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Determinants of open banking adoption intention among Kenyan commercial banks.

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DETERMINANTS OF OPEN BANKING ADOPTION INTENTION AMONG KENYAN COMMERCIAL BANKS

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the dissertation itself.

Name of Candidate: .... Kevin M. Rutto....... **Date**: ....28-03-2022.........

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This research project has been submitted for examination with my approval as the candidate's supervisor.

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DEDICATION

I dedicate this work to my entire family, all my lecturers, and my fellow graduate colleagues for their support, encouragement, and patience during the entire period of my study and their continued prayers towards the successful completion of my course.

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LIST OF ABBREVIATIONS AND ACRONYMS

API	Application Programming Interface
CBK	Central Bank of Kenya
COT	Cost of Technology
EU	European Union
FINTECH	Financial Technology
GS	Government Support
I.T	Information Technology
KYC	Know Your Customer
MFI	Micro Finance Institutions
NACOSTI	National Commission for Science and Technology
PRA	Perceived Relative Advantage
PCV	Perceived Value
PRSK	Perceived Risk
PSD2	Payment Services Directive 2
R&D	Research and Development
SME	Small and Medium Size Enterprises
SACCO	Savings and Credit Co-Operative Society
SEM	Structural Equation Modelling
TAM	Technology Acceptance Model
TRAM	Technology Readiness Acceptance Model
UK	United Kingdom
US	United States

DEFINITION OF TERMS

Adoption - In an organizational context, adoption can be defined as a commitment to investing towards implementing and using a technology to support core business functionalities. For a technology to be used, it should be adopted first (Umpathy, 2009).

Open Banking–is a model in which consumer financial information is distributed through an application programming interface (API) among at least two independent parties to deliver improved financial capabilities for consumers (Brodsky and Oakes,2017).

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ABSTRACT

In Kenya, digital finance has developed at a rapid pace. Notwithstanding, the banking industry still faces a myriad of problems such as information overload on consumers, growing competition from fin-tech & non-traditional players, inefficient manual reconciliation processes, lack of product offering personalization, regulatory compliance inefficiencies, counterparty risks, lack of proper security protocols, lack of financial services that offer single customer view, clearing and settlement time constraints, and poor customer retention. Using Open Banking and Open APIs, banks can innovate by transforming their core systems and integrating their internal systems with external partners to overcome some of these challenges. As a result, the goal of this research was to find out the determinants that will influence the adoption intention of open banking within licensed commercial banks in Kenya. The specific objectives of the study included establishing how perceived risk, perceived value, perceived relative advantage, cost of technology, and how government support affects open banking adoption by Kenyan commercial banks. The main motivators for the study were; the fast-changing competitive environment, globalization, economic paradigm shifts, European Union PSD2 regulation, increased uptake of digitized financial services due to the COVID-19 pandemic, and the demands of financial liberalization within the industry by financial consumers, third-party providers, digital banks and fintech firms. The research focused on all licensed commercial banks within the Kenyan jurisdiction and this informed the unit of study. Thus, respondents comprised of employees from these banks. At least 5 respondents were selected, from the IT department, legal department, finance department, audit department, and operations department. Since the study selected 43 commercial banks this informed a total number of 215 respondents. The study adopted a descriptive cross-sectional survey. Primary data was collected through the use of an online questionnaire which primarily consisted of closed-ended questions. To pretest and validate the study's questionnaire, a pilot study was performed. Using empirical data from the completed responses and partial least squares-structural equation modeling (PLS-SEM), the study developed a quantitative approach using Smart-PLS version 3.3.3. The main aim of the study was to establish the significance of cost of technology (COT), perceived relative advantage (PRA), perceived value (PCV), and perceived risk (PRSK) towards adoption intention by the commercial banks (UNT) and as well analyze the moderating effect of government support (GS) towards adoption intention of open banking. Results indicated that from the five determinants; cost of technology, perceived relative advantage and perceived value had a positive and statistically significant influence on the adoption intention of open banking among Kenyan commercial banks. On the other hand, perceived risk was revealed to have a negative effect, however with a statistically significant influence on the adoption intention, while government support significantly moderated the relationship between these exogenous variables and the endogenous variable. The study recommends that commercial banks should ensure that there is integration between banks and fintech firms through partnerships and collaborations on this open banking platform which will enable banks to scale up a broad range of user efficient and cost-effective innovations. Moreover, commercial banks should take advantage of this new technology to strengthen their consumer relationships and consumer retention since it has the capability of helping the commercial banks' consumers manage their finances better rather than simply facilitating transactions. According to the findings, government regulators should ensure that there is a well-defined regulatory approach that is suitable to the specifics of open banking concerning the financial market. Through a well-defined regulatory approach new policies, regulations and initiatives can be made which will promote the adoption of fintech innovations such as open banking that can spur the growth of the financial sector in the country.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Currently, one of the most significant threats to traditional retail banking is the introduction of open banking (Ramdani, Rothwell & Boukrami, 2020). In 2015, the European Parliament adopted the Second Service Payment Directive (or PSD2). This regulation ensured that Telcos, digital challenger banks, and Fintech companies can compete alongside banks for digital payment services. In 2016, the UK Competition and Markets Authority (CMA) introduced open banking as a way to address market access inequalities between more established incumbent banks, and reduce barriers to market entry for smaller and newer banks.

