technologies that prevented adoption, highlighting the importance of clear introductions through trusted sources to increase uptake. Despite ranking higher than upper-middle-income nations, South Africa's financial literacy falls short of high-income

countries, suggesting a need for stronger financial education (Dhlembeu et al., 2022). In a qualitative study assessing usability of an application, Dietrich et al. (2023) found that users faced limited adoption due to language barriers, data costs, smartphone access issues, and app functionality problems and provided recommendations that emphasised the need for multilingual support, personalised content and frequent app updates for optimal user experience. This demonstrates the how technological barriers can hinder effectiveness of programs. Research by Omotosho (2021) identifies key areas for improvement in mobile banking apps whereby banks can enhance user satisfaction by addressing user complaints, streamlining app functionalities, and educating users about existing features. This focus on user experience leads to a more positive and engaging mobile banking experience. Malhotra and Baag (2023) emphasised that social learning through peer influence within self-help groups effectively promotes financial knowledge and behaviour, highlighting its potential as a tool for building strong financial literacy. User experience on financial literacy programs can therefore be shared by people based on their experiences by using technology. On the contrary research in Indonesia by Novianti and Retnasih (2023) found that despite the rise of financial technology (FinTech), this study found no direct link between FinTech use and improved financial management behaviours. Therefore, financial inclusion practices differ globally, highlighting the need to understand the core principles driving this variation (Ozili, 2020).

2.4.2 *Impact of Awareness on Green Finance*

Understanding how environmental awareness translates into action is crucial for promoting green finance participation.

A study by Compen et al. (2023) found that online training improved students' financial behaviour (how they manage money) even though it did not significantly increase their financial knowledge. This suggests online training can be a valuable tool for promoting financial literacy to support financial decision-making. This finding suggests effective financial literacy empowers individuals to make

informed financial choices, making online training a potential solution to bridge the knowledge gap and encourage participation in green finance options.

An et al. (2022) explored how Fintech can bridge the awareness-action gap in environmental sustainability by simplifying participation in green initiatives through online platforms. The study suggested that these platforms act as a mediator, translating environmental awareness into action for individuals. Furthermore, considering factors like age and income can inform the design of targeted Fintech solutions to promote equitable access to green finance. A localised approach to environmental policy is more effective than a national one, as it considers unique local contexts and promotes adaptability and resilience, ultimately leading to better ecological outcomes and progress towards sustainability goals (Sinaga & Suryanti, 2024). Research by Zain El Shandidy (2023) revealed that local ecological expertise plays a vital part in informing environmentally conscious ultimately contributing to a more sustainable future. The use of foreign languages in sustainability decision-making can lead to a disconnect between Western sustainability concepts and local African actors, resulting in limited engagement and understanding due to linguistic and cultural biases (Litre et al., 2022). The importance of a more localised approach by fintech's will aid in ensuring they align to overall mandates and tailoring them to individual communities.

Gu et al. (2023) conducted research on green finance and provides valuable insights into issues driving access to green finance and its link to consumer awareness. Gu et al. (2023) studies established a positive relationship between green finance for retailers and consumer interest in purchasing green products and highlights the part of environmental consciousness in strengthening the positive impact of green finance on purchase intentions. These findings emphasise that increased access to green finance for individuals potentially translated to a rise in demand for environmentally friendly products and the importance of consumer awareness alongside access to green finance products.

A study T. C and Melvin (2022) revealed a statistically significant difference in awareness of green banking products between public and private sector bank customers in the Kanyakumari District, in India. Findings were that customers of public sector banks tend to be more aware of these products compared to private sector bank customers and online banking emerged as the green banking product with the highest awareness level among both public and private sector bank customers. Governments can cultivate a culture of critical thinking, encouraging individuals to develop and champion innovative solutions that support a more sustainable future by integrating environmental education, (Tripathy et al., 2024).These findings emphasised the importance of targeted awareness campaigns and technology solutions in making informed participation in green finance initiatives. Although this is limited to online banking, other technology mechanisms was used like Fintech apps to raise awareness. Environmental education programs significantly improved participants knowledge, attitudes and actions toward conservation and sustainability, demonstrating the effectiveness of these initiatives in promoting pro-environmental behaviour and conservation practices (Sofyan A Gani et al., 2023). NGOs play a vital part of driving social change and sustainable development by building collaborative relationships with local communities, governments, and businesses (Nugraha et al., 2024). This highlighted the impact that collaboration and education make towards sustainability.

These findings highlighted the importance of addressing the awareness gap in green finance. Technology-based solutions such as online training modules and Fintech platforms hold promise for building financial literacy specifically focused on green finance, adopting informed participation in green initiatives.

2.4.3 *Proposition 2*

By addressing gaps in technology-based financial literacy programs and tailoring them specifically for green finance, South Africa can significantly improve

individual awareness and understanding, leading to increased participation in green finance initiatives in urban areas.

2.5 Policies, Regulation, and Green Finance

Examining the interplay between government policy, regulatory frameworks, and the development of green finance initiatives, these sections explored how these factors influence the accessibility and attractiveness of green financial products for various stakeholders, with a particular focus on individual participation.

2.5.1 *Shaping the Green Finance Ecosystem: Policies and Regulation*

Government initiatives played a crucial part in shaping the availability of green finance products. The international community has taken crucial steps towards achieving sustainable development through landmark agreements like the UN 2030 Agenda for Sustainable Development. This ambitious framework outlines 17 Sustainable Development Goals (SDGs), along with over 230 indicators and 169 targets, to guide international efforts towards a more sustainable future (Martin, 2023). This global commitment highlighted the importance of integrating social inclusion, environmental protection, and sustainable economic growth into development strategies.

South African government's initiatives therefore played a crucial part in shaping the availability of green finance products for individuals in South Africa. The introduction of a national green finance taxonomy in South Africa marks a significant step towards making a more accessible green finance ecosystem for individuals (Department: National Treasury Republic of South Africa, 2022). This government-backed scheme provided loans and reduces risks for businesses and households to invest in solar energy solutions, promoting individual participation in green initiatives.

In response to unreliable power supply, the South African government launched the Energy Bounce Back Loan Guarantee Scheme (EBB). This initiative provided loans with government backing (20% initial loss covered) for small businesses and households to invest in rooftop solar power, aiming to increase generation capacity and build resilience against power cuts (Department: National Treasury Republic of South Africa, 2023). This initiative concluded on the 30 August 2024.

The South African initiatives highlight the critical part that government plays in shaping the green finance ecosystem for individuals. Governments can unlock individual participation in green initiatives by creating transparency through classification systems like the Green Finance Taxonomy and providing financial support through programs like the EBB. As a result, individuals were empowered to make informed financial decisions that contribute to a more sustainable future.

2.5.2 *Assessing Policy Effectiveness: Encouraging Individual Participation*

Effective policy promotes individual participation through specific instruments. The study by Bayram et al., (2022) provided evidence on how regulation and government assistance have aided in Türkiye's financial technology (Fintech) advancements that have boosted financial inclusion and sustainable practices. The study highlighted a planned regulatory sandbox environment in Istanbul that provides exciting potential for even sooner growth. This adopted collaboration between finance, technology, and regulators while ensuring responsible innovation and continued support for fintech, particularly climate-focused solutions and is crucial to solidify Türkiye's position as a model for sustainable finance in emerging economies. South Africa's existing regulatory framework and financial infrastructure might however require small nuances to replicate what was achieved in Türkiye considering the regulatory ecosystem.

Further studies in Indonesia by Kurniati and Suryanto (2022) have highlighted that the Indonesian government adopted collaboration between traditional banks and fintech companies. This created competition and innovation within the

financial sector, leading to a wider range of green financial products for individuals. Furthermore, Kurniati and Suryanto (2022) emphasised the crucial part of regulatory bodies like OJK and BI in ensuring both sectors operate securely and maintain trust and stability. Regulations that focussed on preventing financial misuse, protecting data privacy, and combating money laundering are essential for building consumer confidence in Fintech platforms, ultimately encourages individual participation in green finance.

The above have examined the relationship between policy, regulation, and green finance accessibility for individuals. The case of South Africa demonstrates the potential for government initiatives to shape the green finance ecosystem. Through the analyses of policies in other countries like Türkiye and Indonesia, along with a critical evaluation of their applicability to the South African situation, this research identified specific policy instruments and collaborative efforts that encouraged wider individual participation in green finance.

2.5.3 *Proposition 3*

Supportive government policies, regulations, and collaborative efforts between regulators and Fintech companies can create an enabling environment that creates wider individual participation in green finance for urban GET projects.

2.6 Gaps and opportunities

The access to green finance for sustainable development is undeniable, yet challenges persist.

2.6.1 *Gaps*

Knowledge gaps in Fintech, financial literacy, regulatory hurdles, and untapped opportunities all act as barriers to wider accessibility and participation in these initiatives as highlighted in Table 1.

Gaps (Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech)	
Report highlighted limitations and gaps that rendered green finance more of an aspirational concept than a tangible reality, urging all stakeholders to collaborate for its effectiveness.	(Chenguel and Mansour, 2024)
Bridging the gap between green finance and traditional financial systems is crucial to overcome adoption barriers and unlock wider participation in sustainable development.	(Debrah et al., 2023)
Study on green finance highlighted a significant funding gap, limited attention from financial institutions, missed international goals.	(China Council for International Cooperation on Environment and Development (CCICED) Secretariat, 2023)
Study identified inadequate policy frameworks, limited access to green finance instruments, and a lack of public awareness create significant hurdles for the development and execution of green projects in India	(Wasan et al., 2024)
Despite the potential of green finance, financial service providers perceived it as risky due to new business models, limited data, and	(Devidze, 2022)

Gaps (Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech)	
changing regulations, further hindered by slow technology adoption for green projects.	
Study highlighted the need for synergy between policymakers, researchers, and financial institutions to advance green finance and ensure its alignment with sustainable development goals.	(Akomea-Frimpong et al., 2022)

Table 1: Gaps in Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech

2.6.2 *Opportunities*

Opportunities in Fintech, financial literacy, defined regulatory options, provides wider accessibility and participation in these initiatives as highlighted in Table 2 below .

Opportunities (Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech)	
This study proposed a multi-level approach to strengthen green finance, including increased investment, targeted incentives, standardised regulations, climate cost integration, public education, strong policy frameworks, and	(Chenguel and Mansour, 2024)

Opportunities (Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech)	
stakeholder collaboration, to bridge the financing gap and accelerate sustainable development.	
Bridging the gap with traditional finance and addressing adoption barriers through Fintech is crucial for wider participation in sustainable development.	(Debrah et al., 2023)
The study recommended that Fintech could support funding gap and limited attention from financial institutions	(China Council for International Cooperation on Environment and Development (CCICED) Secretariat, 2023)
This research recommended to establish accessible refinancing avenues and alternative investment channels for green technology and products, enabling more affordable financing for green initiatives.	(Wasan et al., 2024)
Research suggested that digitalisation, through FinTech solutions and supportive policies, can streamline risk assessment in green lending, making it more attractive for financial institutions.	(Devidze, 2022)

Opportunities (Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech)	
To cultivate a more sustainable financial system, this research emphasised the importance of raising awareness and education on green finance options among both banking professionals and the public.	(Akomea-Frimpong et al., 2022)

Table 2: Opportunities in Access to Green Finance, Green Literacy, Green Regulations and Policies and Fintech

Research highlighted a gap between ambition and action, with limited access to green finance products, inadequate policy frameworks, and a lack of public awareness acting as significant barriers (Chenguel and Mansour, 2024; Wasan et al., 2024). Financial institutions may also perceive green finance as risky due to changing regulations and unfamiliarity with new business models (Devidze, 2022), however, there are opportunities that exist to bridge this gap. Studies propose a multi-pronged approach, including increased collaboration, public education, and standardised regulations (Chenguel and Mansour, 2024; Akomea-Frimpong et al., 2022). Furthermore, Fintech solutions hold immense promise for overcoming these challenges. By streamlining risk assessment and facilitating wider access to green financial products, Fintech plays a crucial part in integrating green finance into mainstream financial systems and creating broader participation in sustainable development (Debrah et al., 2023; Devidze, 2022).

2.6.3 *Proposition 4*

Increased adoption of Fintech solutions, combined with supportive green finance regulations, will improve financial literacy and participation in green finance initiatives within urban areas.

2.7 ANALYTICAL FRAMEWORK

The study used the Multi-Level perspective (MLP) framework as the foundational theoretical framework. This framework supported in understanding how socio technical transitions occur, more so those involving technological advancements, with implications to society and the environment.

2.7.1 *Theoretical Framework*

This research employed the Multi-Level Perspective (MLP) framework that was developed using concepts from sociology, evolutionary economics, history of technology, and political economy, for energy transition, encompassing three interconnected processes by (Geels ,2002). The framework was used to analyse the potential of Fintech platforms in facilitating individual participation in green finance initiatives for urban Green Energy Transition (GET) projects in South Africa. A study by Yudha et al., (2022) utilised the Multi-Level Perspective (MLP) to analyse sustainable transition, specifically the energy sector, and demonstrated its effectiveness as an actionable framework. The MLP provided a valuable lens for understanding socio-technical transitions by considering the co-evolution of three key elements which are:

Technological niches that represented new technologies or practices emerging outside the dominant regime. Due to their smaller scale and isolation from mainstream markets, niche's offer a safe space for exploring unconventional solutions and transformative ideas with minimal risk (Rose et al., 2022). In this study, Fintech platforms were examined as a potential technological niche within the traditional financial ecosystem.

Regimes represented the established practices, rules, and regulations that govern a particular sector. According to (Neacșa et al., 2022), regime is a multi-layered stakeholder ecosystem governed by a defined set of formal, normative, and cognitive principles. The research explored how existing policy frameworks and dominant financial practices influenced the adoption of Fintech for green finance.

Landscape is broader societal setting that shapes technological development and adoption. As highlighted by (Smit et al., 2021), the landscape level acts as a source of external pressure, disrupting the established order maintained by the regime. This research examined the part of financial literacy within the landscape, particularly the effectiveness of technology-based programs in promoting green finance awareness among South Africans.

This research explored the potential of Fintech platforms to facilitate individual participation in green finance initiatives for urban Green Energy Transition (GET) projects in South Africa. The chosen framework, the Multi-Level Perspective (MLP), allowed for a varied analysis by considering three key levels: niche, regime, and landscape.

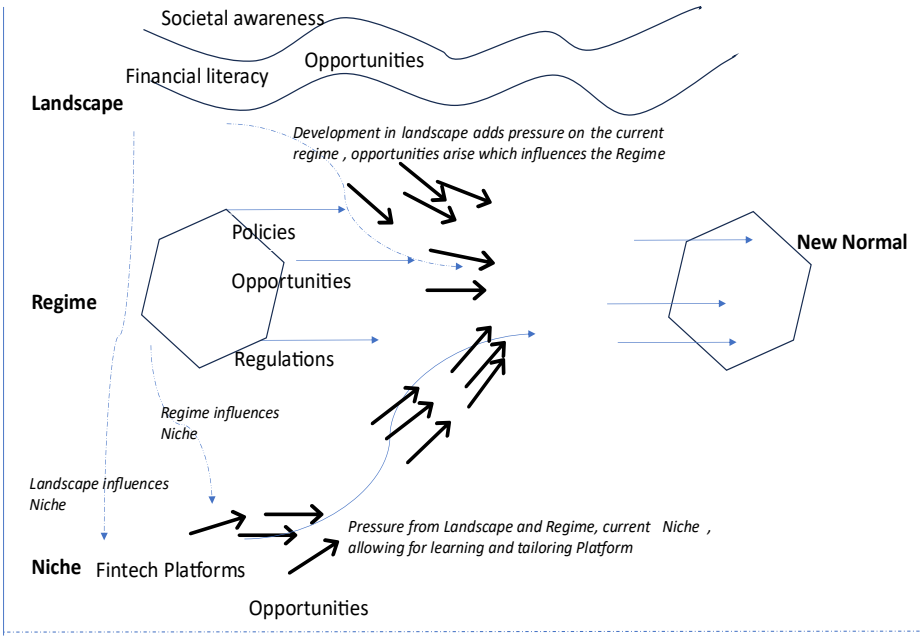

Figure 1 : Multi Level Perspective - Adapted from (Geels, 2011). Authors own construct.

Objective 1: Niche and Technological Disruption

The first objective focused on the niche level, specifically Fintech platforms. It examined how existing platforms can be adapted to function as disruptive forces within the traditional financial system. The research explored how these platforms were modified to offer green loans and investments products tailored to individuals engaged in urban GET projects. This aligned with a core principle of the MLP framework whereby technological niches to present alternative solutions to established systems.

Objective 2: Landscape, Financial Literacy and Green Finance Awareness

The second objective shifted the focus to the landscape level therefore containing the broader societal setting. The research examined the effectiveness of technology-based financial literacy programs in promoting green finance awareness and knowledge among South Africans. The MLP emphasised the influence of the landscape on new technology adoption. Low financial literacy and

lack of awareness about green finance options significantly hindered individual participation in green finance initiatives. The research explored how technology-based programs addressed these challenges and improve the landscape for wider adoption.

Objective 3: Policy Frameworks and Multi-Level Interplay

The third objective examined the interplay between the niche (Fintech) and the regime (dominant practices and policies) levels. This analysis explored how existing government policies and regulations impact the availability of green finance products for individuals and how they interacted with the development of Fintech platforms. The MLP highlighted how the regime level hindered or supported the adoption of new technologies. Through the analyses of policy frameworks and their interaction with Fintech platforms, the research gained understanding of the challenges and opportunities within the current system.

Objective 4: Challenges and Opportunities

The fourth objective influenced the strengths of the MLP framework by applying it comprehensively across all three levels (niche, regime, and landscape) simultaneously. This approach allowed for a holistic examination of both challenges and opportunities for Fintech adoption thereby promoting green finance initiatives. Analysing challenges across all levels revealed issues such as limited functionalities of Fintech platforms for green finance products (niche), restrictive regulations hindering Fintech innovation (regime), or low financial literacy and lack of societal awareness (landscape), therefore, by identifying these challenges, the research then explored potential opportunities for promoting green finance, such as developing user-friendly Fintech features, advocating for policy changes, and designing targeted financial literacy programs.

A major critique is that the MLP places insufficient emphasis on the part of individual and organisational actors in driving change (Smith & Stirling, 2008). Geels, (2011) however the researcher acknowledged this and suggested on

focusing on specific actors within each level. To address this limitation, this research explicitly examined how actors like Fintech's or policymakers influenced the development of green finance initiatives within the MLP framework. Exploration was conducted on how their actions and decisions shaped the evolution of Fintech platforms (niche), policy frameworks (regime), and individual participation in green finance which focus of this research.

Critics also argued that the landscape level can become a catch-all for various external factors therefore reducing its analytical power (Foxon, 2011). This limitation was acknowledged however, while using the landscape level, the research strived to unpack its specific elements within the South African situation. This was done by examining the part of financial literacy levels and the effectiveness of technology-based financial literacy programs in promoting green finance awareness.