In January 2018, CMA mandated the enactment of the open banking reforms to foster competition and innovation in the financial sector. Consequently, major banks were compelled to provide financial data that could be used by other industry players to create new offerings. According to Mallick, McIntyre, & Eleanor (2021), as the open banking wave arrives as much as $416 billion in revenues will be at stake. This revenue is likely to be captured by agile competitors who recognize the opportunity early. FCA (2018), states that open banking has enabled companies to use customer data in innovative ways to shift customers from using a single bank to using new platforms with competing offerings. According to (Briones, 2020; Brodsky and Oakes, 2017) open banking provides commercial banks with potential benefits including new revenue streams, improving customer experience, and a sustainable service model for underserved markets. Smaller and newer banks have been able to disrupt the banking industry due to having less complex IT systems, fewer compliance issues, minor regulatory concerns, and less costly real estate compared to the established banks (Hallsworth, Ruark, and Pollari, 2019).

In Kenya, this provides an opportunity for commercial banks to greatly benefit as a result of sufficient data access and information; conducive regulatory environment; abundance of credit and investment; plenty of both managerial and software-development talent; and the size and maturity of the Kenyan financial market (Cooten & Blythin-Hammond, 2017). However, determinants that will influence the uptake of open banking by commercial banks, especially in Sub-Saharan Africa and particularly Kenya are still unclear. Hence, this paper will seek to explore the determinants that may impact open banking adoption among Kenyan commercial banks rather than banks' end-consumers.

1.1.1 Open Banking

The technology applied to the domain of financial services is termed financial technology 'Fintech' (PwC, 2016) and it's a combination of technological innovation and financial services. Open Banking is a Fintech platform coined by Brodsky and Oakes (2017) as a model in which consumer financial information is distributed through an application programming interface (API) among at least two independent parties to deliver improved financial capabilities for consumers. This will therefore provide bank customers ability to permit third-party providers to manage their financial information by giving access to these third-party providers to collect account information, analyze the financial data, or even initiate payments to other markets on behalf of the consumer (Hallsworth, Ruark & Pollari, 2019).

Boobier (2020), postulates that open banking represents a fragmentation of the supply value chain. In this regard, predominantly fintech products that were previously integrated within the financial institutions themselves may now be performed by third-party providers and consumed as a service. Since open banking is modeled on the assumption that data held by banks is owned by customers and not banks, this will ensure a rebalancing of power between consumers and banks, influencing financial institutions to increasingly become customer-driven by providing improved service quality and reducing cost, while generating higher revenues for themselves (Gartner, 2018).

1.1.2 Open Banking in Kenya

In Africa, and especially in Kenya a significant percentage of the population still lacks access to financial services, open banking can improve and boost financial growth and development; specifically, in terms of access and affordability (Thabit & Boshoff, 2018). Even though Kenya has been a pioneer in financial technologies with the formulation of mobile payment services such as M-PESA, and boasts of being one of the most successful mobile money markets in Africa (World Bank, 2020) stakeholders still note concerns about the low penetration of formal financial services, underdeveloped technology ecosystems, weak infrastructure and associated risks of accessing transactional information from consumers (Saal, Starnes & Rehermann, 2017; Thabit & Boshoff, 2018).