2.7.2 *Conceptual Framework*

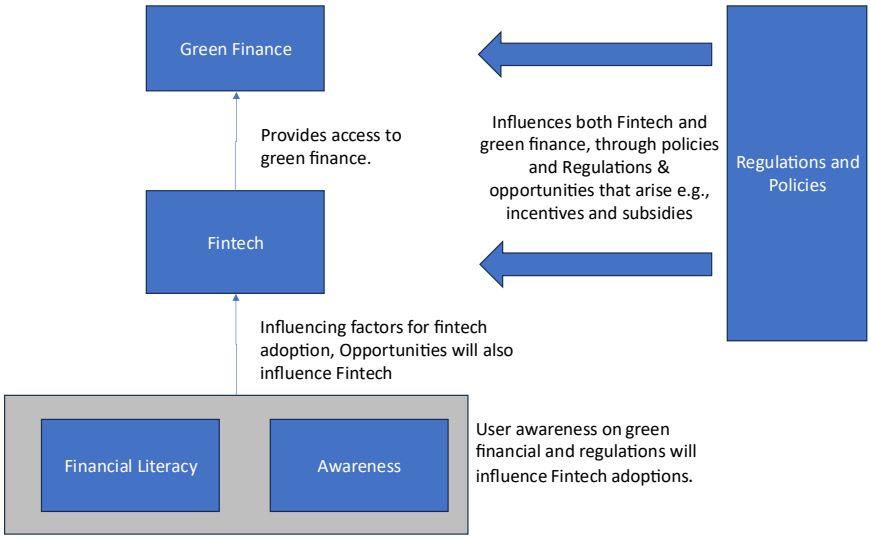

Figure 2: Conceptual Framework: Authors own construct

Green finance- these are the financial products and services which are loans and investments that are used to support the environment friendly initiatives like renewable energy projects and energy efficiency upgrades. Green finance products, like green loan and green financing aim to protect the environment and expand the financial system to include environmentally conscious people (Kahraman, 2022).

Fintech – this refers to the enablement of technology through financial innovation that delivers financial products and services. The rise of Fintech presents an urgent answer to the need for more convenient, secure and quicker payment methods for goods and services (Liang, 2023).

Access to green finance-this refers individual's ability to obtain green finance products and services using the fintech platforms. According to Hemanand et al., (2022), green finance access acts as a key driver of sustainable development by presenting financial backing to initiatives focused on renewable energy, energy efficiency, and environmental protection.

The relationship for these dimensions is:

Financial literacy- this is a positive relationship between financial literacy and access to green finance via Fintech. For individual who have a better understanding of financial products and services, are more likely to be comfortable using the Fintech platforms. Therefore, this allows for individuals to make informed decisions on green finance options.

Awareness- this plays a crucial part on user adoption of the Fintech platforms and accessing green finance. Knowing and understanding regulations and policies on green finance products and services via Fintech contributions can influence decisions on adoption.

Regulations and policies- these can either promote or hinder access to green finance via Fintech's. Regulations that are supportive create a better environment for Fintech innovation and green finance product development and promotion.

2.8 Conclusion of Literature Review

The literature review has identified a detailed relationship of factors influencing access to green finance through Fintech platforms in South Africa. Existing studies explored various aspects, including user awareness of green finance and Fintech, financial literacy requirements for platform use, and the part of government intervention in shaping policies and regulations to promote green finance adoption. These studies often presented both convergent and divergent findings which highlighted knowledge gaps in this area. To address these gaps, this research aim was to build upon the existing body of knowledge by shedding light on the key factors that impact access to green finance through Fintech in the South African situation. Through a series of interviews and data analysis, this study investigated the four research propositions outlined earlier to provide deeper insights into the challenges and opportunities related to utilising Fintech for green finance accessibility in the urban areas of Gauteng province.

2.8.1 *Proposition 1*

Increased access to green finance products through Fintech platforms will lead to greater individual participation in the Green Energy Transition (GET) in urban South Africa (Gauteng Province).

2.8.2 *Proposition 2*

By addressing gaps in technology-based financial literacy programs and tailoring them specifically for green finance, South Africa can significantly improve individual awareness and understanding, leading to increased participation in green finance initiatives in urban areas.

2.8.3 *Proposition 3*

Supportive government policies, regulations, and collaborative efforts between regulators and Fintech companies can create an enabling environment that

creates wider individual participation in green finance for urban Green Energy Transition (GET) projects.

2.8.4 *Proposition 4*

Increased adoption of Fintech solutions, combined with supportive green finance regulations, will improve financial literacy and participation in green finance initiatives within urban areas.

CHAPTER 3. RESEARCH METHODOLOGY

This chapter outlined the methodological approach employed to investigate how individuals in Gauteng Province, South Africa, access green finance solutions through Fintech platforms. The research utilised a qualitative case study design to gain an in-depth understanding of user experiences, perceptions, and challenges. Semi-structured interviews and document analysis were the primary tools for data collection which focused on themes like green finance awareness, Fintech adoption barriers, and user experiences with Fintech applications for green initiatives example solar panel installations. Thematic analysis was used to identify recurring patterns and insights within the data. This research prioritised transferability and credibility by incorporating member checking and triangulation of data sources.

3.1 Research Paradigm

This research adopted an interpretivist paradigm which recognised the subjective nature of individual perceptions and experiences that influence participation in green finance. According to Wiesner, (2022), this approach explored how individuals interpret and give meaning to their experiences with technology, focusing on the "how" and "why" behind these interpretations and Zapata-Barrero & Yalaz (2022), interpretivism emphasises understanding the social situation and subjective meanings people attach to phenomena, allowing for a richer exploration of diversity and its impact.

This approach acknowledged that individuals actively interpret their understanding of green finance based on their experiences and interactions with the world around them. This was crucial for the research as it allowed the exploration of the subjective factors that influence user decisions to participate in green finance initiatives. Through the evaluation of how individuals made use of Fintech platforms, financial literacy programs, and government regulations, valuable insights were gained into the perceived benefits, challenges, and

opportunities associated with green finance adoption. This deeper understanding of user experiences informed the development of more effective strategies for promoting financial literacy, tailoring Fintech solutions, and crafting policies that enhance accessibility and user engagement with green finance in urban areas.

3.2 Research approach

An exploratory qualitative approach was adopted for this research. Qualitative research methods are valuable for developing well-informed policies and practices in green finance and technology (Tomotaki et al., 2023) highlighted the importance of qualitative research. This research followed the qualitative approach to understand experiences and perspectives of the target population to identify potential challenges for interventions and enablers of positive outcomes.

Studies explored green Fintech in India provided rich insights into the intricacies of sustainable financial innovations (Sreelekshmi & Biju, 2023), highlighted the value of qualitative research in understanding challenges.

Qualitative analysis of green finance policies in China helped assess their effectiveness in promoting environmental goals (Wang and Wang, 2023), highlighted policy effectiveness by focusing on the part of qualitative research.

To probe deeper into green finance pilot zones, qualitative research can illuminate how policies create technological advancements in environmentally friendly sectors (Zhang et al., 2022) and emphasised how qualitative research can explore the impact of policies on technological innovation.

Benefits of qualitative research, allowed exploring the why behind user decisions and experiences (McCourt et al., 2023), provided a degree of understanding experiences of underserved communities (Bahner & Lindroth, 2023), empowered one to propose innovative solutions by unpacking the details of the everyday life and considering diverse perspectives (Cruz & Sarmiento, 2022), and crucial for capturing the lived experiences of individuals ensuring the

research reflected the everyday life experiences and informed with inclusive solutions (Read et al., 2023).

This research employed a qualitative approach, which was particularly well-suited for investigating into user experiences and the contextual factors that influence access to green finance and Fintech platforms. The core of this approach is the assumption that user perceptions and decision-making processes were crucial for understanding access patterns to green finance. Additionally, qualitative research identifies the significant part of related factors, such as social norms and economic realities, in shaping the behaviour of users and the effectiveness of green finance policies.

3.3 Research design

The study employed a qualitative case study design to explore how Fintech platforms facilitate access to green finance for individuals in urban South Africa, with a specific focus on Gauteng Province. The decision to adopt a case study approach was based on its suitability for examining complex social phenomena within real-world contexts, particularly when the goal is to understand processes, experiences, and perceptions rather than generalising findings across populations (Baxter & Jack, 2015).

A case study design was appropriate for this research because it allowed for an in-depth exploration of a bounded system —in this instance, green finance adoption through digital financial tools in an urban setting. This aligns with the views of Warren and Bell (2022), who note that case studies are valuable for capturing the interplay between context, actors, and structures within a defined environment. By focusing on Gauteng, a region characterised by economic activity, high energy demand, and increasing interest in solar-based solutions due to load-shedding, the study provided a focused and meaningful insight into how technology influences access to sustainable financial products.

The case study approach also supported the interpretivist paradigm adopted in this research. As outlined by Wiesner (2022), interpretivism recognises that individuals construct meaning through their interactions with systems and technologies. This perspective was central to understanding how users perceive and interact with Fintech-driven green finance offerings, including issues such as trust, affordability, and clarity of information.

Although formal case study methodology often involves multi-method data collection including interviews, observations, and document analysis, this study primarily relied on semi-structured interviews with 20 participants to gather rich, descriptive accounts of individual experiences. Despite the absence of secondary documents in the final execution, the case study framework still offered value by enabling a detailed examination of user narratives and identifying key themes influencing green finance accessibility.

As described by Geels (2002), the case study method is effective for analysing socio-technical transitions, which made it suitable for investigating the evolving relationship between Fintech innovations and green finance adoption. Using this design, the research explored how niche-level innovations (Fintech platforms), regime-level practices (government policies and banking systems), and landscape-level pressures (climate change awareness and energy instability) interact to shape individual participation in Green Energy Transition (GET) projects.

The research design prioritised depth over breadth, aiming to uncover the motivations, challenges, and opportunities experienced by both users and non-users of green finance products. This aligns with broader qualitative traditions that seek to generate understanding through personal narratives rather than statistical representation (Wiesner, 2022).

In summary, the case study design enabled a contextualised and detailed investigation into how Fintech can improve access to green finance at the individual level. While not exhaustive in scope, it provided meaningful insights

relevant to policymakers, financial institutions, and future researchers interested in sustainable finance and technological innovation in emerging economies like South Africa.

3.4 Data collection methods

This study was informed by the collection of primary data to gain better insights into the factors that influenced the access to green finance using Fintech in South Africa. Combining primary data from interviews strengthened qualitative case studies by enabling validation and a fuller understanding of the phenomenon under investigation (Kaufmann et al., 2022).

3.4.1 *Primary data*

Conducting interviews as the primary data collection method promoted a direct link with participants thereby enriching the study's authenticity and capturing the lived experiences within the research area (Kern & Mustasilta, 2023). Another advantage, according to Canaway et al., (2022), of talking directly to participants is that it lets researchers uncover rich details and unique experiences, leading to a more well-rounded analysis. To gain in-depth understanding of green finance adoption in South Africa, this study employed primary data collection through semi-structured interviews. Twenty participants were recruited in the Gauteng province urban area, encompassing a diverse range of stakeholders including solar owners and potential buyers. Through the process of interviews with these individuals directly, the research explored their lived experiences, perceptions, attitudes, and motivations regarding green finance adoption.

3.5 Population and sample

This section explored into the target population and sampling strategy for the research. Understanding who we studied and how we selected participants was crucial to ensure the research gathered the relevant and insightful data.

3.5.1 *Population*

This research investigated factors influencing the adoption of green finance products to green finance in South Africa, focusing on Gauteng province. The target population involved urban residents within this province. Gauteng has economic significance and growing sustainability focus makes it a relevant location to explore green finance adoption. To gain a comprehensive understanding, the research further segmented this population into two sub-groups which are individuals who successfully utilised green finance for solar panels and those interested but have not yet adopted it. Therefore, by analysing experiences from those who have accessed green finance, alongside the challenges faced by those who have not, provided valuable insights into both facilitators and barriers to green finance accessibility using Fintech.

3.5.2 *Sample and sampling method*

To ensure that participants are aligned with the research goals, the study utilised purposive sampling by selecting 20 individuals with specific characteristics and relevant experiences. It started with a few individuals and increased to the required number through referrals of the intended participants required.

By employing a targeted non-probability sampling approach, researchers can select participants with characteristics directly relevant to the research question, yielding a sample that provides great insights into the occurrence being investigated (Baker et al., 2022; Smit et al., 2021). Purposive sampling is crucial in qualitative research as it enables the selection of participants who can provide comprehensive and detailed information, contributing to a thorough understanding of detailed and emotionally laden experiences, as highlighted in studies with interpretivism research paradigms (McInally & Gray-Brunton, 2021). By incorporating snowballing, Moult et al. (2023) highlighted referrals can enrich data collection with diverse perspectives for a more robust and insightful study.

According Subedi (2021), qualitative research prioritises in-depth understanding over broad generalisability and therefore allows researchers to use purposive sampling, selecting a small group of 1-20 people with rich experiences relevant to their specific research question and further highlights this targeted approach facilitates deeper exploration through methods like in-depth interviews, leading to detailed descriptions of the phenomenon under investigation.

3.6 The research instrument

This research utilised a researcher-developed interview guide to collect detailed participant data through in-depth interviews. Crafting research questions that precisely aligned with study aims and conceptual framework, allowed the researcher to collect focused data on both hurdles and possibilities within green finance growth (Guo et al., 2022) and furthermore by exploring interview questions that considered the part of evolving digital technologies in green finance can shed light on how advancements can improve the accessibility and effectiveness of these financial products and services (Wang & Xu, 2023). Piloting interviews before a larger study allowed the researcher to refine their questions, deepen analysis categories, and guarantee the instrument aligned with research objectives (Sándor, 2022). Interview guides can be instrumental for researchers designing digital behavioural interventions by helping them understand user motivations and needs, along with the advantages digital approaches offer for participants (Marcu et al., 2022).These guides helped standardise data collection, enhance the quality of information gathered, and provided a structured approach to interactions, ultimately contributing to the success and effectiveness of the research. Semi structured interview methods enables the gathering of detailed, open-ended insights into participants' perspectives and experiences, requiring key skills such as defining the research purpose, selecting participants, ensuring ethical standards, creating an interview guide, building rapport, and analysing the collected data (DeJonckheere & Vaughn, 2019).

This study used a semi structured interview guide to understand the research gaps highlighted in the above-mentioned literature review. This guide was specifically designed to gather data on participants' experiences, perceptions, attitudes, and motivations related to accessing green finance products through Fintech platforms. By employing the interview guide, the research conducted a systematic and in-depth exploration of the factors influencing access to green finance.

The interview guide investigated a broad range of themes to achieve a comprehensive understanding. This included exploring how participants perceive the potential advantages and disadvantages of utilising Fintech platforms for green finance products. The guide also examined participants' experiences and comfort level with using these platforms for financial transactions.

Furthermore, the interview assessed participants current level of understanding regarding green finance and how it functions. This assessment helped determine the part of financial literacy in influencing access to green finance. Additionally, the guide explored participants' awareness of existing government policies and regulations related to green finance and their perceived impact on accessibility. Finally, the interview examined the part of social factors, such as community norms or peer influence, in shaping individual decisions about green finance adoption.

This research aimed to capture rich and detailed data on the factors affecting access to green finance through Fintech platforms by utilising a well-designed interview guide, The valuable insights gathered contributed to a better understanding of this important topic in the South African situation therefore informing future research efforts, making policy recommendations, and industry practices within the field of sustainability.

3.7 Procedure for data collection

In the data collection phase, semi-structured interviews guided by an interview guide were conducted. Potential participants were sourced via LinkedIn contacted via phone and formally invited via email. According to Leighton et al., (2021), LinkedIn, can be a tool for snowball sampling in research, allowing researchers to reach target audiences through professional and educational online communities. These benefits of data collection were achieved by reaching the required audience though existing online communities. The interviews were done via MS Teams to ensure rich data collection. Before each interview, participants received the interview guide, 30 minutes before the interview, a consent form, and assurances of anonymity. Online interview tools enhanced research efficiency and broaden geographical reach by facilitating data collection from a pool of participants without the inconvenience (Arntson & Yoon, 2023). The interview guide, developed using insights from the literature review, served as a framework which allowed participants to share their unique perspectives and experiences. This open-ended approach aligned with the qualitative nature of the research and promoted in-depth exploration of the topic of access to green finance using Fintech. Piloting of the interview guide, allowed for the refinement of the approach and gather more reliable data by gaining practical experience (Aung et al., 2021). To further strengthen the data collection process, pilot interviews were conducted to assess how effective the interview guide and the interviewer's technique was. This ensured the quality of the data gathered. The pilot interviews were analysed, and any necessary adjustments were made to the interview guide or the interviewer's technique. The analysis revealed that the interviewer followed up on interviewee points with overly broad questions, the guide was refined to provide more targeted prompts. This iterative process strengthened the research by ensuring the interview guide produces rich data and the interviewer effectively facilitated the discussions.

3.8 Data analysis strategies and interpretation

Due to its adaptable nature, openness to diverse theoretical frameworks, and capacity to yield intricate details from qualitative data, thematic analysis has become a prominent method for researchers across numerous disciplines (Campbell et al., 2021; Cernasev & Axon, 2023). Braun and Clarke's thematic analysis process follows a six-step journey: immersing yourself in the data, forming initial codes, crafting themes, refining those themes, giving them clear definitions and names, and culminating in a final report (Campbell et al., 2021). The research kicked off by thoroughly going through understanding the interview transcripts. The next step was to code the data to identify initial patterns and concepts. These codes were then grouped and refined into potential themes. The research analysis then critically reviewed these themes, ensuring they accurately represent the data. Finally, clear definitions and names were assigned to the final themes, resulting in a comprehensive report that provides the key aspects of access to green finance using fintech.

3.9 Possible limitations and challenges of the study

- Accessing respondents: Difficulty in getting respondents to commit to the interview within specified timelines for data collection.
- Social desirability bias: The interview guide relied on information reported by the respondent's, could be inclined to social desirability bias. Participants were hesitant to disclose financial limitations or challenges when discussing green finance access.
- Semi-structured format: Although allowing for flexibility, the semi-structured format of the interview guide might introduce some inconsistency in the data collected across participants.
- Sample size: With a target group of 20 individuals, the research design did not capture the full spectrum of experiences within the chosen sub-groups.

- The study focused on Uban residents in Gauteng province; therefore, it may not be applicable to other provinces with different cultural and economic situations.
- The limited timeframe for the study restricted the depth of data collection to understand the longitudinal data on impact of government policies.
- Green finance was predominantly referred to purchases, loans and rentals of solar panels, given the current electricity crisis, and did not cover a full spectrum of green finance products.

3.10 The Quality Assurance

This section focused on the quality assurance measures employed in this research. These measures ensured the transferability of the findings therefore meaning the findings can be credibly applied to closely related future research. Furthermore, the credibility was determined by demonstrating that the research was conducted rigorously and that the findings are trustworthy. Finally, the measures strengthened dependability, which signified the consistency of the findings and reduces the chance they are random or isolated.

3.10.1 *Transferability*

This research acknowledged the inherent limitations of transferability, or generalisability of findings, common in qualitative studies. The specific focus on Gauteng's urban areas in South Africa recognised the potential challenge of directly applying findings to other settings. The research improved on transferability which provided detailed descriptions of the research setting, employed thick description during data analysis, and grounded the study within the theoretical framework. This approach prioritised a thorough connection within the data. The researcher utilised methods like thematic analysis and interpretive phenomenological analysis to extract the multifaceted details of the phenomenon under investigation and emphasis on detail allows for an understanding of the experiences and perspectives which were explored (Weckesser & Denny, 2022).

Furthermore, the researcher piloted the interview guide with a broader sample and was done to supplement the applicability of the findings beyond the Gauteng case. Pilot testing allowed the researcher to refine interview guides, enhance their interviewing skills, and ultimately gather more comprehensive data during the main study (Sándor, 2022). These strategies allowed participants to evaluate the relevance of the research to their own situations, even if the specific Gauteng environment is not directly transferable.

3.10.2 *Credibility*

The research design prioritised the establishment of credibility, or internal validity. According to Holter (2022), credibility, central to internal validity, hinges on establishing the truthfulness and believability of the research data. Member checking, with its focus on adapting transcription and interpretation methods to diverse backgrounds, bolsters both the validity and richness of the data analysis (Brewer & Scandlyn, 2022). Member checking where participants reviewed key findings for accuracy, was planned to strengthen the trustworthiness of interpretations. Employing triangulation through diverse data sources or analysis methods strengthened the research credibility and replicability by mitigating uncertainties (Hoffmann et al., 2021). Triangulation, through incorporating government reports or Fintech platform materials alongside interview data, further enhanced credibility which demonstrated convergence across information sources. To further maximise credibility, piloting the interview guide with a small sample with refined questions, ensures they elicit rich data. Furthermore, prolonged engagement with participants, where feasible, involved follow-up interviews to clarify points or gather missing information. These strategies collectively strengthened the acceptability and trustworthiness of the research findings.

3.10.3 *Dependability*

The study prioritised dependability through a standardised interview guide (refer to Appendix X for details) and meticulous data recording with verbatim transcription. According to Weckesser and Denny (2022), in qualitative research, dependability is built by documenting your methods meticulously, using various data sources. These measures ensure consistency in data collection across participants and minimised errors during the transcription process. This is achieved through techniques like code and meaning saturation, strengthened internal validity by systematically analysing data and ensuring findings are not random (Janis, 2022). Furthermore, to enhance the potential for future replication, a comprehensive research log was maintained, documenting key decisions made throughout the research journey. This log, alongside the standardised interview guide, served as a solid foundation for future researchers aiming to replicate the study. While detailed coding presented a vital approach to data analysis, this initial research phase focused on establishing a strong foundation for later analysis.

3.10.1 *Confirmability*

Confirmability was achieved by creating a trustworthy peer review system (Radha et al., 2021) and; therefore, by analysing the factors influencing successful peer review, prediction in a study's publication potential, which in turn lends credibility to the research ensured its methods are sound and replicable (Dymkova & Varlamov, 2022). Triangulation strengthens research allowed the researcher to confirm their findings from different angles by drawing on multiple data sources and methods, (Adler, 2022). For this research, due to time constraints, the relevant review was conducted by the assigned supervisor to confirm the was no bias in the research findings from the data form the participants and data sources from literature.

3.11 Ethical considerations

Crafting an interview guide for qualitative research required careful consideration of multiple ethical aspects to safeguard participants' well-being and respect their autonomy. A key ethical consideration was participant vulnerability, as interviews can delve into personal experiences and coping strategies, requiring sensitivity and awareness (Pilbeam et al., 2022). Due to the time-sensitive nature of research, obtaining informed consent from participants with full capacity was crucial (Armstrong et al., 2019).

A clear explanation of the research project and its objectives of study was shared with all participants of the study. Consent from all participants was undertaken via a consent form before the interviews took place and detailed their right to withdraw from the study at any point. No names and any other identifying information were part of the interview transcripts. Data was stored securely in password protected device and access was restricted to the researcher and supervisor. The researcher ensured the interview setting was comfortable and participants were aware of their right to withdraw at any stage. All data storage and disposal after the research to be retained for a year before being destroyed. The researcher obtained the necessary ethical approval from the university's research ethics committee before commencing the research.

CHAPTER 4. PRESENTATION OF FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presents the findings and discussions of the qualitative research, which explored how Fintech platforms facilitate access to green finance for individual Green Energy Transition (GET) projects in urban South Africa, focused on Gauteng Province. Through the process of thematic analysis, the data was collected from semi-structured interviews whereby participants revealed key themes and patterns related to affordability, accessibility, financial literacy, government policies, environmental benefits, and collaboration in the ecosystem in digital solutions. The insights gained provided a comprehensive understanding of the factors which influenced adoption, highlighting both barriers and opportunities within the current financial and regulatory ecosystem

Building on the four research propositions outlined earlier, this chapter examined the relationship between different levels of the Multi-Level Perspective (MLP) framework, landscape, regime, and niche, to explain how external pressures, institutional practices, and technological innovations collectively shape green finance adoption. Each proposition was analysed in detail, which showcased how themes such as affordability, community engagement, and environmental benefits intersect to influence individual participation in GET initiatives. These findings were presented to suggest actionable insights for stakeholders, including policymakers, Fintech companies, traditional financial institutions, and urban communities, while also identifying areas of relationship between the themes.

4.2 Background of participants

This study engaged with 20 participants which compromised of 10 users and 10 non-users of green finance products to explore their perceptions and experiences with loans and investments with fintech's. The research design intentionally avoided collecting sensitive information regarding participants' race, ethnic groups, gender, religion, or disability, to maintain confidentiality and respect their privacy. To provide context, participants were adults over the age of 18, as financial regulations prohibit loans and investments for minors. All the participants resided in urban areas within the Gauteng province of South Africa therefore ensuring a degree of understanding of the local setting. To maintain anonymity, participants are referred to as P1, P2, P3, and so on throughout the study. P1 to P10 are users of green finance and P11 to P20 were non-users of green finance. There was no formal demographic data collected however, participants shared their professional backgrounds during interviews which offered insights into how some participants occupations might have influenced their awareness and perceptions of green finance products.

4.3 Research settings

The research was conducted remotely via MS Teams, a decision necessitated by the employment status of all participants. Data collection took place during the year-end period, which presented unique challenges. Participants' busy schedules resulted in delays in obtaining consent forms, extending the anticipated timeline for data collection.

Interviews were semi-structured, which lasted approximately 30 to 45 minutes, and were designed to explore participants' perceptions and experiences with green finance products. Interviews were conducted during working hours which led to occasional interruptions, such as urgent work calls or distractions from the hybrid working environment with an example of delivery collections mid-interview. To ensure a comfortable data collection environment, the researcher adapted to

these disruptions whereby a flexible schedule was offered and paused interviews when necessary.

Despite these challenges, the required number of participants was met, thanks to the timely responses of those who completed consent forms and scheduled interviews promptly. The experience provided valuable insights into the practicalities of remote data collection and highlighted the importance of flexibility in research design.

The overall experience was filled with great insight from the process, engagement with the participants, and learnings to take into future research.

4.4 Initial impressions

Initial interviews revealed a generally high level of awareness regarding Fintech solutions among participants. This suggested a solid ground for exploring the adoption and impact of such technologies within the South African situation. Most participants easily identified Fintech's and their contributions however their understanding of green finance was initially more narrowly focused. The main association was with solar energy which was likely influenced by the electricity crisis in South Africa. This immediate connection to solar highlighted a possible gap in understanding the larger scope of green finance, however it was encouraging to find that some participants demonstrated knowledge of other green finance instruments including bonds, investments in water infrastructure, and other environmentally sustainable initiatives given that some worked at financial institutions and some grew up and mentioned they still have family in rural areas with limited infrastructure for water.

4.5 Research propositions

The propositions this research aimed to provide insight into were:

Proposition 1: Increased access to green finance products through Fintech platforms will lead to greater individual participation in the Green Energy Transition (GET) in urban South Africa (Gauteng Province).

Proposition 2: By addressing gaps in technology-based financial literacy programs and tailoring them specifically for green finance, South Africa can significantly improve individual awareness and understanding, leading to increased participation in green finance initiatives in urban areas.

Proposition 3: Supportive government policies, regulations, and collaborative efforts between regulators and Fintech companies can create an enabling environment that creates wider individual participation in green finance for urban Green Energy Transition (GET) projects.

Proposition 4: Increased adoption of Fintech solutions, combined with supportive green finance regulations, will improve financial literacy and participation in green finance initiatives within urban areas.

4.6 Thematic analysis process

Participant feedback from the interviews provided the data, which allowed for the researcher to meet the aim of the study. Braun and Clarke's thematic analysis process follows a six-step journey: immersing yourself in the data, forming initial codes, crafting themes, refining those themes, giving them clear definitions and names, and concluding in a final report (Campbell et al., 2021).

Thematic analysis was employed to uncover patterns and meanings within the data, using Atlas. TI 25. The analysis involved a systematic process of coding, categorising, and theme development. Initially, codes were generated through an iterative process of organised reading of the transcripts to obtain a greater understanding of the data therefore allowing for the identification of significant concepts and ideas.

These were coded, then grouped into categories which facilitated the recognition of relationships and patterns within the data.

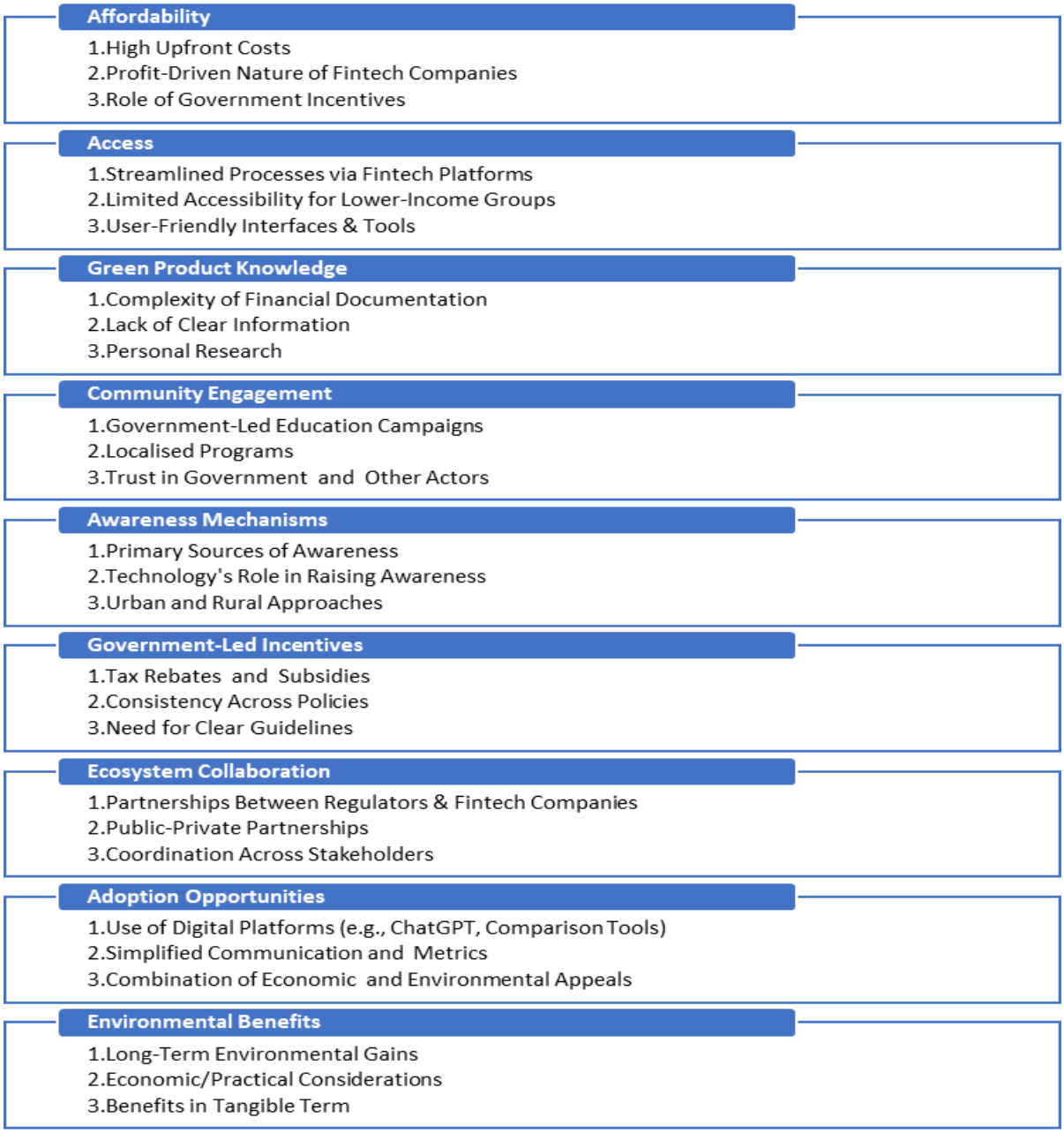

Figure 3: Categories and themes

The finalised themes were documented and linked to the study's research propositions. This step provided a comprehensive understanding of participants' experiences and perceptions regarding access to green finance products through

Fintech platforms. Table 3 provides the linkage of the objectives, propositions, and themes. Nine main themes emerged during the analysis, reflecting the complexity and richness of participant experiences with green finance access through Fintech platforms. Although, some overlap existed between themes, each was retained where it captured conceptually distinct aspects of the phenomenon under investigation. For example, Affordability and Access themes frequently intersected, but were kept separate to distinguish structural barriers example high upfront costs from user-specific challenges example limited accessibility for lower-income groups.

Similarly, Awareness Mechanisms and Community Engagement overlapped in discussions about education campaigns, but were treated as distinct themes to differentiate institutional efforts example government-led programs from individual actions example personal research.

Each theme was mapped back to specific research objectives and levels of the MLP framework landscape, regime, and niche to ensure analytical coherence and theoretical alignment. This approach supported a nuanced understanding of how participants construct meaning through their interactions with financial systems and digital tools, aligning with the interpretivist paradigm supporting the study.

Thematic analysis also allowed for iterative refinement of the findings. As new ideas emerged during the analysis phase, earlier transcripts were revisited to ensure consistency and accuracy in theme identification. This iterative process strengthened the internal validity of the study by reducing the likelihood of misinterpretation or premature conclusions.

In summary, thematic analysis provided a structured yet flexible approach to interpreting qualitative data while ensuring alignment with the interpretivist paradigm and the study's theoretical framework. Although nine themes were identified, more than typically expected, each was necessary to capture the full

range of participant experiences and perspectives. Far from being excessive, this number reflects the depth of the topic and enhances the richness of the findings.

RESEARCH OBJECTIVE	PROPOSITION	THEME
Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.	Increased access to green finance products through Fintech platforms will lead to greater individual participation in the Green Energy Transition (GET) in urban South Africa (Gauteng Province).	1. Affordability impact on green finance. 2. Access to green finance 3. Green product knowledge for Solar
Evaluate the effectiveness of existing initiatives in promoting financial literacy and awareness of green finance using technology.	By addressing gaps in technology-based financial literacy programs and tailoring them specifically for green finance, South Africa can significantly improve individual awareness and understanding, leading to increased participation in green finance initiatives in urban areas.	4. Financial documentation 5. Community engagement. 6. Awareness mechanisms of green finance

RESEARCH OBJECTIVE	PROPOSITION	THEME
Examine the part of government policies, regulations, and financial institutions practices in promoting the availability and accessibility to green finance products.	Supportive government policies, regulations, and collaborative efforts between regulators and Fintech companies can create an enabling environment that creates wider individual participation in green finance for urban Green Energy Transition (GET) projects.	7. Government led incentives and support 8.Ecosystem collaboration
Identify the key challenges and opportunities associated with financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.	Increased adoption of Fintech solutions, combined with supportive green finance regulations, will improve financial literacy and participation in green finance initiatives within urban areas.	9.Adption opportunities using technology 10.Environmental benefits

Table 3: Linkage of Objective, Proposition and Themes

4.7 Proposition 1: Findings and discussion

The findings and discussions for Proposition 1 explored how Fintech platforms enhanced access to green finance products for urban residents in Gauteng. This

section explored key themes such as affordability, access to green finance, and green product knowledge for solar. Participants experiences revealed that while Fintech simplified access, affordability remained a significant hurdle due to high initial costs and profit-driven practices by some fintech companies. The discussion also examined government incentives like tax rebates and subsidies, which highlighted their importance in making green finance more accessible. The analysis considered how landscape level pressures economic inequality interact with regime level policies and niche level innovations to influence adoption using the Multi-Level Perspective (MLP).

4.7.1 *Affordability impact on green finance*

The data presented the affordability of green finance products as a key theme of the participants experiences. The observations from participants have highlighted the findings with the challenges associated with high upfront costs, the part of government incentives and the profit-driven nature of fintech companies in the situation of green energy solutions.

Of the 20 participants, 80% have cited affordability as a challenge as shown in Figure 4. Surprisingly, this was made up of 9 participants that have used green finance compared to 7 that did not use green finance. Participant data to support findings are in Appendix D: non green finance users and Appendix E for green finance users.

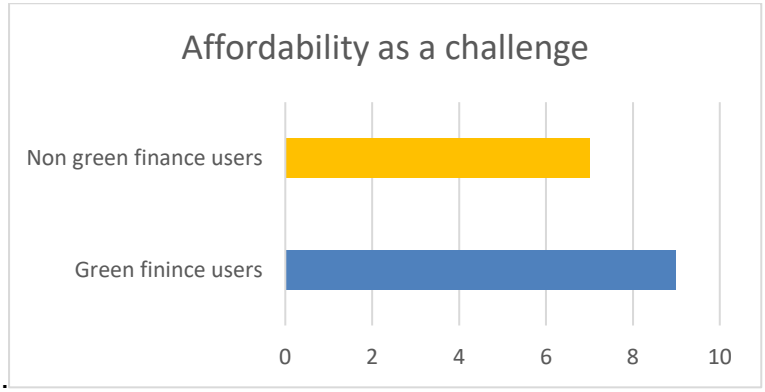

Figure 4: Affordability as a challenge

The demand for affordable green finance solutions is on the rise, which emphasised the need for financial institutions, including banks and fintech companies to expand their reach. A key challenge lied in balancing profitability with sustainability, as the private sector's focus on profit and efficiency significantly influences the development of green finance products.

Participants highlighted challenges and opportunities related to affordability to green finance. Some participants had successfully used green finance however both users and non-users, identified barriers. The data shows that 80% of participants cited affordability as a challenge, with high upfront costs being a significant barrier to adoption. According to the World Economic Forum (2021), investments in clean energy are often stalled by high costs of capital which can make it challenging for projects to become financially viable. One of the reasons why the costs of capital are high for clean energy projects, is the often requirement of high upfront costs which can be a barrier to investors.

Participant 18: non-green finance user

“If there are these solutions that whether they're primarily from a funding point of view being offered, let's say by banks and the likes of Fintechs can have a wider reach of making this more accessible to more consumers.”

Participant 2: green finance user

“So those were the three items that we were investigating at the moment as an alternative to bring an upfront investment, which at the time was, you know, quite material with the price increases in demand.”

A common view from three participants had cited shorter-term investment with lower upfront costs associated with rental options as their reason of choice. Further insights highlighted that 2 out of 3 undertook personal research to inform their decision. The views by Participant 1, on reason to rent, was the shorter-term investment to cater for their affordability needs. Furthermore, participant 2 and participant 5 provided insights on conducting personal research to calculate the

options, which their informed decision on renting rather than investment. Financial education empowers individuals with the knowledge and skills to navigate challenging financial ecosystems, make informed decisions, and confidently spot opportunities while avoiding potential pitfalls (Hasan et al., 2021). There are opportunities to increase participants in green finance through providing of the required information to potential customers. Hasan et al. (2021) recommended establishing accessible refinancing avenues and alternative investment channels for green technology and products, enabling more affordable financing for green initiatives. The findings revealed that rental options are an alternative to traditional financing and requires further exploration.

Participant 1: green finance user

"I chose the option of renting just because of its a shorter-term investment that you rent to buy basically whereas where you go for the full-on Implementation of the solar type of thing it is a big investment and not many people can afford. They just see this big amount of money and then it puts them off."

Participant 5: green finance user

"Started doing my own research, I understand it and to see rent versus purchase and I went to the option of rent instead of purchasing."

The data also suggested that the profit-driven nature of Fintech companies can hamper the affordability of green finance. Participants noted that the private sector is mainly focused on profit and efficiency, which can translate to higher costs for consumers. The drive for profit could lead to higher interest rates or less flexible payment plans or other factors which make the green products less affordable even when access is streamlined. The rise of FinTech disrupts banking with innovative financial products for digital payments, lending, wealth management therefore creating both opportunities and challenges (Zhao, 2023). To meet these demands, traditional financial institutions (FIs), are actively integrating Fintech solutions which includes process digitisation, big data analytics, and mobile-based financial products (LaPlante and Watson, 2018),

therefore requires a regulatory body oversight to ensure innovations promotes financial inclusion and sustainability. The pressure between profits and affordability requires further exploration on ethical challenges fintech's experience with innovation.

Participant 10: green finance user

"And then from there private sector perspective, it's like I said, it's always it's always about profit and it's always around sort of like efficiency."