Currently, Kenyan banks have collaborated with platform providers such as Safaricom to build applications and financial solutions that operate on the principles of open banking. Additionally, Nairobi is classified among one of the top Fintech hubs in Sub-Saharan Africa, having an estimated 20 percent share of African Fintech firms and an emergent environment of local investors and private-equity firms (Cooten & Blythin-Hammond, 2017) thereby boosting the capability of developing and implementing Open banking applications. Moreover, Kenya's banking regulator Central Bank of Kenya, launched the

National Payments services (NPS) vision and strategy paper in 2021, which has set the agenda for the country's future concerning digital payments ecosystems including the adoption of technologies that enable the delivery of new open banking services.

Likewise, Kenya has localized data protection and privacy regulations through the Data Protection Act (2019), Data Protection (Compliance and Enforcement) Regulations, (2021), the creation of the National Payments System Division by the Central Bank of Kenya to spearhead initiatives that modernize the national payment system, which includes the formulation of payments system frameworks and strategy documents (CBK,2021), development of Kenya's Real Time Gross System (RTGS) System that facilitates the country's interbank settlement as well as enable the country to establish regional links that create regional settlement systems, enactment of the National Payment System Act 2011 and the National Payment Systems Regulations in 2014 and amendment of the Central Bank of Kenya Act to include Section 4A 1(d) that gives the CBK an explicit mandate to "formulate and implement policies that best promote the establishment, regulation, and supervision of efficient and effective payment, clearing and settlement systems" (CBK, 2021). These frameworks and policies already set in place a conducive environment for the implementation of open banking. Finally, research on open banking in the Kenyan context requires further exploration.

1.1.3 Drivers of Innovation Adoption

In this study, we consider open banking as a multi-level service innovation, and its adoption as consisting of a series of adoption processes. Unlike the invention of new technologies, which often appear as single events, the diffusion of these technologies is typically characterized by a long, tedious and continuous process (Hall & Khan, 2004). Ultimately, it is diffusion, not innovation, that inevitably determines the rate of acceptance and adoption (Dearing & Cox, 2018). Until numerous users adopt new technology, it might not make a significant contribution to the consumers' well-being (Hall & Khan, 2004). A variety of determinants influence a firms' incentives and ability to innovate, including; the prevalence of regulatory frameworks and government support, perceived risks accrued to the innovation, cost of innovation, market competition, perceived benefit of the innovation among many other factors. Some of these factors are firm-intrinsic, reflecting either characteristics of the firm for example its size, age, the perceived benefit accrued from the innovation, or external highlighting characteristics of the business environment for example government support and macroeconomic factors.

Firstly, from numerous research, the apparent determinants of technology adoption are the perceived benefits accrued and the costs of adoption. In many cases, these benefits are simply the difference in profits when a firm shifts from legacy technologies to newer technologies (Salvatore, 2008). The cost-benefit determinant informs the perceived value of innovation. Furthermore, perceived risk is one of the important factors that affect the adoption intentions of innovations (Claudy, Garcia & O'Driscoll 2015; Kleijnen, Lee & Wetzel, 2009). It is very difficult to capture risk as an objective reality (Dowling & Staelin, 1994) since it is interpreted as the "consumer's subjective belief of suffering a loss in pursuit of a desired outcome" (Yiu, Grant & Edgar, 2007). Laroche, H.G. McDougall, Bergeron & Yang (2004) particularly suggests that service innovations are considered as having a higher risk when compared to product innovations. This is because the heterogeneity characteristic specific to service innovations means that the service is always subject to some variation in performance. Moreover, he adds that for service innovation adoption, consumers must not only adopt the actual new service but also adopt other additional elements which can't be separated from the new service innovation, resultantly affecting the adoption intention of this innovation. Likewise, extant literature suggests that even in situations, where a consumer has evaluated and considered adopting an innovation, perceived risk and uncertainty still creates substantial barriers to adoption (Khan, Hyunwoo & Abraha, 2009). Innovation always involves some degree of perceived risks because of uncertainty (Marafon, Basso, Espartel, Barcellos & Rech, 2018), so innovation that is associated with considerable perceived risk, has a slower rate of diffusion (Abbas, 2015) and higher consumer resistance.