There was also a view that green finance is more expensive than traditional finance. Environmentally friendly products and amenities are a great step towards sustainability but often come with a higher price tag therefore making them less competitive in the market compared to their traditional counterparts (Hanley et al., 2020). The high unemployment rate makes large proportion of individuals that fall within this bracket; therefore, affordability green finance is made more challenging which is compounded by the higher upfront costs and higher costs for environmentally friendly products. Traditional banks sometimes overlook the financial needs of vulnerable communities including those in rural areas, low-income households, and individuals rebuilding their credit (Harsono & Suprapti, 2024). Harsono and Suprapti (2024) provided further insight that Fintech has emerged as a game changer, bridging the financial divide by bringing essential banking services within reach of people who have long been excluded from the traditional banking system.

Participant 6: green finance user

"I think that's the main challenge given the high unemployment rate in South Africa to say that majority of the household, they don't really see themselves being able to afford the set-up cost related to green energy."

Interestingly data that provides insights that government decisions on regulation can also hinder affordability. The introduction of new legislation and policies can erode initial calculations for investment benefits. In the South African situation,

with its high unemployment and inequality, makes the part of government incentives even more critical. The development of green finance in underdeveloped areas is hindered by a combination of factors which includes inadequate government support, insufficient infrastructure and limited resources which must be addressed to drive progress (Zhuang et al., 2023).The cost of green products is a barrier to much of the population, as most people are concerned about basic needs than green finance therefore the absence of government incentives further worsens the affordability issue. Regulation and government assistance have aided in Türkiye's financial technology (Fintech) advancements that have boosted financial inclusion and sustainable practices (Bayram et al., 2022). This has shown that with government matters whereby the Turkish government has played a crucial part in developing the fintech industry. It has also demonstrated that it can increased access to underserved communities while it prioritised environmental and social responsibility.

Participant 2: green finance user

"The legislation that then came in from, I'm not sure whether it's from City power or Eskom was to then implement a minimum fee for all prepaid users. At the moment, about 300 rands. Now they're at is, you know, against this item, so all the benefits you were reaping per month is now a significant portion has now deteriorated,"

Participants also emphasised the importance of government incentives in making green finance products more affordable.

Participant 5: green finance user

"Then the second thing that will help faster is more government incentives to actually adopt so. It is government incentives. It helps with affordability."

At the landscape level, economic factors such as high unemployment rates and the lack of disposable income created an unfriendly environment for green

finance adoption. These external pressures hindered the transition by limiting the ability of individuals to participate in the GET.

At the niche level, fintech platforms represented innovative solutions that can disrupt the traditional financial regime by contributing user-friendly and accessible green finance products however, their impact is constrained by the regime level focus on profitability for specific middle to upper class client bases. Full realisation of their potential, fintech platforms must balance profitability with inclusivity, to offer affordable solutions that facilitate to a broader audience.

At the regime level, government policies and regulations shaped the affordability of green finance products. Although government policies can shape the affordability of green products, inconsistence regulations hindered progress. This highlighted the need for regime level interventions that promoted affordability for green finance.

4.7.2 *Access to green finance*

The theme of access to green finance emerged as a significant concern among participants in the study. The findings on this theme provided insight on the challenges and opportunities that participants identified in accessing green finance. The word counts below provided insights on how they were shaped, with government, fintech's and accessibility strongly featured.

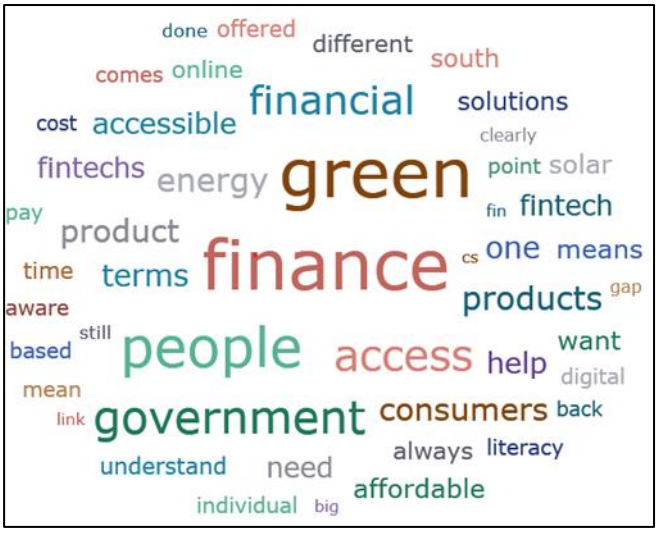

Figure 5: Word count for access to green finance theme

The theme of access to green finance emerged as a significant concern among participants in this study. The findings indicated that Fintech platforms can optimise loan application processes, credit assessments, and investment procedures, making it easier for individuals to participate in green finance. The literature review acknowledged the potential of Fintech in enhancing access to green finance (Jarvis & Han, 2021; Sulaksana, 2023).The findings in this study resonated with this perspective and represented that Fintech platforms can increase the efficiency and accessibility of green finance. Participants emphasised that green finance is currently inaccessible to the majority of South Africans, particularly those from lower-income backgrounds. Financial providers need to address barriers to inclusive finance and develop innovative solutions to meet the needs of local green entrepreneurs (Hattingh & Appies, 2022). An et al. (2022), suggested that these Fintech platforms act as a mediator, translating environmental awareness into action for individuals. This suggested that fintech platforms needed to meet the needs of local green investors and promote green finance adoption whereby green finance products are developed to accommodate for lower income households.

Participant 8: green finance user:

"The majority of South Africans are unable to finance green purchases or participate in green finance initiatives. At the moment, only middle- to upper-class individuals are participating."

Participant 12, a non-green finance user, echoed this sentiment, highlighting the need for increased awareness and accessibility:

"Awareness and meeting consumer needs are key. The burden on finances and how accessible green finance is to the individual are critical factors."

Participants highlighted the potential of fintech to simplify and enhance the green finance experience. The positive perception of fintech aligned with studies that emphasised its part in democratising access to financial services (Valavan, 2023). Fintech solutions may not reach rural or low-income areas due to limited digital infrastructure (Zhuang et al., 2023). The success of fintech in enhancing accessibility may depend on the availability of digital infrastructure and user-friendly interfaces. Fintech's impact may be limited in areas with poor internet connectivity or low digital literacy, highlighted the need for inclusive digital infrastructure development. Fintech platforms can also provide individuals with convenient access to green finance options by allowing them to apply and manage their finances online or through mobile apps.

Participant 2: non-green finance user

"Fintech’s are becoming disruptive in a good way. They make onboarding easier and offer attractive options."

Participant 6, a green finance user, also praised the part of fintech in simplifying processes:

"They created an app or website where you could type in your address, and it would tell you if your house is solar-ready and help with calculations."

Participants observed that green finance options are often geared toward corporate clients rather than individual consumers. This finding contrasted with literature that highlights the growing demand for individual green finance products, such as solar loans and energy-efficient mortgages (Sharma &

Choubey, 2022). The discrepancy may reflect a gap in the South African market, where green finance providers prioritise large scale projects over small-scale, individual solutions. The corporate focus may be driven by the higher profitability of large-scale projects and the perceived risks associated with lending to individual consumers. To address this gap, green finance providers must develop tailored products for individual consumers, particularly those from lower-income groups.

Participant 8 – green finance user

"When I Googled green finance, I found more corporate investment banking provides than options for the individual on the street. They focus a lot on corporates but less on the public."

Participants emphasised the critical part of government and financial institutions in promoting access to green finance. It was stressed the importance of government leadership and partnerships with fintech's and highlighted the need for personalised (in peoples own languages) and accessible information. that identify government policies and public-private partnerships as key drivers of green finance adoption (Huijuan & Guangyu, 2023). Ozili (n.d), suggested that government initiatives in developing countries often lack coordination and implementation which may explain the inconsistent accessibility reported by participants. Effective government intervention, combined with collaboration with financial institutions and fintech's, could significantly improve access to green finance. This requires coordinated efforts to address infrastructure gaps and ensure the availability of tailored financial products.

Participant 9

"If the government leads and teaches people, and partners with fintech's, we can spread the accessibility of these projects to more people."

Participant 17, a non-green finance user, highlighted the need for personalised and accessible information:

"*Personalizing the message, delivering it in the user's language, and using platforms like banking apps could make green finance more accessible and encourage people to learn more."*

Participants shared mixed experiences regarding digital channels. While many praised the convenience of online processes others raised concerns about accessibility in rural areas and the reliance on internet access. The dual nature of digital channels aligned with their potential to enhance accessibility while also worsening the digital divide (Harsono & Suprapti, 2024). The effectiveness of digital channels depends on the availability of reliable internet access and digital literacy. To address these barriers, green finance providers could adopt a hybrid approach that combines digital and offline solutions.

Participant 4: green finance user

"Everything was done online, application, document signing, and processing. It was seamless."

Participant 20, a non-green finance user, also highlighted the potential of digital platforms.

"Online applications, approvals, and financial options can make the process quicker and easier."

However, concerns were raised about the accessibility of digital channels, particularly in rural areas.

Participant 6: green finance user

"My worry is how this might be received in rural areas, where access to digital channels is limited."

Participant 7: green finance user

"If I didn't have internet access, I wouldn't be able to find green finance providers online."

At a landscape level, challenges such as economic inequality and limited digital infrastructure created a hostile environment for green finance adoption. These

factors are beyond the control of individual actors but significantly shaped the transition process. The global push for sustainability, example climate change agreements, acted as a positive landscape pressure therefore encouraged the adoption of green finance, however, this pressure is not yet strong enough to overcome local economic and infrastructural barriers in South Africa.

At the regime level the current regime was characterised by a corporate centric approach to green finance which excluded individual consumers, particularly those from lower-income groups. This aligned with the MLP concept of regime stability, where existing practices and rules resist change, however, the potential for regime shifts was evident in the call for government leadership and partnerships with fintech's. These actors can act as intermediaries, bridging the gap between niche innovations and the mainstream regime.

At a niche level fintech and digital platforms acted as niche innovations that challenged the traditional financial regime. These innovations offered user-friendly, accessible solutions that can democratise green finance, however, the limited reach of niche innovations in rural areas highlighted the challenges of scaling up niche solutions in the face of landscape level barriers.

4.7.3 *Green product knowledge - Solar*

The findings on product knowledge revealed a variety of challenges and opportunities in the situation of green finance. The data highlighted the importance of understanding solar products, including their benefits, risks, and costs. This is consistent with the literature, which emphasised the importance of financial literacy and education in promoting green finance (Fu et al., 2024; Sulaksana, 2023). The findings suggested that knowledge gaps and areas for improvement exist in the green finance sector. Participants noted that understanding green finance products is crucial for affordability and access. This is in line with the literature, which highlighted the importance of addressing digital literacy and accessibility concerns in promoting green finance (Kahraman, 2022).

Chenguel and Mansour (2024) also emphasised the need to bridge the gap between green finance and traditional financial systems.

Participant 4: green finance user

"The challenge is getting more green energy out there, But the cost thereof being managed by the person that's willing to do the investment. it's understanding the product and how to use it and when to use it".

Participants emphasised the importance of clear information and simple language in promoting green finance products. Many participants noted that the complication of green finance products can be a barrier to adoption. This is consistent with the literature, which highlighted the importance of clear and transparent information in promoting green finance (Sulaksana, 2023). Ferrer et al. (2021), also noted that green investments fall into different categories. Clear and transparent information shared by fintech's became crucial in promoting green finance as it allowed for better understand of the product. Green banking initiatives play a significant part in restoring customer trust (Hasan et al., 2021), therefore, trust and communications product design became crucial in the consumer decision making process.

Participant 6: green finance user

"*The challenge is getting more green energy out there, but the cost thereof being managed by the person that's willing to do the investment, it's understanding the product and how to use it and when to use it."*

Participant 16: non-green finance user

"And then sometimes I don't even understand as they are not very clear on the ownership especially the rental agreements or say do I own the product at the end or is it like that lease to pay?"

Participant 15: non-green finance user

"I think for them it's to punt to sale so whatever they can do to convince me to get the product will be there. They won't tell me or give me the negatives of owning that product, which is a challenge, right?"

Participants highlighted the need for inclusive product design that provides to diverse customer needs and literacy levels. Many participants noted that green finance products are often designed with a one size that fits all approach, which can exclude marginalised communities. The importance of financial inclusion and accessibility in promoting green finance (Jarvis & Han, 2021). Alayza et al. (2023) noted that developing nations face a particularly urgent challenge in balancing economic growth with environmental sustainability. Green finance products must be designed with diverse customer needs and literacy levels in mind to promote financial inclusion. The lack of inclusive design may be due to a focus on corporate clients and high-income consumers, who are perceived as more profitable. To address this, green finance providers could develop simpler, more accessible products that delivers to a broader audience.

Participant 11: Non green finance user

"*Alot of times when people develop products and they want to market it, they forget that you just want to know what am I getting for my house or my property or whatever need and how much is it going to cost me a month and how long am I supposed to pay for this?"*

Participant 6: green finance user

"It's also for them to look deeper into what people need before they implement these policies and also if Fintech companies implementing their own products check with customers or check with people on the ground if they understand what it is and if they really need it."

Participants emphasised the need for clear government policies and regulations to support the development of green finance products. Many participants noted that the lack of clear policies and regulations can create uncertainty and barriers to adoption. This is consistent with the literature, which highlighted the importance of regulatory frameworks in promoting green finance (Du et al., 2022). Zhuang et al. (2023), also note that the development of green finance in underdeveloped areas is hindered by inadequate government support, insufficient infrastructure, and limited resources. The lack of clear policies and regulations can create

uncertainty and barriers to the adoption of green finance products. In addition, the absence of clear government policies and regulations can hinder innovation by Fintech's and other institutes in the green finance sector.

Participant 3: green finance user

"*The parties are not in the sync then it makes it difficult. So, for instance from a Fintech perspective, you are selling and you're promoting this product, but they don't really have a clear indication from government as to how far they want to go with this from a product perspective, as well, right, do Fintech's further develop this?"*

Participant 18: non-green finance user

"So, government, how do they promote the sort of environment to ensure that, let's say it's business friendly that consumers are also protected, making sure that financial institutions sort of have the right incentives to put the right kind of products out."

At the landscape level, the lack of product knowledge reflected broader socio-cultural challenges, such as low financial literacy and limited awareness of green energy solutions. These external pressures hindered the transition by creating uncertainty and mistrust among potential users. Educational campaigns and simplified product designs are interventions required to bridge the knowledge gap by addressing these barriers at the regime level.

At the niche level fintech platforms represented innovative solutions that can disrupt the traditional financial regime by offering accessible and transparent information, however, their impact was constrained by the regime level focus on profitability, which prioritised sales over education. For full benefits realisation, fintech platforms must balance profitability with inclusivity therefore providing clear and neutral information that empowers users to make informed decisions.

At the regime level the lack of inclusive product design reflected the dominance of traditional financial practices which often failed to account for the diverse needs of consumers. To drive the transition, regime level interventions are needed to

promote the development of inclusive and accessible green finance products. This includes collaboration between fintech platforms, policymakers, and consumer advocacy groups to ensure that products meet the needs of all users.

Government policies and regulations acted as key enablers of the transition by providing stability and incentives for innovation. Inconsistent or unclear policies can create uncertainty and hinder progress. This required the need for regime level interventions that promoted clarity and consistency in green finance regulation. For example, government incentives and consumer protection measures can encourage fintech platforms to develop inclusive and accessible products.

4.7.4 *Conclusion for proposition 1*

The findings support Proposition 1 which suggested that increased access to green finance through fintech platforms will lead to greater individual participation in the GET. The findings also highlighted the importance of affordability and product knowledge as prerequisites for access. To fully realise the potential of fintech, interventions are needed at all levels of the MLP framework.

Landscape level interventions address economic barriers such as high unemployment and low disposable income and to improve digital infrastructure. Regime level interventions are to implement clear and consistent government policies, promote inclusive product design, and provide incentives for fintech innovation.
Niche level interventions are done by scaling up fintech platforms that provide transparent and accessible information therefore balancing profitability with inclusivity.

In summary by addressing these challenges, fintech platforms can play a transformative part of driving individual participation in the Green Energy Transition, contributing to a more sustainable and equitable future.

4.8 Proposition 2: Findings and discussion

For Proposition 2, the findings and discussion focussed on the effectiveness of existing financial literacy programs and technology-based tools in promoting awareness of green finance. Key themes included the understanding of financial documentation, community engagement, and awareness mechanisms. Participants emphasised the need for simplified language, clear explanations, and personalised content delivered through digital platforms or workshops. The discussion highlighted the proactive part of banks in integrating green finance into product offerings and the democratising effect of technology in empowering individuals to make informed decisions. Furthermore, it explored the importance of trust-building through government-led initiatives communicated in local languages. Using the MLP framework, this section explains how landscape level factors, example low financial literacy shape regime-level responses, example education campaigns and niche level innovations, example fintech apps.

4.8.1 *Understanding financial documentation*

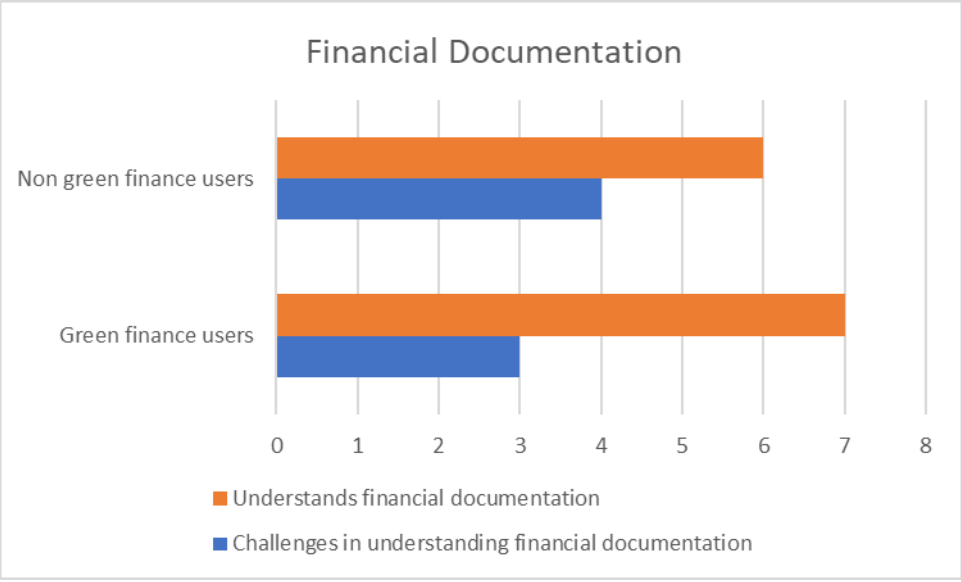

Figure 6- Understanding financial documentation

The findings indicated a mixed understanding of financial documentation among participants. Nearly two-thirds of participants, expressed comfort with financial documents, a significant minority, particularly those less familiar with financial jargon and complex legal language, reported challenges. This was consistent for both users and non-users of green finance products. Some individuals, specifically those with a background in finance or higher education, reported feeling comfortable with financial documents. Participants without such backgrounds, often referred to as the "man on the street," found financial documentation challenging due to the use of small print, legal language, and difficult terminology and stating that terms and conditions are often not designed for the average person, making them difficult to understand. This disparity in understanding points to a broader issue of uneven financial literacy levels in South Africa, which can act as a significant barrier to the adoption of green finance products. As Todorov et al. (2023) suggests, financial literacy is a key driver of financial inclusion, and the findings in this study align with this view. Participants who were comfortable with financial documentation often attributed their understanding to their education or professional experience, while those without such backgrounds struggled. This aligns with the study by (Kumari & Harikrishnan, 2021),which emphasised the need for education and technology to empower individuals to make informed decisions, particularly in the situation of climate change and green finance. Although the findings highlighted the need for improved financial literacy and simplified documentation, Hasan et al., (2021) highlighted it is also important to consider the part of cultural and socio-economic factors in shaping financial behaviour. Some individuals may be cautious to engage with green finance due to a lack of trust in financial institutions or a preference for traditional financial practices therefore by addressing these concerns requires a complete approach that goes beyond financial education and documentation.

Participant 2: green finance user

"I was relatively comfortable being a financial services executive and within the lending space, I think I was a bit more comfortable with a lot of the dynamics across but what I could see in engagements with other friends, acquaintances who's not from the banking space, who has exposure to lending and some of the clauses it can be a bit overwhelming in terms of what does this mean and specifically beyond just the lending but, because these are hardware installations ,your cancellation clauses the fine print."

Participant 15: non green finance user

"I think through the background that I have from a schooling perspective and tertiary education that comes second hand."

"So, I think for a general ordinary South African it might be a challenge."

Participant :10 green finance user

" So if you look at the terms and conditions, they normally they're not made for the normal men on the streets because it's like, first of all, it's pages and pages of information and then secondly, it's some of the jargons which are used in the terms and conditions it makes, it makes it a bit difficult to sort of like understand."

Participant 16: non-green finance user

"I think that's where the policy is really lacking in terms of like understanding those long-term implications for the, for the normal person or the man on the street."

Participants also highlighted the potential for Fintech companies and the government to play a more active part in improving financial literacy and simplifying financial documentation. Participants also expressed discomfort with green finance documentation and suggested that fintech's and the government could do more to inform customers. This sentiment was shared by other participants who felt that the difficulty of financial documentation could lead to confusion or exclusion from green finance initiatives. The profit driven nature of some Fintech platforms was also noted as a potential issue, with participants also

suggested that reckless lending practices could exploit consumers who do not fully understand the terms and conditions of financial agreements. However, Fintech also has the potential to address these challenges. As Lee and Huruta, (2022) argued, Fintech can boost financial literacy and empower individuals to make informed choices in green financing projects. This aligned with the study by Matsepe and Van Der Lingen (2022) which highlighted the importance of clear introductions to new technologies through trusted sources to increase uptake. Furthermore, fintech have the potential to bridge the financial literacy gap, it is also not a complete solution. The digital divide in South Africa, according to Hanley et al. (2020), that unemployed individuals often lack the resources to access digital technologies therefore creating a cycle of exclusion . This implication highlighted that not all individuals have access to the technology needed to engage with Fintech platform therefore, the efforts to improve financial literacy must also consider the wider situation of digital inclusion.

Participant 1: green finance user

“The small print is not as easy to understand, so I also did a lot of research on the terms and conditions.”

Participant 14: non green finance user

“Not really. The legal language tends to be a bit daunting.”

Participant 9: green finance user

“If I'm to be honest, I'm not as comfortable as the more traditional ones. Like I mentioned, now if you know this Fintechs or the government or the banks were to inform its customers more about this, have the drive to inform its customers. So, I'm one of those that I'm not that comfortable as much as I have a loan with a fintech, but I'm not 100% certain of that entire process.”

At the landscape level the data revealed that existing societal structures, example, the education systems and the difficulty of the regulatory environment,

influenced the adoption of new technologies and practices like Fintech and green finance. The level of financial literacy in the population was a critical landscape factor that needs to be addressed to facilitate the transition to green finance.

At the regime level the current financial regime, the traditional method of financial documentation needed to adapt to meet the needs of a more diverse population. The way financial products and their documentation are structured was part of the regime and the findings suggested that this structure is not currently conducive to encourage the adoption of green finance. The regime must evolve to include more accessible and clear financial documentation.

At the niche level, Fintech companies have the potential to innovate in how they share financial information and introduce new tools and technologies that can bridge the financial literacy gap. Therefore, by creating accessible, easy-to-understand documentation and providing additional support through mobile apps, Fintech platforms can challenge the existing regime and create an alternative model that is more inclusive to South Africans.

4.8.2 *Community engagement*

The findings highlighted the critical part of community engagement and education in promoting green finance and its benefits. Participants highlighted their views and perceptions for the need for community-based programs, seminars, and workshops to help individuals understand green finance and its implications. These initiatives were seen as essential tools for creating broader adoption and engagement, referring to urban areas. The data also revealed the importance of government involvement in taking the lead in driving these efforts together with the need to address language and literacy barriers to ensure inclusivity Participants suggested that community-based education and awareness programs are essential in promoting green finance.

Participants consistently highlighted the value of community-focused education and awareness programs. A suggestion by participants provided insight that

seminars and workshops could help individuals understand what green finance is, how it works, and how it benefits them. Further suggestions highlighted the importance of webinars and community meetings to make information more accessible and clearer. The importance of grassroots initiatives and localised education in ensuring behavioural change and adoption of sustainable practices (Hanley et al., 2020; Todorov et al., 2023). The effectiveness of community-based education in the promotion of sustainable practices, particularly in developing countries, benefits the community to make the correct decisions and choices on green finance. Workshops and community meetings were particularly emphasised as effective ways to engage people and explain the financial and environmental impacts of green finance. People in underserved areas might not understand the financial benefits of green finance unless they are directly engaged through workshops (Sofyan A Gani et al., 2023), highlighted the importance of interactive and participatory formats in addressing topics like green finance.

Participant 9: green finance user

"I think maybe one of the things that they should look into is to first start to have seminars whereby they teach, they guide people and offer information to people about what is green finance, what is green projects and how is it gonna benefit individuals?"

Participant 7: green finance user

"I don't think people in the locations, for instance, would worry a lot about how green finance would impact them financially, unless you come and do maybe workshops."

Participant 10: green finance user, echoed this sentiment:

"So if I were to sort of like translate it to the, the man on the, the street definitely having webinars, having sort of like community meetings it would sort of like help

because sometimes it's, yes, you can't get the information, it's it you find it's not clear enough."

Participants consistently identified the government as a key player in promoting green finance through community engagement. Governments are capable of driving systemic change through policy, funding and public awareness campaigns (Kurniati & Suryanto, 2022)). A unique aspect of the findings was the emphasis on localised government efforts. Participants argued that national policies alone are insufficient and must be complemented by community level programs which are tailored to local situations (Tripathy et al., 2024). National policies are not sufficient and would require a more localised effort from provinces and municipalities to ensure the promotion of green finance promotion.

Participant 3: green finance user:

"A lot of it for me comes from government or from local municipalities. I think it's gotta be localised."

Participant 9: green finance user:

"Also, the government must come into picture and gazette more information. Have community-based programs whereby they go out, reach out whereby they teach more community around what is green finance and what is also can project."

The findings highlighted the importance to address language and literacy barriers to ensure inclusivity in green finance initiatives. Government-led initiatives were more likely to be trusted, especially when communicated in local languages. The part of cultural and language sensitive communication in promoting sustainable practices benefits communities (Dietrich et al., 2023; Litre et al., 2022; Zain El Shandidy, 2023). The current study added a new dimension through the linkage of trust to government involvement. Participants noted that information from the government is more likely to be trusted, especially when communicated in local languages. NGOs played a vital part in driving social change and sustainable

development by building collaborative relationships with local communities, governments, and businesses (Malhotra & Baag, 2023; Nugraha et al., 2024). Participants views differed whereby they have more trust in government unlike NGOs and local groups who are normally used to drive change and communication to local communities.

Participant 17: non-green finance user

"Using the government would be a very easy or collaborative with the government would be a very easy way to raise awareness because people especially people who are not knowledgeable, always trust stuff that comes from the government and spoken in their own language."

Participant 17: non-green finance user

"And I see others and those people I'm talking about are very, are very illiterate. They are old people, but I think that they know the need and if we are to speak to them in their own language and then and raise this awareness and take it up."

Participant 9: green finance user

"I think maybe one of the things that they should look into is to first start to have seminars whereby they teach, they guide people and offer information to people about what is green finance, what is green projects and how is it gonna benefit individuals?"

Participant 10: green finance user, echoed this sentiment:

"So if I were to sort of like translate it to the, the man on the, the street definitely having webinars, having sort of like community meetings it would sort of like help because sometimes it's, yes, you can't get the information, it's it you find it's not clear enough."

At the landscape level the increased environmental awareness and global climate commitments created pressure for sustainable financial practices. These

landscape level changes are pushing regime level actors, such as governments, to adopt and promote green finance.

At the regime level the government are influencing their authority and resources to drive community engagement through localised programs and policies. Importantly, the regime is also being challenged to adapt to the varied needs of communities therefore reflecting the interplay between landscape pressures and regime level responses.

At the niche level the community-based initiatives such as workshops and seminars represented local innovations that complement regime level efforts. These niche level activities are crucial for translating policies at a high level into actionable knowledge at the local level. The findings suggested that effective community engagement requires alignment between niche level innovations and regime level support.

4.8.3 *Awareness mechanisms for green finance*

The findings revealed that awareness mechanisms for green finance are multifaceted. Participants have citied a variety of sources including banks, online research, social media, government initiatives and word of mouth. Banks emerged as the primary source of awareness, followed by personal online research. The data also highlighted the potential of usage of technology, particularly in rural areas, to bridge information gaps and promote green finance. These insights align with the proposition that tailored awareness mechanisms are essential for improving individual understanding and participation in green finance initiatives. Table 4 below provided a breakdown of the mechanisms used for green finance awareness.

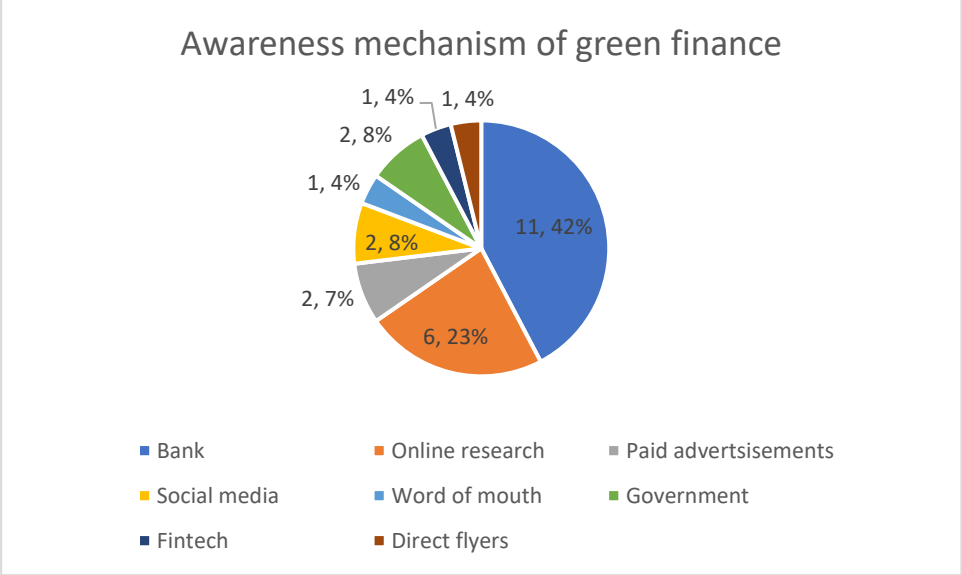

Table 4: Awareness mechanisms of green finance

Banks played a significant part in raising awareness about green finance, both for users and non-users. Their communication channels and product offerings were particularly effective in distributing information. This proactive approach by banks aligned with literature which emphasised the part of financial institutions in promoting sustainable finance products (Harsono & Suprapti, 2024). This suggested that banks are not only informing users but also actively integrating green finance into their product offerings (Omotosho, 2021), which reflected a shift in the socio technical landscape driven by regulatory and societal pressures.

Participant 3 –green finance user

"Was actually sent communications from my bank informing me of this product that they are offering or it's a platform that they're offering."

Participant 8 green finance user

"So we applied for a pre-approved bond about 34 months ago at Nedbank and right at the end once your pre-approved bond has been approved, I ask you whether you want to install solar and if you say yes, they actually give you a 10% on top of your bond for the solar that you're going to be installing".

Participant 20: non-green finance user

"*There was an initiative where there were discounts towards installing solar, so those are the two that I was aware of at that time when I was busy researching."*

Half of the green finance users reported conducting personal online research to deepen their understanding of green finance. The digitalisation of financial services highlighted the increasing reliance on online platforms for information (Jarvis & Han, 2021). Digital platforms capabilities proved how access to financial knowledge and product knowledge empowered individuals to make informed decision. Interestingly one participant who participated in green finance took the initiative to further explore green finance options online, despite receiving information from their bank. This behaviour reflected a cultural shift towards autonomy, where individuals seek to verify and supplement information through multiple sources (Malhotra & Baag, 2023; Matsepe & Van Der Lingen, 2022).

Participant 1: green finance user

"Looksee prompted me to research the option, because in our area loadshedding is quite bad, so that prompted me to look at the various options available and they basically just browse the internet, Google a lot of options."

The data highlighted the potential to combine traditional methods, such as classroom learning, with digital platforms to raise awareness in rural areas. The use of different awareness approaches (Kumari & Harikrishnan, 2021; Ozili, 2020), explored the effectiveness of combining traditional and digital methods in low resource settings. Interestingly one participant, supported for a purely technology-driven approach. This reflected a broader debate in the literature about the feasibility of only digital solutions in low-resource settings. Mobile technology has expanded access to information which suggests it may not entirely address fundamental barriers such as low financial literacy or lack of trust in digital platforms (Ozili, n.d.).

Participant 6: green finance user

“It like in rural places, not everyone have got an e-mail so hence I'm referring to those pop ups where people are using social media so I think. Even the normal learning way it can be a classroom learning or it can be just people who are running campaigns and they're teaching customers about it.”

Participant 17: non-green finance user

“I think leveraging technology and making sure that perhaps you engage with society and the community using digital platforms such as digital devices such as cell phones and platforms such as banking apps and all other digital media that's out there that would enable us to learn more about this.”

At the landscape level the increased environmental awareness and regulatory pressures are driving financial institutions to promote green finance. This landscape level change has created pressure for sustainable financial practices.

At the regime level, show banks, as regime level actors, are adapting their communication strategies and product offerings to align with sustainability goals. This reflects a regime level response to landscape pressures.

At the niche level showed digital platforms and grassroots initiatives are emerging as complementary mechanisms for raising awareness. These niche level innovations challenge traditional information distribution methods and reflect the dynamic interplay between landscape pressures and regime level responses.

4.8.4 *Conclusion for proposition 2*

The findings from the three themes financial documentation, community engagement, and awareness mechanisms support Proposition 2: By addressing gaps in technology-based financial literacy programs and tailoring them specifically for green finance, South Africa can significantly improve individual awareness and understanding, leading to increased participation in green finance initiatives in urban areas.

Landscape Level: Increasing environmental awareness and regulatory pressures are creating a demand for sustainable financial practices.

Regime Level: Financial institutions and governments are adapting their strategies to promote green finance, but more needs to be done to address structural barriers such as financial literacy and accessibility.

Niche Level: Grassroots initiatives and digital innovations are emerging as complementary mechanisms for raising awareness and creating participation in green finance.

In conclusion, effective strategies must influence the strengths of both traditional institutions and emerging technologies, ensuring that green finance initiatives are accessible, understandable, and inclusive for all. Future efforts should focus on building trust, simplifying financial processes, and creating collaboration between stakeholders to drive the transition toward a greener economy.

4.9 Proposition 3: Findings and discussion

In the findings and discussion for Proposition 3, the research investigated the impact of government policies, regulatory frameworks, and ecosystem collaboration on green finance adoption. Key findings included inconsistent municipal fees, the discontinuation of subsidies, and the need for clearer guidelines. Participants stressed the importance of supportive policies, such as reinstating tax rebates and expanding subsidies to cover components like inverters and batteries. The discussion also evaluates the part of public-private partnerships in driving innovation and trust. Through the lens of the MLP framework, this section analysed how landscape level pressures example environmental awareness influenced regime level actors example policymakers and enable niche level innovations example fintech collaborations. The key role player gains, are the insights into the challenges of policy implementation and the opportunities for creating cohesive frameworks that align stakeholders toward common sustainability goals.

4.9.1 *Government led incentives and support*

The findings on government-led incentives and support highlighted the importance of government initiatives in the promotion of access to green finance. Participants discussed various government-led incentives and support mechanisms, including subsidies, tax rebates, and preferential interest rates. The findings also revealed a significant challenge of burden of levies and fees applied by government municipalities which can hinder the adoption of green finance.

A key topic of discussion that emerged from the research was the impact of government incentives and subsidies. The positive impact of past initiatives like tax rebates for solar panels, aligned with research (Moner-Girona et al., 2022; Uhunamure & Shale, 2021), that emphasised the effectiveness of financial mechanisms and incentives in the promotion of the adoption of green technologies. Participant 5 however noted the limitations of focusing solely on solar panels without considering other components like inverters and battery backups, which can be prohibitive for individuals (Moner-Girona et al., 2022), suggesting that an all-inclusive approach to incentives of green technologies are necessary. The effectiveness of government incentives had a direct impact on affordability where findings in Propostion1, highlighted the benefits to make green finance more affordable.

Participant 19: non-green finance user,

"*I know that capability now what that solution has now since come to an end, so I just I think it was the solar tax rebate something to that effect where you'll get your rebate if you buy solar panels and it doesn't necessarily tie to the full system."*

Participant 5 green finance user

“I'm aware the tax rebates that no are no longer there so for the 2023 tax year, the tax rebates on solar panels also where they just only on solar panels, not on inverters and battery backup.”

The findings also highlighted the need for consistent and supportive policies across different government levels. Several participants expressed frustration with the contradictory nature of government policies, where incentives for green energy are undermined by levies and fees imposed by municipalities. This inconsistency created confusion and discouraged individuals from investing in green solutions. This challenge resonated with broader research on green finance, where inadequate policy frameworks and regulatory hurdles acted as significant barriers to wider accessibility and participation (Chenguel & Mansour, 2024; Wasan et al., 2024). The lack of a cohesive national framework for green finance in South Africa hindered the effectiveness of individual initiatives (Department :National Treasury of South Africa, 2023).

At the landscape level the increased environmental awareness and global sustainability goals created pressure for governments to adopt policies that promoted green finance. These external pressures push regime level actors, such as policymakers, to develop supportive frameworks for green energy transitions. Economic challenges like high unemployment rates and limited disposable income in South Africa however reduced the effectiveness of these initiatives by limiting individual participation.

At the niche level the fintech platforms acted as innovative mechanisms that can amplify the impact of government-led incentives. Fintech solutions can make green finance products more accessible to a broader audience by simplifying processes like loan applications and credit assessments therefore fintech solutions make green finance products more accessible to a broader audience. Their reach was constrained by inconsistent or incomplete government policies, which failed to provide adequate support for lower-income groups. To fully realise their potential, fintech companies must align with inclusive government policies and offer personalised solutions that address affordability concerns.

At the regime level the government policies and regulations played a critical part in shaping the affordability and accessibility of green finance products. Subsidies, tax rebates, and preferential interest rates have historically encouraged adoption

while inconsistencies across government levels undermined progress. For instance, municipal levies and fees often contradicted national incentives, creating confusion, and discouraging investment in green technologies. This highlighted the need for regime level interventions that ensure policy alignment and consistency.

4.9.2 *Ecosystem collaboration*

Effective collaboration among stakeholders was crucial for promoting green finance initiatives, as it enabled the sharing of expertise, resources, and risk. This theme explored the importance of ecosystem collaboration and support in promoting green finance initiatives, and highlighted the need for government support, education, and collaboration between government fintech's and other stakeholders. This is highlighted in the wordcount of the theme.

Figure 7: Word count: Ecosystem collaboration

A significant proportion of participants emphasised the importance of government support and education in promoting green finance initiatives. Education was vital to help people understand the part of fintech's in green finance initiatives, and government leadership in promoting awareness can help build trust and increase accessibility.