In addition, a firm's readiness and ability to innovate will depend on the size of the firm, age, and the ability to raise capital to fund innovations. Startups are often perceived to be the main drivers of innovation (Mazzarol, Reboud & Volery, 2010). While such enterprises contribute significantly to the development of new products, they are not always more innovative than existing firms (Acs & Audretsch, 1988). This is partly because when startups are successful, they often experience rapid growth, resultantly transforming into larger firms. Interestingly, innovative start-ups that are not successful, on the other hand, typically run out of funding and exit the market. Since the development of new innovations is commonly characterized by large fixed costs and unpredictable investment spikes. This may simply be easier for larger more established firms to bear – particularly if large firms enjoy better access to finance and considerable market share (Symeonidis, 1996). Hence, these large firms are more receptive to adopting new technologies. This could be a reason why smaller firms are less likely than larger firms to invest in R&D (despite spending a higher percentage of their annual revenues on in-house R&D). Baporikar (2015) states that larger firms may also conduct more innovation projects, making them more likely to successfully introduce new products and services, unlike smaller firms.

Rogers (2003) notes that relative advantage is one of the strongest predictors of an innovation's rate of adoption. In general, firms recognize that embracing innovation either provides solutions to existing problems or opens up new production opportunities, such as higher productivity and increased operational efficiency (Kevin, Dong, Xu, & Kraemer, 2006). Firms rationally utilize the adoption decisions that provide potential benefits of the new technology to the business processes (Mndzebele, 2013). Additionally, she adds that organizations adopt innovations when they see a need for that technology, believing it will either take advantage of a business opportunity or close a suspected performance gap. Brown and Kaewkitipong, (2009) argue that innovations such as websites are more likely to be adopted when organizations perceive that they will help with the sharing of business information within an establishment. While some of these factors are internal, reflecting characteristics of the firm, some determinants are external and shape the general business environment in which firms operate such as market structure, degree of industry concentration, network effects, and especially technological innovations, regulatory frameworks, and macroeconomic factors. Numerous studies note that external factors such as the poor business environment, widespread corruption, and burdensome red tape negatively affect innovation adoption.

Lileeva and Trefler (2010), note that lack of government support and weak regulatory frameworks can substantially increase the cost of introducing new products and make returns to investment in new products and technologies more uncertain and riskier to partake in (Schou-Zibell & Madhur, 2010). These factors can undermine firms' incentives and ability to innovate. Symeonidis (1996) posits that firms that introduce new products and services regard all aspects of their business environment as a greater constraint on their operations than firms that have not engaged in product innovation. The differences between the views of innovative and non-innovative firms are especially large when it comes to skills, perceived benefits, cost of innovation, and conducive business environment (Hall & Khan, 2004). Inadequate regulations, corruption, and poor government support, in particular, are perceived to be among the main constraints for all non-innovative firms, and they are even greater constraints for innovative firms (Baporikar, 2015).

While hardware and software capabilities continue to evolve at a rapid speed, problems of underutilized systems remain prevalent. Sivathanu (2019) indicates that there is still a lack of conclusive findings on the determinants of innovation adoption and specifically, Open Banking. Hence, further research is required regarding the role of firms, individual and social processes affecting the adoption of innovations and notably Open Banking. Consequently, our study will attempt to fill this gap at the firm level. While focusing on the factors derived above i.e. perceived risk, perceived relative advantage, perceived value, cost of technology, and governmental support.

1.2 Statement of the Problem

In Kenya, digital finance has developed at a rapid pace in the recent past. However, there are still critical problems that face the banking industry both at the supply and demand side of financial services; information overload on consumers, rising competition from fin-tech & non-traditional players, manual reconciliation processes, lack of product offering personalization, regulatory inefficiencies, counterparty risks, lack of proper security protocols, lack of financial services that offer single customer view, clearing and settlement time constraints and poor customer retention (Mehrban, Khan, Nadeem, Hussain, Ahmed & Abbas, 2020; Suprun, Petrishina & Vasylchuk,2020; Ketter, 2017; Lynos & Westcott,2017; Li, 2016; Cui, Bao & Chan, 2009). As well, Philippon (2015) points out that advances in financial technology have failed to reduce intermediation costs. Barua, Gati, Lajumoke, Taraporevala, Havas & Radni, (2019) add that banks have not fully leveraged big data and need to move away from traditional banking services and offer value-added services. Particularly, due to the huge amount of data that banks collect through their payment systems, it's further suggested that banks should employ new data processing techniques to generate customer insights for consumers and merchants. Currently, the market boasts of third-party solutions that use big data stream processing and machine learning to provide actionable insights for consumers (Mallick, McIntyre & Eleanor, 2021). Given that banks have much larger data sets, they could leverage this and offer much better insights and a broad set of value-added services to their consumers. Moreover, Delloitte (2021) mentions that KYC practices are redundant within financial institutions and therefore inefficient, requiring every counter party to exchange information with every financial institution in their operating network.

Fortunately, through Open APIs, banks will be able to collect actionable data such as purchasing habits, KYC information, financial goals, risk tolerance, and even social interactions from various internal and external sources. This data will allow for more proactive (and accurate) multi-channel marketing, moving away from reactive sales pitches and toward proactive solutions. To put it in another way, the difference between traditional 'rear-mirror' notifications to newer 'financial GPS' recommendations. (Omarini, 2018). Additionally, through Open banking banks could purposely shift from the customary value propositions and venture into new value-added propositions. Open Banking will allow third parties to plug in through OpenAPIs and provide additional value-added services for customers. A bank might choose to orchestrate one of several different kinds of an ecosystem—from a large-scale national ecosystem to a local one (Marcous, 2021; Maj 2019). Likewise, Remolina (2021) notes that a bank might choose to aggregate a wide variety of services and providers in its ecosystem or could focus on a niche segment ecosystem.

Therefore, despite the current problems faced by traditional banking and the opportunities presented by Open banking, there is still a lack of sufficient interrogation on the adoption of this new fintech innovation, especially focusing on the banks adoption intention i.e. supply side in the Kenyan context. For this reason, there is a need for the current research to expand available evidence. Several studies have been conducted in the area of open banking and open banking adoption from different dimensions. Sivathanu (2019) examined the factors that influence end-user adoption intention of open banking while Zarchiadis and Ozcan (2017) focused on the key challenges and opportunities that Open APIs pose for the banking sector in the UK and the EU. On the other hand, Schur and Sily (2020) investigated consumer sentiments on the adoption of open banking in Brazil. Even though numerous open banking adoption studies have been investigated, regrettably, most studies were conducted in countries such as Spain, the UK, Brazil, Australia, and India with relatively little attention paid to developing Sub-Saharan countries such as Kenya. The context of open banking in these studies was solely based on jurisdictions outside Kenya and also primarily focused on end-user adoption rather than adoption by financial institutions and distinctively banks. Furthermore, these studies were done under different regulatory environments.

Sivathanu (2019) noted that perceived usefulness, perceived ease of use, and familiarity with traditional banking services affected the adoption of open banking by bank's end consumers. Zarchiadis and Ozcan, (2017) revealed that lack of government regulation and organizational implementation strategies affect open banking adoption. Schur and Sily (2020) indicated that the adoption of digital banking services based on an open platform will be higher, only if there will be high assurances to consumers regarding their privacy and the risk management of third parties who connect to the platform. They state that equally there is a need to expand the technological environment with more broadband access and higher usage of smartphones, which will enable Open Banking to reach a wider spectrum of consumers. Schur and Sily, (2020) further add that integrating a diverse range of banks and non-banks under a common infrastructure will potentially facilitate financial inclusion, as evidenced in Brazil by the increase in high volume-low value payment transactions. Various researchers (Dahdal, 2021; Carriere-Swallow, Haksar, & Patnam, 2021; Ramdani et al.2020; Briones de Araluze, 2020; Sivathanu, 2019 & Zarchiadis & Ozcan, 2017) have looked at the concept of open banking through different extents, but non-focused on the adoption intention by commercial banks, and rightfully so in the Kenyan context. It is in this regard that the determinants of uptake of this new technology by commercial banks need to be empirically ascertained.