Participants emphasised the critical part of government in leading awareness campaigns and educating the public about green finance initiatives. This I supplemented by acting together, with the importance of local engagements and initiatives by the government or private sectors to reach underserved communities. Some participants emphasised the importance of government-led education while others highlighted the potential of fintech platforms to bridge the knowledge gap. This suggested that fintech platforms could play a key part in the improvement of access and affordability by providing clear and transparent information, complementing government efforts. The part of government-led education in promoting green finance adoption (Chenguel & Mansour, 2024) provided clear direction participation in green finance. Akomea-Frimpong et al. (2022) highlighted public awareness campaigns can increase trust and understanding of green finance products, particularly in developing countries where financial literacy is low. Government support and education are essential for the creation of collaboration among stakeholders. Through leading awareness campaigns and providing clear information, the government can build trust and understanding, enabling fintech companies, financial institutions, and other stakeholders to work together effectively. The findings revealed, particularly in the context of South Africa, where inconsistent policies and limited outreach to rural areas hindered progress (Zhuang et al., 2023). Some participants emphasised the importance of government-led education others highlighted the potential of fintech platforms to bridge the knowledge gap.

Participant 9: green finance user

“So education is very important in this key so that everybody understands why there's fintech’s in this whole process so if because if as an individual then I start seeing banks and stuff like that, this fintech’s coming and say we installing, I always think that they want to are they monopolising the process and stuff like that, but if the government leads and teaches people we partner with fintech’s because we want to also make sure that we spread the accessibility of these projects to many people here.”

Participant 20: non-green finance user,

" I'm basing it on my hometown I come from in Polokwane, like it's a small village and if those people they struggle with water, electricity then if there is like local engagements or initiatives from the government or private sectors to go into such areas , and have those discussions or engagements with them that will be very helpful and that will make the people that are staying in those areas more informed of different types of green initiatives that they can actually implement within their local areas."

Participant 14: non-green finance user

"Hopefully the Fintechs out there explain it properly and not to their benefit only."

Participants stressed the importance of collaboration between government, fintech companies, financial institutions, and subject matter experts. Nugraha et al. (2024) highlighted the importance of stakeholder collaboration in promoting green finance. Research showed that partnerships between traditional banks, fintech companies, and governments can drive innovation and adoption, (Kurniati & Suryanto, 2022) and effective collaboration enabled stakeholders to share expertise, resources, and risk, ensuring that green finance solutions are accessible and affordable. The potential of Fintech innovation to simplify access to green finance is highlighted by (Liu & You, 2023), however findings also revealed that collaboration must be supported by clear regulatory frameworks to ensure consumer protection and affordability.. For example, partnerships between fintech companies and financial institutions can simplify access to green finance, while government support can provide the necessary regulatory framework.

Participant 6: green finance user

"So we 100% need collaboration between government and fintech companies. The other reason for that is because for me, as we can see the issues of global warming and other issues of just the environment deteriorating, I think it needs

government to lead by example and be able to partner or support fintech companies that people can understand why they need to maybe to take such loans to build those type of Those type of houses, those type of electricity generation components in their houses."

Participant 17: non-green finance user

"They could work together if we get a subject matter expert will drive home the message clearly."

Participant 18: non-green finance user

"It is important that fintech service take in terms of providing their views, their insights. Equally financial institutions as they meet with government as a stakeholder community, so then that helps to say whatever that we are shaping, those are views that is representative of all stakeholders."

The findings highlighted several challenges that must be addressed to promote green finance initiatives effectively. These included building trust among consumers, ensuring affordability, and implementing clear regulatory frameworks. Participants also expressed scepticism about Fintech companies. Lamidi and Juta (2024); Matsepe and Van Der Lingen (2022) , emphasised the importance of trust-building in the promotion of financial inclusion. Participants highlighted the need for affordable financing options to encourage wider participation. It was stressed by Hoosain et al. (2020) on the importance of affordability in driving the adoption of green technologies. Participants emphasised the need for clear regulatory frameworks to guide green finance initiatives. These challenges highlighted the need for a cohesive national framework for green finance (Department :National Treasury of South Africa, 2023).

Participant 17 – non green finance user

“As consumers generally we don't trust fintech companies, so I think the Fintech companies would need to use other people if they're failing to drive the message home, use other parties or third parties or other partners within this ecosystem to drive the message home and to build trust and I think.”

Participant 3 green finance user:

"But they don't really have a clear indication from government as to how far they want to go with this from a product perspective, as well, right, do fintech’s further develop this."

Participant 2- green finance user

"So you actually making that mandatory like stupid example, but like how certificate of compliance is mandatory when purchasing a new home, This would be one of the steps to ensure that X percent bond is funded by off grid and implementing that."

Participant 7: green finance user:

"A relook at that business model somehow I think may just encourage a lot of people to take up green finance..."

At the landscape level the increasing environmental awareness (landscape) can push governments and financial institutions (regime) to adopt green finance policies.

At niche level the Fintech companies (niche) can introduce innovative solutions by creating simplified solutions that challenge traditional financial practices encouraging regime actors to adapt and change policies and regulations.

At the regime level the change of government policies and funding can provide the support through incentives needed for niche-level innovations to scale and become mainstream.

4.9.3 *Conclusion for proposition 3*

The combination of government-led incentives and ecosystem collaboration created a synergistic effect that amplified the impact of green finance initiatives. Addressing financial, regulatory, and social barriers, ensured the approach created an enabling environment that encourages wider individual participation in urban GET projects.

At the niche level, Fintech companies acted as innovators by providing accessible and user-friendly platforms for green finance. These innovations simplify processes like applying for green loans or accessing subsidies, making green finance more appealing to individuals. Trust in Fintech remained a challenge therefore the framework suggested that niche innovations need to gain legitimacy and acceptance within the regime which can be achieved through government support and collaboration.

At the regime level, the current financial system is dominated by traditional banks and regulatory frameworks which often lacked the flexibility to support green finance initiatives. Government policies and regulations played a critical part in reshaping this regime by creating incentives example (tax rebates and subsidies) and clear regulatory frameworks. Collaboration between government, fintech companies and traditional financial institutions bridges the gap between niche innovations and the existing regime therefore enabling the scaling of green finance solutions.

At a landscape level the pressures such as climate change, global sustainability goals, and local urban challenges example (energy poverty and unreliable grid access), creates an urgency for green finance adoption. These pressures push the regime to adapt and create space for niche innovations to grow. Government policies and collaborative efforts align with these landscape pressures, ensuring that green finance initiatives are responsive to both global trends and local needs. Eventually, the collaborative model accelerates the transition to sustainable

energy and ensures that the benefits of green finance are fairly distributed across urban Gauteng.

4.10 Proposition 4: Findings and discussions

The findings and discussion for Proposition 4 examined the interplay between Fintech adoption, supportive regulations, and improved financial literacy in promoting green finance participation. Topics explored included trust in digital platforms, the dual nature of economic versus environmental motivations, and the potential of AI-driven tools example ChatGPT and comparison platforms to simplify challenging information. Participants highlighted concerns about credibility, particularly in regions with high rates of digital crime, and suggested integrating green finance applications with trusted banking apps to build confidence. The discussion further explored how the need for balanced messaging, by combining environmental, economic, and benefit that can appeal to a broader audience. The MLP framework applied in this section explained how niche level innovations example fintech tools, that complement regime level policies and respond to landscape level pressures example climate change.

4.10.1 *Adoption opportunities using technology*

The transition to a low-carbon economy requires innovative financial solutions that supports sustainable development. Effective ecosystem collaboration and support are essential for addressing the challenges and promoting the adoption of green finance initiatives. This theme explored the importance of ecosystem collaboration and support in promoting green finance initiatives, highlighting the need for government support, education, collaboration between stakeholders, and to address the barriers to adoption.

The findings from this study highlighted the part of technology in facilitating the adoption of green finance solutions. Participants consistently highlighted the importance of user-friendly digital platforms, online tools, and social media in the

promotion of access to green finance. Technology can significantly improve access to financial services by simplifying processes and providing personalised solutions (Istudor et al., 2022; LaPlante & Watson, 2018). Furthermore, the use of digital platforms and social media for marketing and education reflected the growing influence of technology in shaping financial behaviours and decisions (An et al., 2022). The study also revealed that educational resources delivered through technology such as short videos and AI-driven tools like ChatGPT, can clarify challenging green finance concepts and make them more accessible to a broader audience. According to Compen et al. (2023); Kumari & Harikrishnan (2021) highlighted the part of financial literacy and education in driving the adoption of sustainable financial products. Therefore, by the usage of technology to deliver educational content, financial institutions can bridge the knowledge gap and create greater participation in green finance.

Participant 1: green finance user

"There's so many products available, but it would be nice to have a proper comparison tool, buying versus renting the options because that's something that I didn't really find, so I had to use a spreadsheet type of thing to actually compare what would work and what wouldn't work."

Participant 13: non-green finance user

"It would definitely be online application, but if it could be, you know linked to a banking app, so you know that the people that you are using are reputable and are vetted by the bank, I think that would make it easier."

Participant 2: green finance user*:*

"And even mini videos could help inform a lot of the guys. Maybe short tutorials, almost like a YouTube type of video of how it will help you and how it will save you money."

Participant 15: non green finance user

"I think the one part of it is sort of an objective, and I love that the concept of AI, look at ChatGPT, something that I could throw the information and ask questions around it, because I think most of the information that you get around these contracts is one, it's sort of unidirectional."

Trust and credibility emerged as critical factors that influenced green finance adoption. Participants expressed concerns about the transparency and reliability of fintech solutions, particularly in regions like South Africa where trust in digital platforms is dominant due to high rates of digital crimes. Participants also highlighted the need for comparison tools to evaluate green finance products effectively. It was also suggested that the integration of green finance applications with existing banking apps are applied to enhance trust and usability. The importance of trust and credibility in financial decision-making process was highlighted by (Matsepe and Van Der Lingen, 2022). Financial institutions and fintech's must prioritise transparency, accountability, and clear communication to build trust and encourage adoption.

Participant 11: green finance user

"Based on my experience with some of these marketing campaigns and when you start asking questions about so walk me through the process from me signing to me, getting a solution that's working, what's going to happen, you find a whole lot of red tape and different key players, so it doesn't make it trustworthy as opposed to walking into a garage, seeing your car, taking it, registering it and leaving."

Participant 15: non green finance user

"I think as in South Africa, an environment that we in we see a lot of digital distrust because of some of the digital crimes that we see people getting scammed on a daily basis and some of the things that the banks will sort of inform you about. So there's a lot of hesitancy and scepticism from my perspective at least that before I engage in something."

Affordability and accessibility were also identified as being key for green finance adoption. Participants noted that fintech companies have the potential to offer innovative and cost-effective solutions that make green finance more attractive and suggested that fintech's could close the affordability gap by providing bespoke and tailored solutions. The part of technology in reducing costs and expanding access to financial services was highlighted by (Dzomonda, 2022; Valavan ,2023). Therefore, fintech companies can overcome traditional barriers to entry and make green finance more accessible to urban populations by utilising technology more.

Participant 12: non-green finance user

"I think if the Fintech is able to close the gap around the affordability through cleverer ways of offering unique solutions with individual that can make it more attractive, I think there's definitely an opportunity that can exist to overcome those challenges."

At the landscape level the increased environmental awareness and global sustainability goals created external pressures for governments and financial institutions to adopt green finance practices. These pressures drive the need for innovative solutions that balance economic, social, and environmental objectives.

At the regime level the traditional financial practices often prioritised corporate clients over individual consumers, which limits access to green finance products. Government policies and regulations play a fundamental part in reshaping these practices by incentivising green investments and ensuring consumer protection. Inconsistent policies and limited outreach to underserved communities' however hindered progress.

At the niche level the fintech platforms represent innovative solutions that challenge established norms by providing accessible, user-friendly green finance products. Their success depends on alignment with regime level policies and

landscape level pressures, requiring collaborative efforts to overcome barriers like trust and affordability.

4.10.2 *Environmental Benefits*

The theme of environmental benefits explored the perceived advantages of green energy solutions, particularly in terms of reduced carbon emissions and long-term sustainability. This theme highlighted the perspectives of both green finance users and non-users and therefore revealed the benefits and challenges associated with environmental sustainability. The findings highlighted the importance of awareness, education, and government support in the promotion green energy adoption displayed in wordcount: Figure 8. It also revealed conflicting motivations and infrastructural barriers that hindered progress.

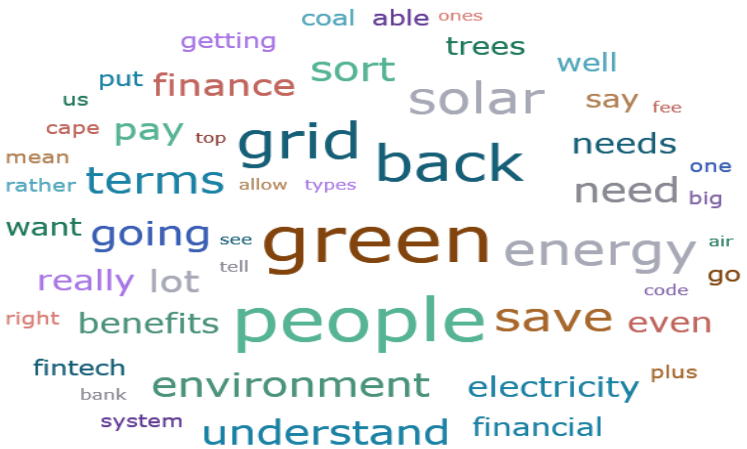

Figure 8: Word count Environmental benefits

Participants acknowledged the environmental benefits of green energy, such as reduced carbon emissions, water conservation, and tree preservation. These benefits were framed in everyday, relatable terms, which made them more accessible to the public. A green finance user emphasised the importance of calculating environmental benefits in "layman's terms," such as the number of trees saved, or carbon emissions prevented. It is stressed for the need of clear communication and public awareness to drive green energy adoption (T. C &

Melvin, 2022). Participants highlighted the environmental benefits of solar energy by noting its potential to reduce reliance on non-renewable resources. The study revealed that while environmental benefits are widely recognised, they may not always be the primary motivator for adoption. One participant noted that solar sales and battery sales slowed down during periods without load shedding therefore suggesting that economic and everyday concerns often outweigh environmental considerations. This finding challenged the assumption that environmental benefits are the primary driver of green energy adoption (Gu et al., 2023). Instead, it highlighted the need for a better understanding of the factors influencing public behavior.

Participant 8: green finance user

"The worlds benefit, you know the carbon emission very clear and I'm involved with a lot of ESG related reporting which tells you in in in terms of water how much water do you save? How many trees do you save? How much? Carbon emissions do you prevent you know in in in layman's terms express that landfill you know what it really means. Environmental benefits are and if you express it in those layman terms."

Participant 14 non-green finance user

“And obviously, there's also the benefit to the environment where people are using solar."

There are long-term benefits of green energy, including reduced carbon emissions and a better future for generations to come.

Participant 5 green finance user

“There isn't consistent approach across all municipalities around capacity to the grid.”

Participants also emphasised the long-term benefits of green energy, particularly for future generations. A participant noted that the benefits may not be realised

in their lifetime. This aligned with literature on intergenerational equity, which emphasises the ethical responsibility to promote sustainability for future generations (Gu et al., 2023; Martin, 2023).Participants also highlighted the part of financial literacy and education to drive long-term adoption therefore suggested, that the understanding the broader benefits of green energy can influence decision-making. Despite this acknowledgment, some participants struggled to connect long-term benefits with immediate actions. The World Economic Forum (2021) highlighted that affordability and reliability are important factors in that influence participation in green energy projects in developing contexts. To address this, green finance initiatives should emphasise both economic and environmental benefits which appeals to broad range of motivations (Chenguel and Mansour, 2024; Zhuang et al., 2023). This gap in understanding identified the need for targeted education campaigns that emphasised the impact of green energy adoption. Policymakers and green finance advocates can appeal to a broader audience and create greater engagement by positioning environmental benefits for immediate and long-term gains.

Participant 1: green finance user

"Then, in the long run, maybe not in our lifetimes, but in our children children's lifetimes, the world will be a better place to live in, actually."

Participant 5: green finance user

" But the more financially financial literate are, and whether it's fintech's that aids in getting that financial literacy up, whether it's, fintech's, or environmental groups that say there's actually benefits beyond just keeping the lights on, I think that helps to drive the ultimate decision."

Government support and regulation emerged as critical factors in the promotion of green energy adoption. Participants called for stronger leadership and collaboration between governments and fintech companies to incentivise green energy solutions. The importance of part of public-private partnerships in

advancing sustainability goals is highlighted by (Bayram et al., 2022; Kurniati & Suryanto, 2022). Importantly, the findings also revealed significant gaps in government infrastructure, particularly in regions like Gauteng, where excess solar energy cannot be fed back into the grid. In contrast, the Western Cape has implemented policies that allowed individuals to sell excess energy back to the grid, with the creation a more favourable environment for green energy adoption. This inconsistency reflected broader challenges in developing countries, where regional disparities in infrastructure often hindered progress (Akomea-Frimpong et al., 2022; Chenguel & Mansour, 2024).To address these disparities, it requires a coordinated effort at both the national and local levels complimented by greater collaboration between governments, fintech companies and other stakeholders.

Participant 6: green finance user

"The other reason for that is because for me, as we can see the issues of global warming and other issues of just the environment deteriorating, I think it needs government to lead by example and be able to partner or support fintech companies that people can understand why they need to maybe to take such loans to build those type of those type of houses, those type of electricity generation components in their houses."

Participant 10- green finance user

“I think it's in Western Cape where they're going to sort of like allow actual community members to generate much of solar energy and feedback onto the grid”

Participants identified several challenges to green energy adoption which included inconsistent infrastructure and fluctuating demand. It was highlighted by a participant on the lack of a "consistent approach across municipalities" regarding grid capacity, which limited the ability to fully influence green energy solutions. Infrastructure limitations acted as a major barrier to green energy adoption, particularly in developing countries (Zhuang et al., 2023). In addition, some participants reported that demand for green energy solutions decreased

during periods without load shedding which suggested that environmental benefits may not be a primary motivator for all individuals. A participant described green energy solutions as a "grudge purchase," driven more by necessity than by environmental concerns. The study revealed conflicting views on the motivations for adopting green energy solutions. While some participants were driven by environmental benefits, others were more influenced by economic factors or the immediate need to address load shedding. This contrasted with Dzomonda (2022), who highlighted that a positive and significant relationship exists between people and commitment to environmental sustainability therefore there is a need in identifying underlying factors that is driving green energy adoption. The findings suggested that while environmental benefits are important, economic factors take precedence and plays a significant part in shaping perceptions.

Participant 5 green finance user

“There isn't consistent approach across all municipalities around capacity to the grid.”

Participant 15: non-green finance user

"I think when load shedding was still hectic, I think that's when we're looking at it and now load shedding is sort of equalised or the presence of it has minimise, one tends to forget about some of those service providers, so it's only like a grudge purchase."

“I think it does make a big difference if you can further reduce your electricity both. So Western Cape has it, but we've been waiting forever.”

Participant 5: green finance user

“Solar sales and battery sales slowdown when there's no load shedding, which tells you that people aren't moving to green solutions because they want a greener solution.”

At the landscape level, increased environmental awareness and regulatory pressures are driving the adoption of green energy solutions. This was evident in the growing emphasis on sustainability goals and the integration of green energy into mainstream financial systems.

At the regime level, governments and financial institutions adapted their policies and practices to align with these goals. For example, the call for government leadership and collaboration with fintech companies reflects a regime level response to landscape pressures.

At the niche level, grassroots initiatives and innovative technologies have emerged as complementary mechanisms for promoting green energy adoption. The reliance on social media, online tutorials, and AI-driven tools, as highlighted by participants, demonstrated the innovative potential of niche level solutions. These technologies challenge traditional methods of information dissemination and provide new avenues for raising awareness and educating users about green energy

The interaction between these levels explained the real patterns observed in the study, with technology acting as a bridge between landscape pressures, regime adaptations, and niche innovations.

4.10.3 Conclusion for proposition 4

At the landscape level the increased environmental awareness and regulatory pressures drive the adoption of green energy solutions. This was apparent in the growing importance on sustainability goals and the integration of green energy into mainstream financial systems.

At the regime level government and financial institutions adapted their policies and practices to align with these goals. An example would be the need for government in collaboration with fintech companies reflecting a regime level response to landscape pressures.