1.3 Research Objectives

1.3.1 General objective

The purpose of the study was to find out the factors influencing open banking adoption among Kenyan commercial banks.

1.3.2 Specific objectives

To address the general objectives, the study attempted to answer the following specific objectives: -

i. To find out the influence of perceived value on the adoption of open banking among Kenyan commercial banks.
ii. To investigate the influence of perceived risks on the adoption of open banking among Kenyan commercial banks.
iii. To determine the influence of the cost of infrastructure on the adoption of open banking among Kenyan commercial banks.
iv. To establish the influence of perceived relative advantage on the adoption of open banking among Kenyan commercial banks.
v. To determine the moderating effect of government support on the adoption of open banking among Kenyan commercial banks.

1.4 Research Questions

i. Does perceived value affect the adoption of open banking among Kenyan commercial banks?
ii. Do perceived risks affect the adoption of open banking among Kenyan commercial banks?
iii. Does the cost of infrastructure affect the adoption intention of open banking among Kenyan commercial banks?
iv. Does perceived relative advantage affect the adoption of open banking among Kenyan commercial banks?
v. Does government support have a moderating effect on the adoption intention of open banking among Kenyan commercial banks?

1.5 Scope of the Study

Currently, the Kenyan financial market is undergoing rapid economic and technical transformations with liberalization leading to a wider playing field for industry players, such as Telcos, fintech firms, SMEs, MFI/SACCO(s), especially with regards to financial technology transformation and innovation. Therefore, the study was a cross-sectional study and highlighted one of the key players in the open banking ecosystem; licensed commercial banks in Kenya. Similarly, it mainly focused on the Cost of Technology, Perceived Relative Advantage, Perceived Risk, Perceived Value, and Government Support as the determinants of open banking adoption.

1.6 Significance of the Study

The researchers' main aim was to examine determinants that will influence Kenya's commercial banks' intention to adopt open banking. This study sought to complement academic literature on the field of financial technology and also boost direct improvements towards derived value addition by commercial banks. It will also enable commercial banks to strategically plan their products and service offerings. The finding of this study will also enlighten people in academia, industry players, professional organizations, and government and regulatory institutions.

Furthermore, Academia will gain literature on different angles of adoption and impact of open banking and give impetus for further research in open banking with regards to the Kenyan banking sector. As comparative studies may be necessary to critique and build on the knowledge of open banking adoption in Kenya. Moreover, Industry players and providers of financial products and services will gain from this study as it will highlight the commercial bank's intention to adopt open banking, which they can use to leverage increasing revenue and market share by exploiting the opportunities presented. Additionally, through the study they can formulate strategies that will increase value addition to their consumers by helping people manage their finances better, increase access to better products, and provide them with meaningful tools to help them understand their choices.

In addition, professional bodies such as Capital Markets Authority, Kenya Institute of Bankers, Institute of Certified Public Accountants of Kenya, Computer Industry and Services Association of Kenya will be interested in the findings of this study as it will serve as an advisory organ for open banking development and adoption. By understanding the extent of the adoption of open banking they will offer professional guidance and counselling related to open banking and its operations. Finally, The Government of Kenya and the Central Bank of Kenya will use the knowledge gained to formulate policies that promote and effectively govern open banking implementation and maintenance. Withal, they shall ensure industry players have adequate knowledge in running this ecosystem.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter analyzes the determinants that will influence Kenyan commercial banks' intention to adopt this new banking technology. It summarizes the significant literature conducted by academics in this same field. It covers the theoretical and empirical dimensions linked to open banking and it will examine factors that will influence Kenyan commercial banks' intention to adopt open banking as new technology. Additionally, this chapter outlines a critique of gaps from previous studies while incorporating a conceptual framework to understand and provide a pictorial representation of the study's hypotheses.