At the niche level the emergence of grassroots initiatives and innovative technologies are developing as complementary mechanisms for promoting green energy adoption. The reliance on social media, online tutorials and AI-driven tools as highlighted by participants, determines the innovative potential of niche level solutions. These technologies challenged traditional methods of information spreading and provided new avenues for raising awareness and educating users about green energy. The relationship between these levels explained the patterns observed in the study, with technology acting as a bridge between landscape pressures, regime adaptations and niche innovations.

4.11 Relationship between the proposition's findings and discussion

To fully understand the dynamics influencing green finance adoption, it was essential to examine the relationship between the four propositions explored in this study. Each proposition addressed distinct yet interconnected aspects of the challenge, which revealed insights into how various factors influence individual participation in urban Green Energy Transition (GET) projects.

4.11.1 *Proposition 1 and Proposition 4: Affordability and Adoption*

Both propositions emphasised affordability as a critical factor influencing adoption. Proposition 1 focused on streamlining processes to enhance access while Proposition 4 highlighted that trust in Fintech platforms and regulatory support is essential for overcoming scepticism about high upfront costs. Participants preferred rental options due to lower upfront costs (Proposition 1) but noted that limited understanding of product components mistrust in digital platforms hindered wider adoption (Proposition 4). Matsepe and Van Der Lingen, (2022) found that digital distrust, particularly limited fintech adoption despite its potential to simplify processes. The discontinuation of subsidies for components like inverters and batteries (Proposition 1) created affordability barriers, which Fintech companies could address by contributing tailored product and financing

options (Proposition 4) however, without clear regulations which ensures transparency, participants may remain sceptical of these offerings.

4.11.2 *Proposition 2 and Proposition 3: Financial Literacy and Policy Support*

Financial literacy programs (Proposition 2) played a crucial part in ensuring individuals understand green finance products, but their effectiveness depended on supportive policies (Proposition 3). Government-led campaigns delivered in local languages build trust and awareness, complementing Fintech-driven tools aimed at simplifying hard to understand information. Participant suggested that localised education campaigns led by the government would increase trust and accessibility (Proposition 3), while also highlighting the need for simplified documentation and relatable metrics provided by Fintech platforms (Proposition 2). Dietrich et al. (2023) highlighted the importance of multilingual support and personalised content in improving user experience, suggesting that the combination of policy-driven education with Fintech innovations could maximise impact. A lack of clear guidelines for green finance products (Proposition 3) worsened existing knowledge gaps among users (Proposition 2) therefore by harmonising policies and incorporating educational resources into Fintech apps, stakeholders can overcome both challenges simultaneously.

4.11.3 *Proposition 1 and Proposition 3: Access and Policy Frameworks*

Fintech platforms (Proposition 1) offered innovative solutions to simplify loan applications and investment procedures, but their impact was limited without consistent and supportive policies (Proposition 3). Inconsistent municipal fees and levies undermined national-level incentives, created confusion, and discouraged participation. Participants noted how municipal fees eroded initial savings from tax rebates (Proposition 3), suggesting that aligning niche innovations (Fintech platforms) with regime level frameworks (government

policies) was important for maximising benefits. Zhuang et al. (2023) argued that inadequate government support and conflicting regulations hindered progress, which reinforced the need for alignment between Fintech capabilities and policy frameworks. The introduction of the Energy Bounce Back Loan Guarantee Scheme (EBB) (Proposition 3) increased interest in solar panel installations, but its narrow focus on panels alone (excluding inverters and batteries) limited its reach (Proposition 1). Expanding subsidies to cover all components would enhance the appeal of Fintech platforms to offer comprehensive financing solutions.

4.11.4 *Proposition 2 and Proposition 4: Financial Literacy and Trust-Building*

Improved financial literacy (Proposition 2) created trust in Fintech platforms (Proposition 4), making users more comfortable engaging with green finance products. Trust cannot be built solely through education as it also requires transparency, accountability, and alignment with reputable institutions like banks.

Participants expressed hesitancy due to mistrust in digital platforms, citing the prevalence of scams in South Africa (Proposition 4). At the same time, they acknowledged the value of online training modules in providing background for detailed concepts (Proposition 2). Compen et al. (2023) found that online training improved students' financial behaviour even if it did not significantly increase their knowledge which highlighted the dual part of education in building confidence and driving action. Integrating Fintech apps with trusted banking platforms (Proposition 4) could enhance credibility while delivering educational content through AI-driven tools (Proposition 2). This hybrid approach addresses both trust concerns and knowledge gaps to encourage broader participation.

4.11.5 *Proposition 3 and Proposition 4: Regulation and Innovation*

Government policies (Proposition 3) set the stage for Fintech innovation (Proposition 4) by reducing risks and encouraging experimentation. Clear

guidelines and standardised regulations ensured that niche innovations aligned with broader sustainability goals, creating greater adoption. Participant commended Fintech for simplifying processes but noted that inconsistent policies created uncertainty (Proposition 3). They suggested that government leadership and partnerships with Fintech companies could clarify expectations and encourage wider participation (Proposition 4). Bayram et al. (2022) demonstrated how Turkey's regulatory sandbox environment created collaboration between finance, technology, and regulators, driving responsible innovation and inclusion. Expanding the scope of subsidies to include additional components like inverters and batteries (Proposition 3) would incentivise Fintech companies to develop more inclusive products (Proposition 4) therefore such alignment ensures that technological advancements meet every day needs on the environmental benefits.

4.11.6 *Proposition 1 and Proposition 2: Access and Awareness*

Fintech platforms (Proposition 1) made green finance products easier to access while their effectiveness depends on users' ability to understand these products (Proposition 2). Without users having adequate financial literacy, streamlined processes may fail to drive meaningful adoption. Participants highlighted the need for accessible refinancing avenues and alternative investment channels (Proposition 1) but stressed that many individuals lacked the knowledge to navigate these options effectively (Proposition 2). Hasan et al. (2021) showed that financial literacy empowered individuals to participate confidently in financial systems, highlighting the importance of the combination of access with education. Developing comparison tools within Fintech platforms (Proposition 1) to explain terms like "carbon emissions prevented" or "trees saved" in layman's terms and benefit to the environment (Proposition 2) would bridge the gap between accessibility and understanding and therefore enhance overall adoption rates.

4.11.7 *Proposition 2 and Proposition 3: Education and Policy Alignment*

Government-led education campaigns (Proposition 3) complemented Fintech-driven literacy programs (Proposition 2) by addressing cultural and language barriers. Participants emphasised the need for clear communication through trusted sources, which suggested that policy frameworks must prioritise inclusivity. Participants expressed greater trust in government-led initiatives communicated in local languages (Proposition 3), while also recognising the convenience of digital platforms for learning (Proposition 2). Kumari and Harikrishnan (2021) highlighted the importance of culturally sensitive communication in promoting sustainable practices, supporting the study's findings. Localised government programs targeting underserved communities (Proposition 3) could incorporate Fintech tools for interactive learning (Proposition 2) therefore ensuring that all individuals regardless of income or education level can engage meaningfully with green finance opportunities.

4.11.8 *Proposition 1 and Proposition 2: Simplification and Understanding*

Simplified processes offered by Fintech platforms (Proposition 1) reduce technical barriers but do not eliminate knowledge gaps entirely. Effective financial literacy programs (Proposition 2) ensured users fully understand the implications of green finance products, leading to informed decision-making. Participants struggled with hard-to-understand documentation despite using Fintech platforms for convenience (Proposition 1). They suggested integrating educational features into apps to clarify ownership structures and cancellation clauses (Proposition 2). Guo et al. (2022) argued that simplifying terms and conditions is key to expanding access, especially among populations with low financial literacy. Designing fintech apps with embedded tutorials or chatbots (Proposition 2) to explain product details step-by-step would complement the ease of use provided by these

platforms (Proposition 1) therefore ensuring users feel confident and informed throughout the process.

4.11.9 *Proposition 3 and Proposition 4: Collaboration and Synergy*

Collaboration between government, Fintech companies, and traditional financial institutions (Proposition 3) enables the development of innovative yet trustworthy solutions (Proposition 4). Clear regulatory frameworks provide stability, encouraging Fintech companies to invest in green finance products. Participants called for joint initiatives between government and Fintech companies to spread accessibility and awareness (Proposition 3), noting that such partnerships would build trust and clarify misconceptions (Proposition 4). Kurniati and Suryanto (2022) emphasised the importance of stakeholder collaboration in driving innovation and adoption, aligned with this study's findings. Establishing platforms for dialogue between policymakers, Fintech companies, and community members (Proposition 3) would help design user-friendly interfaces and transparent communication strategies (Proposition 4), ensuring that solutions are delivered to diverse audiences.

4.12 Conclusion

This chapter presented and discussed the findings of the qualitative research, exploring the part of Fintech in facilitating access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa. The study used an interpretivist paradigm to analyse participants' experiences, perceptions, and meanings related to Fintech platforms. Thematic analysis uncovered emergent themes that reflected the participants' constructions of reality, bringing their voices and perspectives to the forefront.

Key themes explored included affordability, access, product knowledge, financial documentation, community engagement, awareness mechanisms, and environmental benefits. The findings indicated that while Fintech platforms significantly enhance access to green finance by streamlining loan applications

and credit assessments, affordability remained a critical barrier due to high upfront costs and limited inclusivity for lower-income groups. Financial literacy programs tailored for green finance played a crucial part in improving awareness and understanding but required clear communication and relatable metrics to overcome difficulty. Government-led incentives, such as tax rebates and subsidies, drive adoption but are undermined by inconsistent municipal fees and levies. Lastly, trust-building mechanisms, balanced messaging, and technological innovation are essential for creating wider participation in green finance initiatives.

The study examined the Multi-Level Perspective (MLP) framework on how landscape level pressures, for example climate change awareness, and economic inequality, the regime level rules example government policies and institutional practices, and niche level innovations, for example fintech platforms, can interact to influence socio-technical transitions in green finance. These insights offered actionable strategies for stakeholders seeking to promote green finance adoption in urban Gauteng.

In conclusion, the findings suggested that no single factor whether technological, educational, or regulatory, can independently drive green finance adoption. Instead, coordinated efforts across all levels are required to address affordability, improve financial literacy, implement supportive policies, and build trust.

CHAPTER 5. CONCLUSIONS AND RECOMENDATIONS

5.1 Introduction

This chapter synthesised the key findings from the research, addressing each objective systematically while highlighting how the propositions align with everyday experiences. The conclusions aimed to provide actionable insights into the factors influencing green finance adoption through Fintech platforms in urban South Africa, particularly Gauteng Province. Through the integration of participant perspectives, thematic analyses, and literature review insights, this chapter provides a comprehensive view of the challenges and opportunities within the study's scope.

The findings indicated that Fintech platforms played a significant part in enhancing access to green finance products for individuals. However, affordability, financial literacy, government policies, and trust in digital solutions remain critical barriers to widespread adoption. These insights extended beyond existing literature by focusing on setting specific factors such as municipal fees, cultural differences, and regional disparities in infrastructure. Furthermore, the study highlighted the importance of balancing environmental benefits with economic and everyday considerations to appeal to a broader audience.

Below, the researcher addressed each research objective, drawing connections between the findings, propositions, and theoretical framework. This approach ensured clarity and relevance while identifying areas where this study added value to the existing body of knowledge.

5.2 Conclusions regarding research objective 1

Objective 1: Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.

The findings indicated that Fintech platforms significantly enhance access to green finance by streamlining loan applications, credit assessments, and investment procedures. Participants emphasised the convenience of online processes, such as rental options and mobile apps, which made green finance products more accessible to individuals in urban areas. For instance, fintech solutions allowed users to calculate their solar-readiness or compare financing options through digital tools, reducing challenges and decision-making time. However, affordability remained a critical barrier, with high upfront costs deterring many participants despite streamlined access (80% cited affordability as a challenge). This aligned with literature highlighting the importance of balancing profitability with inclusivity in fintech contributions (Devidze, 2022; Qadri et al., 2024).

A key difference between this study and previous research lied in the focus on rental models as an alternative to traditional financing. Earlier studies primarily examined purchase-based solutions with this research highlighted the preference for shorter-term investments like rentals among participants who lacked capital. Furthermore, inconsistent government policies and municipal fees were identified as undermining the benefits of green finance initiatives, suggesting that regulatory support is crucial for maximising fintech's potential (Uhunamure & Shale, 2021).

Through the addressing of the gap in understanding how fintech impacts affordability and accessibility, this study contributed to the literature by highlighting the need for tailored fintech solutions targeting lower-income groups. Future efforts should focus on integrating fintech innovations with supportive policies and subsidies to ensure broader participation in GET projects.

5.3 Conclusions regarding research objective 2

Objective 2: Evaluate the effectiveness of existing initiatives in promoting financial literacy and awareness of green finance using technology.

This study revealed that technology-based initiatives aimed at improving financial literacy and awareness of green finance are effective but required a multifaceted, scenario specific approach. Banks emerged as primary drivers of awareness, leveraging established communication channels and customer trust to promote green finance products. This proactive integration reflected the growing pressure on financial institutions to align with sustainability goals, extending beyond their traditional part as intermediaries.

Participants, however also relied heavily on independent online research to verify or supplement information provided by banks which indicated scepticism and a desire for deeper understanding This contrasted with earlier assumptions of passive acceptance of institutional messaging and highlighted the democratising part of technology in empowering individuals to make informed decisions (Harsono & Suprapti, 2024; Omotosho, 2021).

In rural areas, hybrid approaches combined traditional methods, example classroom learning with digital platforms, proved effective. Yet, there was divergence in views regarding purely digital solutions due to infrastructure limitations and varying levels of digital literacy (Zhuang et al., 2023). Community engagement, particularly interactive formats like workshops and webinars, was highlighted as a catalyst for behavioural change and building trust (Sofyan A Gani et al., 2023).

Using the MLP framework, the study explained how macro-level pressures, example environmental awareness and regulatory changes influenced regime level actors example banks and governments, while niche level innovations example digital platforms and grassroots initiatives, complemented these efforts

by addressing local needs. This dynamic interplay provided a structured analysis of the factors that drive financial literacy and awareness in green finance.

This research addressed the gaps in the literature by emphasising the importance of localised strategies, trust-building through government-led initiatives, and the part of interactive community engagement. Through the integration of these elements, stakeholders can create more inclusive and impactful green finance programs.

5.4 Conclusions regarding research objective 3

Objective 3: Examine the part of government policies, regulations, and financial institutions practices in promoting the availability and accessibility to green finance products.

Government policies and regulations played a pivotal part in shaping the availability and accessibility of green finance products. Positive examples include past tax rebates and subsidies that encouraged solar panel installations, demonstrated the effectiveness of well-designed incentives (Moner-Girona et al., 2022). The challenges however persisted due to inconsistencies across government levels, where municipal levies and fees undermined national incentives. The discontinuation of subsidies for components like inverters and batteries further limited affordability and created barriers for low to middle income households (Department :National Treasury of South Africa, 2023).

Financial institutions and fintech companies are essential partners in driving innovation and simplifying access to green finance. Their collaboration depended on supportive government policies and consumer trust, both of which remained underdeveloped in the South African situation. High upfront costs and distrust in fintech platforms were identified as significant barriers, requiring innovative financing solutions and third party collaborations to build confidence ((Matsepe and Van Der Lingen, 2022).

Ecosystem collaboration emerged as a critical enabler of green finance adoption. Partnerships between government, fintech companies, financial institutions, and subject matter experts drive innovation and ensured alignment with sustainability goals (Kurniati &Suryanto, 2022). Government-led education campaigns, delivered in local languages and tailored to diverse audiences, can increase public understanding and acceptance of green finance options.

This study differed from prior research by focusing on municipal levies and fees as barriers to green finance adoption, a factor often overlooked in favour of national policy analysis (Chenguel & Mansour, 2024). In addition, it highlighted consumer distrust in fintech companies and the contradictory nature of certain policies and offered new insights into the complexities of implementation. Through the addressing of these shortcomings, the study provided a holistic view of the factors influencing green finance adoption and emphasised the need for consistent, supportive regulations and stakeholder collaboration.

5.5 Conclusions regarding research objective 4

Objective 4: Identify the key challenges and opportunities associated with financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.

Fintech solutions offered significant opportunities to simplify financial information and improve accessibility to green finance products. User-friendly applications, AI-driven tools example ChatGPT, and comparison platforms empowered individuals to make informed decisions about green energy investments Despite these advantages, trust and credibility emerged as major barriers, particularly in regions with high levels of digital distrust (Matsepe & Van Der Lingen, 2022). Integrating fintech features into reputable banking apps or partnering with trusted third parties could mitigate these concerns.

Environmental benefits, though recognised, were not the sole motivator for green finance adoption. Economic factors and immediate everyday needs, such as

addressing load shedding, took precedence for many participants. This finding contrasted with literature assuming environmental benefits as the primary driver and highlighted the need for balanced messaging that incorporated economic and everyday considerations (Gu et al., 2023).

Government support and regulation acted as enablers of green finance adoption. Public and private partnerships and policies that incentivise green energy adoption were viewed positively, but regional disparities in infrastructure example grid capacity and inconsistent regulations hindered progress ((Zhuang et al., 2023). Standardised regulations and coordinated efforts across government levels are necessary to overcome these challenges.

Financial literacy and awareness remained critical for green finance adoption. Participants called for educational resources, including short videos and tutorials, to explain green finance concepts in relatable terms (Compen et al., 2023). Technology-driven education campaigns targeting urban populations could bridge knowledge gaps and encourage wider participation.

Key differences from previous research included the emphasis on trust and credibility in fintech adoption, conflicting motivations driving green finance decisions, and regional disparities in infrastructure and regulation. These findings addressed gaps in the literature by providing a better understanding of the socio-economic and technological factors influencing green finance adoption. Through the balancing of environmental, economic, and everyday demands, stakeholders can develop more effective strategies to promote green finance in urban areas.

5.6 Theoretical contribution

This study makes a significant theoretical contribution by adapting and extending the Multi-Level Perspective (MLP) framework to examine the socio-technical transitions driving green finance adoption at the individual level in an urban setting. It explored how technological innovations (Fintech as a niche), existing financial systems and policies (regime), and broader societal pressures like

climate change, economic inequality, and sustainability goals (landscape) interact to influence the accessibility and adoption of green finance products.

At the niche level, the study highlights Fintech platforms as disruptive forces challenging traditional financial practices while catering for accessible, user-friendly solutions tailored to individual needs. These platforms simplify loan applications, credit assessments, and investment procedures, making green finance more appealing to urban residents. However, their impact is constrained by factors such as profitability-driven models, trust issues, and limited inclusivity for lower-income groups therefore by analysing these dynamics, the study reveals how niche innovations can co-evolve with regime-level actors to create scalable and reasonable solutions.

At the regime level, the research examines how government policies, regulations, and institutional practices shape the availability and attractiveness of green finance products. It reveals that inconsistent policies, conflicting municipal fees, and limited outreach hinder progress despite national-level incentives. This finding extends the MLP framework by showing how regime level actors must adapt to align with landscape pressures, particularly through clear regulatory frameworks, standardised guidelines, and public-private partnerships. The study also highlights the importance of regime-level stability in promoting innovation and ensuring consistency across different levels of governance.

At the landscape level, the study unpacks external pressures influencing green finance adoption, including rising environmental awareness, global commitments to sustainability, and local challenges like high unemployment rates, limited digital infrastructure, and cultural barriers. These factors create both opportunities and constraints for niche level innovations and regime level adaptations hence by incorporating these setting-specific elements into the MLP framework, the study enriches its application to developing countries, where socio-economic certainties significantly affect transition processes.

A common critique of the MLP framework is its limited focus on the part of individual and organisational actors in driving change (Smith & Stirling, 2008).This study addresses this limitation by clearly examining how specific actor such as Fintech companies, policymakers, financial institutions, and urban residents shape the development of green finance initiatives.

Fintech Companies act as innovators offering simplified processes but require legitimacy and trust-building mechanisms. Policymakers play an essential part in creating enabling environments through consistent policies and subsidies. Urban Residents influence adoption patterns based on affordability, financial literacy, and everyday considerations like load shedding. By integrating key actors' analysis, the study provides a better understanding of how transitions occur in practice therefore moving beyond intangible structural interactions to include lived experiences and decision-making processes.

The MLP framework has been widely applied to energy transitions and sustainability however, its use in studying urban green finance through Fintech remains underexplored. This research fills this gap by demonstrating how the framework can be adapted to analyse socio-technical transitions at the individual level within an urban setting. The key contributions included highlighting the dual part of Fintech as both disruptor and collaborator in reshaping traditional financial regimes. Highlighting the need for regime level interventions, such as supportive policies and infrastructure improvements, to enable niche level innovations. Unpacking the landscape level to revealed unique challenges faced in South Africa, such as economic inequality and limited digital access, which influence the transition process.

The study introduced financial literacy as a critical factor influencing the landscape level of the MLP framework. It shows how improving financial literacy can bridge knowledge gaps and empower individuals to make informed decisions about green finance products. This aligns with the broader concept that education plays a key part in promoting sustainable practices, but the study adds depth by highlighting the interplay between financial literacy, technology-based programs,

and cultural situations as participants emphasised the value of multilingual support and relatable metrics example “trees saved" or "money saved per month" in enhancing understanding and engagement.

The findings indicated a dynamic interplay between the three levels of the MLP framework.

Landscape Level: External pressures such as climate change agreements and local energy crises push for greater adoption of green finance.

Regime Level: Governments and financial institutions respond to these pressures by designing policies and products aimed at promoting sustainability, though inconsistencies and inefficiencies remain.

Niche Level: Fintech platforms emerge as innovative solutions addressing accessibility and affordability gaps, but their effectiveness depends on alignment with regime-level policies and responsiveness to landscape level demands.

This integrated approach explains why some green finance initiatives succeed while others fail, creating actionable insights for stakeholders seeking to promote sustainable transitions.

5.7 Recommendations

The following recommendations are made to key stakeholders with the aim to address the barriers to green finance adoption and influencing the opportunities for promoting sustainability.

Level	**Stakeholder**	**Recommendations**
	Academia and researchers	Researchers play an important part in documenting successful green initiatives locally and globally therefore to by

Level	Stakeholder	Recommendations
Niche		collaborating with Fintech's, financial institutes, and policy makers, they can use practices and lessons learned to bridge research and practice gaps to ensure decisions are made on evidence.
	Fintech companies	Collaborate with Fintech companies to use each other's expertise to reach a wider audience. Joint initiatives like financing programs to pool resources and reduce risks. Develop and promote green finance products, such as green mortgages or energy-efficient home improvement loans. Ensure that these products are affordable and accessible to a diverse range of customers. Actively participate in government-led initiatives, such as education campaigns or subsidy programs to build trust and drive adoption of green finance products. Allocate resources to research, engage with communities, and develop new green finance products and services that address emerging urban challenges
Regime	Traditional finance institutes	Collaborate with Fintech companies to use each other's expertise to reach a wider

Level	Stakeholder	Recommendations
		audience. Joint initiatives like financing programs to pool resources and reduce risks. Develop and promote green finance products, such as green mortgages or energy-efficient home improvement loans. Ensure that these products are affordable and accessible to a diverse range of customers. Actively participate in government-led initiatives, such as education campaigns or subsidy programs to build trust and drive adoption of green finance products. Allocate resources to research, engage with communities, and develop new green finance products and services that address emerging urban challenges
	Government and policymakers	Establish a national green finance framework to ensure consistency across different government levels and minimise conflicting policies. This framework should include clear guidelines for grid-tied solar systems, tax rebates, and subsidies. This should be done in multilingual education campaigns.
	Urban communities	Share experiences and feedback with Fintech companies, financial institutions, and

Level	Stakeholder	Recommendations
		policymakers to help improve green finance products and services. invest in green technologies, such as solar panels or energy-efficient appliances, to reduce energy costs and contribute to sustainability goals. Take advantage of government-led education campaigns and Fintech-driven outreach efforts to learn about the benefits of green finance and available products.
Landscape	Academia and researchers	Investigate the impact of landscape pressures on regime and niche level interventions. Share findings and recommendations to inform evidence-based decision-making.
	Government and policymakers	Align policies with global sustainability goals, address economic inequality through targeted subsidies.

Table 5: Recommendations to stakeholders

5.8 Suggestions for further research

This study focused exclusively on Gauteng province, highlighting its economic significance and growing emphasis on sustainability. However, expanding the

research to include other provinces would provide a broader understanding of how regional differences influence green finance adoption. Future Research Idea is to conduct comparative studies across multiple provinces to identify setting specific factors influencing green finance adoption. This could reveal best practices and transferable solutions between regions.

Do coastal provinces like KwaZulu-Natal or Western Cape face unique challenges or opportunities due to their energy needs and regulatory environments? Future research idea is to conduct comparative studies across multiple provinces to identify setting specific factors influencing green finance adoption. This could reveal best practices and transferable solutions between regions.

The study acknowledges the digital divide between urban and rural areas but does not investigate into the rural perspective. Future research could investigate how Fintech can overcome barriers such as poor internet connectivity, low financial literacy, and cultural differences in rural settings.

Another future research idea is Investigate hybrid models combining offline and online approaches to promote green finance in underserved rural communities. For example, mobile banking agents equipped with tablets could bridge the gap between traditional and digital systems.

Due to time constraints, this study could not assess the long-term effects of government policies, Fintech innovations, and educational programs on green finance adoption. A longitudinal study would help understand whether short-term incentives translate into sustained behavioural change. Future research idea is to track participants over a period of 2 to 5 years to evaluate the persistence of interest in green finance products and the effectiveness of policy interventions. This could involve monitoring changes in household energy consumption, savings, and environmental impact.

The research primarily examined solar panel financing due to its relevance during the current electricity crisis. However, there are many other forms of green finance, such as water conservation projects, electric vehicle loans, and

sustainable agriculture investments. Exploring these areas could uncover additional opportunities and challenges. Future research idea is to study the feasibility and demand for non-solar green finance products in urban and rural situations. An example is what part can Fintech play in promoting microloans for rainwater harvesting tanks or energy-efficient appliances?

Participants expressed scepticism about Fintech platforms and prioritised affordability over environmental benefits. Future research could incorporate behavioural economics principles to better understand decision-making processes around green finance. Future research idea is to investigate how framing messages example emphasising cost savings versus environmental impact, influences individual participation in green finance. Additionally, explore nudging techniques, such as default options or peer comparisons, to encourage adoption.

The findings indicated inconsistencies in municipal policies, particularly levies and fees that undermine national incentives. To address this, further research could analyse how different municipalities implement green finance policies and identify best practices. Future Research Idea is to compare the effectiveness of green finance policies in major cities like Johannesburg, Cape Town, and Durban. Focus on how local governments align with national frameworks and mitigate conflicting regulations.

Although the study avoided collecting sensitive demographic data, future research could examine how gender, income level, education, and occupation influence participation in green finance. This could inform targeted interventions for marginalised groups. Future research idea is to investigate whether women-led households or low-income families face unique barriers to accessing green finance products. Use mixed methods approaches to quantify disparities and qualitatively explore underlying reasons.

Low digital literacy was identified as a barrier to Fintech adoption. Future research could focus on designing user-friendly interfaces and training programs tailored to diverse audiences, including older adults and those with limited technical skills.

Future Research Idea: Co-create Fintech tools with end-users from various socio-economic backgrounds to ensure inclusivity. Test prototypes and gather feedback to refine features like simplified language, multilingual support, and offline functionality.

Community engagement played a significant part in driving behavioural change. Future research could investigate how grassroots organisations and local leaders can amplify awareness and trust in green finance initiatives. Future research idea is to study the effectiveness of community-led green finance programs versus top-down approaches. Highlight successful examples where local actors collaborate with Fintech companies and government agencies.

Collaboration between government, Fintech companies, and traditional financial institutions emerged as a key enabler of green finance adoption. Future research could explore the mechanics of effective partnerships and their scalability. Future research idea is to document successful public-private partnership models in green finance. Identify key success factors, such as shared goals, resource allocation, and accountability mechanisms.

Rental options and shorter-term investments were highlighted as alternatives to traditional loans. Future research could explore additional models, such as pay-as-you-go systems or community crowdfunding platforms. Future research idea is to design and pilot alternative financing models targeting specific segments, such as students, renters, or informal sector workers. Assess their viability and appeal compared to conventional loan structures.

RO #	Research Objective	Prop #	State Proposition	Data collection detail	Data analysis method
1	Determine how existing technology-enabled financial platforms (Fintech) are adapted to facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.	1	Increased access to green finance products through Fintech platforms will lead to greater individual participation in the Green Energy Transition (GET) in urban South Africa (Gauteng Province).	Interview guide questions 1, 2, 3, 4, 5	Thematic analysis
2	Evaluate the effectiveness of existing initiatives that are aimed at promoting financial literacy and	2	By addressing gaps in technology-based financial literacy programs and tailoring them specifically for green	Interview guide questions 6,7,8	Thematic analysis

RO #	Research Objective	Prop #	State Proposition	Data collection detail	Data analysis method
	awareness of green finance using technology.		finance, South Africa can significantly improve individual awareness and understanding, leading to increased participation in green finance initiatives in urban areas.		
3	Examine government policies, regulations and financial institutions practices that impact the availability and access to green finance products.	3	Supportive government policies, regulations, and collaborative efforts between regulators and Fintech companies can create an enabling environment that promotes wider individual participation in green finance for urban Green Energy Transition (GET) projects.	Interview guide questions 9,10,11,12	Thematic analysis

RO #	Research Objective	Prop #	State Proposition	Data collection detail	Data analysis method
4	Identify the key challenges and opportunities associated with financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.	4	Increased adoption of Fintech solutions can improve financial literacy around green finance products and the implementation of supportive green finance regulations will lead to greater participation in green finance initiatives within urban areas.	Interview guide questions 13, 14, 15,	Thematic analysis

Table 6. Consistency Table: research questions, propositions, data collection and data analysis

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APPENDIX A (Participant Information Sheet)

Participant Information Sheet

Dear Sir/Madam

“We do not inherit the earth from our ancestors; we borrow it from our children.”

– Native American Proverb

My name is Jayesh Singh. I am a master’s student member in Digital Business at the University of the Witwatersrand, Johannesburg under supervision of Professor Tendani Mawela. As part of my studies, I am researching the part of FinTech in facilitating access to Green Finance to individuals in South Africa.

I am inviting you to take part in an online interview and should you decide to participate, 30 minutes of your time will be required in this research study. The online interview will be scheduled at your convenience either during or after work hours.

With your permission, I would like to audio record the interview. This data will be stored in password protected folder for 2 years and deleted thereafter. Only the researcher and Supervisor will have access to the data. A transcript of the interview can be made available on request.

Your participation in this research is completely voluntary. You can choose to stop participating at any time without penalty. There' is no pressure to answer questions with which you are uncomfortable.

This research study will be written up as a research report. The report will be available on the university library website. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor Professor Tendani Mawela on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za .

Yours sincerely,

Jayesh Singh

Researcher:

Jayesh Singh, 2767037@students.wits.ac.za

+27 082 571 4260

Supervisor:

Tendani Mawela, tendani.mawela@wits.ac.za, (+27 012 420 6484)

APPENDIX B (Consent Form)

Consent Form:

I have read and understood the Participant Information Sheet for the research project titled, The Part of Fintech in Facilitating Access to Green Finance in South Africa"

Jayesh Singh

I, ……., agree to participate in this research project.

I agree to the following:

(Please choose either yes or no for the relevant options below)

I agree to participate in this study and the study has been explained to me

YES NO

I understand that I can volunteer to take part in the study free to withdraw from the study at any point without penalty

YES NO

I consent that the interview may be audio recorded

YES NO

I consent that direct quotations from my interview may be used by the researcher in their research project.

YES NO

I agree that my participation will remain anonymous (researcher will not use my name or other identifying data in their research project)

YES NO

I consent that other researchers may use the information I provide in my interview anonymously.

YES NO

_____

Participant Signature

_____

Date

APPENDIX C Interview Guide

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
1	Do you currently use any mobile apps or online platforms for managing your finances (e.g., banking apps, budgeting tools)?	Theoretical framework- Niche (technological disruption) Conceptual Framework- Fintech and green finance	Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.	Gauges existing use of technology for financial activities, relevant to understanding Fintech's part in green finance adoption
2	Have you encountered any information or resources about green finance products in South Africa? If so, can you tell me about them?	Theoretical framework- Niche (technological disruption) Conceptual Framework- Fintech and green finance	Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.	Explores awareness of green finance products, which could be facilitated by Fintech platforms.
3	(For those who have not used green	Theoretical framework- Niche	Determine how existing technology-enabled financial	Identifies potential barriers for those who

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
	finance): Have you considered using green finance products for clean energy projects in your home, such as solar panel installations? If not, why not?	(technological disruption) Conceptual Framework- Fintech and green finance	platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.	have not adopted green finance, even if Fintech exists.
4	(For those who have used green finance): How did you find out about the green finance product you utilised?	Theoretical framework- Niche (technological disruption) Conceptual Framework- Fintech and green finance	Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition (GET) projects in urban South Africa.	Uncovers how Fintech platforms might have played a part in product discovery.
5	In your opinion, how could features like online applications, comparison tools, or digital documentation	Theoretical framework- Niche (technological disruption)	Determine how existing technology-enabled financial platforms (Fintech) facilitate access to loans and investments for individual Green Energy Transition	Directly explores participants perspectives on how Fintech features like online applications, comparison tools, digital

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
	offered by Fintech platforms make green finance products more accessible to individuals in Gauteng?	Conceptual Framework- Fintech and green finance	(GET) projects in urban South Africa.	documentation can make green finance more accessible.
6	Do you feel comfortable understanding the terms and conditions of financial products, including green finance options?	Theoretical framework- Landscape Conceptual Framework- Financial literacy and awareness	Evaluate the effectiveness of existing initiatives in promoting financial literacy and awareness of green finance using technology.	Assesses financial literacy, which is crucial for understanding green finance options.
7	In your opinion, how important is financial literacy when considering utilizing green finance for Green energy transition projects?	Theoretical framework- Landscape Conceptual Framework- Financial literacy and awareness	Evaluate the effectiveness of existing initiatives in promoting financial literacy and awareness of green finance using technology.	Explores the perceived link between financial literacy and green finance adoption

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
8	What resources would be most helpful for you (e.g., educational workshops, online tutorials, simplified information sheets) to improve your understanding of green finance, specifically tailored for urban residents in Gauteng?	Theoretical framework- Landscape Conceptual Framework- Financial literacy and awareness	Evaluate the effectiveness of existing initiatives in promoting financial literacy and awareness of green finance using technology.	Identifies what resources participants find helpful for learning about green finance.
9	Are you aware of any government initiatives or regulations related to green energy or making it easier for people to access financing for clean energy projects?	Theoretical framework- Regime Conceptual Framework- Regulations and policies	Examine the part of government policies, regulations, and financial institutions practices in promoting the availability and accessibility to green finance products.	Gauges knowledge of existing policies that might influence green finance accessibility
10	**(Based on their answer to the awareness**	Theoretical framework- Regime	Examine the part of government policies, regulations, and financial	Provides a deeper understanding of

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
	question): Can you elaborate on what you know about government policies or regulations related to green finance or renewable energy adoption in South Africa?	Conceptual Framework- Regulations and policies	institutions practices in promoting the availability and accessibility to green finance products.	participants perceptions of government policies.
11	In your opinion, what challenges do you see with current policies, and how could they be adjusted to make it easier for individuals to participate in green finance programs?	Theoretical framework- Regime Conceptual Framework- Regulations and policies Conceptual Framework- Fintech and green finance	Examine the part of government policies, regulations, and financial institutions practices in promoting the availability and accessibility to green finance products.	Explores participant views on policy barriers and potential solutions for wider green finance participation.
12	Do you think collaboration between government regulators and Fintech companies	Theoretical framework- Regime Conceptual Framework-	Examine the part of government policies, regulations, and financial institutions practices in promoting	Investigates attitudes towards collaboration to increase green finance accessibility.

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
	would be beneficial in promoting wider access to green finance for urban Green energy transition projects? Why or why not?	Regulations and policies	the availability and accessibility to green finance products.	
13	Considering increased access through Fintech, improved financial literacy, and supportive government policies, how do you think these factors could work together to increase individual participation in green finance initiatives for urban Green energy transition projects?	Theoretical framework- Niche, landscape, and regime Conceptual Framework- all factors	Identify the key challenges and opportunities associated with financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.	Assesses how these factors might collectively influence individual participation in green finance initiatives
14	Are the challenges you see in adopting green	Theoretical framework- Niche,	Identify the key challenges and opportunities associated with	Identifies the key obstacles perceived by

#	Research Question	Alignment to Theoretical/Conceptual Framework	Research objective	Short motivation for including the question
	finance solutions related to awareness, affordability, trust in Fintech platforms, or something else?	landscape, and regime Conceptual Framework- all factors	financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.	participants when considering green finance adoption.
15	In your ideal scenario, what would an environment look like that look after widespread participation in green finance for the Green Energy Transition in Gauteng?	Theoretical framework- Niche, landscape, and regime Conceptual Framework- all factors	Identify the key challenges and opportunities associated with financial technology (Fintech) adoption, financial literacy, and regulation for promoting green finance in urban areas.	Identifies the key characteristics of an environment that would encourage widespread green finance adoption.

APPENDIX D Affordability challenges for non-green finance users

Participant	Reason for not proceeding
11	"I have not done it, but I would say also in the same vein that If you if you don't have the bandwidth to put away or save, you won't do well to get green financing and given that maybe your circumstances may change, you can just pay more and reduce your term and interest rate."
12	"The reason for not doing it immediately is that obviously from financial feasibility perspective."
14	"it's really a matter of being ready financially."

Participant	Reason for not proceeding
15	"So I have looked into those I think looking at my monthly bill from City of Joburg and some of those friction costs that are in there, like connection fees that actually if I look at my bill account for about 60 to 70% of the amount that I'm paying which is actually not a utility that I'm getting but paying just to be connected to the grid. So things like those sort of leave a bitter taste in the mouth to say how can I get away from some of that."
16	"The reason I have not proceeded ahead is just from a financing perspective. I was trying to understand the right mix of energy that that I will need to fully go out and just go green financing and basically go on to solar and use gas for cooking and solar to power up the house."

Participant	Reason for not proceeding
19	"Once I sit down with the representative and we can unpack this properly, I become fairly comfortable whether you rent or you own."
20	"It will be very important where you'll be able to measure the costs that you're going to spend initially and also the cost that you're going to save in the long run."

APPENDIX E Affordability challenges for green finance users

Participant	Reason for not proceeding
1	“That would be the main option that I would say it's definitely affordability.”
2	“Your cash users or they've got an adverse credit history. Individuals automatically excluded from the current model, right? And how do we solve for that? And how do we bring in alternative scoring? How do we bring into the earlier point a different model? And I think that's probably a hindrance across the board, because you only really including the financially inclusive population.”

3	“Affordability is a factor because it, you know, these solutions are often very expensive and finance is definitely going to be required.”
4	“Most people prefer saving up and buying it off on sale than going through finance so they believe it's gonna cost them more for longer.”
5	“It's still a big continuous investment of financing period that just don't think people have the ability to take, especially in tough economic times.”
6	“Affordability so I don't know how big competition is there, but maybe the pricing can also be critical.”

7	“Those things were expensive. 8-9 panels, 1 battery, was 130K think when I purchased it.”
9	"The accessibility, and affordability of it and How does an ordinary South African can be able to access that in terms of the finance."
10	"There's people that know about them, but they are not financially stable to go and implement those."