2.2 Theoretical review

Numerous theories try to explain factors that affect consumer adoption intention of new technologies. This study concentrates on the factors that influence the adoption intention of open banking in the Kenyan banking sector. It will highlight on Diffusion of Innovation theory (Rogers, 1995) Perceived risk theory (Peter & Ryan, 1976), the Technology Acceptance Model by Davis (1989), and the Value-Based Adoption model by Kim, Chan, and Gupta (2007) to evaluate adoption intention of open banking as a new technology if implemented by commercial banks. The study incorporates a multi-theoretical approach since these theories best evaluate and explain the factors that influence the adoption of new technologies. Additionally, the multi-theoretical approach also provides a comprehensive conceptual understanding of factors that influence the intention to use new technology such as open banking by focusing on different aspects of data and providing a framework/model within which to conduct an analysis (Davis, 1989).

2.2.1 Technology Acceptance Model (TAM)

Davis (1989) formulated the Technology Acceptance Model (TAM) to examine variables that influence a consumer's acceptance of new technology. This model focuses primarily on two major principles; Perceived usefulness (PU) and Perceived ease of use (PEOU). Perceived usefulness coined by Davis (1989) is the extent to which users believe using a particular technology will improve their output. He justified that a user would adopt new technology if he/she perceived the new technology would increase the user's yield capacity. Perceived ease of use as termed by Davis (1989) is the extent to which a user feels that by using a particular technology he would be released from exerting effort in performing a task. This implies that if a certain technology is difficult to use, users will develop a negative attitude towards it. Therefore, users will be reluctant to adopt this technology. Of the two factors, Davis (1989) claimed that perceived ease of use directly impacts perceived usefulness because, the easier a user perceives a new technology’s ease of use, the greater the likelihood they would use it and experience higher productivity thereby proving usefulness to the adopter. Consequently, these two factors are understood to have a direct positive influence on the perceived value of innovation.

However, researchers share diverse opinions regarding its practical effectiveness theoretical assumptions. This is because TAM is insufficient regarding its rigor and relevance in making it an established theory of information systems (Rogers & Everett, 1983). A review of the past literature concludes that the use of the TAM model by different researchers showed that TAM is not only parsimonious but it can provide empirical support to explain determinants of technology usage (Agarwal & Prasad, 2009). While other scholars have extended the model to suit the direction of their study with variables such as motivation, price, convenience, trust, perceived risk, financial risk, performance risk, privacy risk, and security had been included. It’s also evident that the two variables of the TAM model play a central role in attitudes and perceptions, towards the use of new technology. Scholars further state that there is a need for this theory to be integrated with other I.T approaches that incorporate decision-makers social and idiosyncratic characteristics. TAM goes further to claim that a user’s adoption of technology is determined by an intention to use, which in turn is driven by attitudes and beliefs about the system.

In this study, usefulness and ease of use are constructs that inform the perceived value of commercial banks and are defined as the extent to which technology usage would be useful in improving or increasing the usage of the open banking platform. It is important to note that the technology acceptance model opens ways for better use of technology which creates avenues for value-added products and services by commercial banks.

2.2.2 Diffusion of Innovation Theory

Rogers (1995) seeks to explain how innovations are adopted, he postulates that an invention or innovation gains momentum and spreads through a specific population or social system. The result of this diffusion is that people, as part of a social system, adopt innovation. The key to adoption is that the person must perceive the idea, behavior, or product as new or innovative and it is through this that diffusion is possible. Adoption of an invention or innovation does not happen simultaneously in a social system; rather it is a process whereby some people are more apt to adopt the innovation than others

(Hager, 2006). This theory proposes that there are five attributes of an innovation that affect adoption. Relative advantage, compatibility, complexity, trialability, and observability.

Relative advantage is defined by Rogers as "the degree to which an innovation is perceived as being better than the idea it supersedes". It must be demonstrated that new technology offers considerable benefits compared to traditional offerings (Manfield, 1963). Saxena and Kehar (2011) found out that the relative advantage of new technology had a positive relationship with adoption. Keramati, Taeb, Larijani, and Mojir (2012) corroborated this by stating that relative advantage has a positive relationship with the adoption of innovation. Other studies, such as; Onjure, Wanyoike, and Mun'gatu (2018) found that the relative advantage of new technology is positively related to adoption. Hence, innovation adoption will be positively encouraged if it has benefits that are perceived as having advantages over existing traditional working practices and/or systems (Ekong, Ifinedo, & Ayo, 2012). In this study, the theory is relevant because relative advantage as an attribute of the model assists in anchoring perceived relative advantage as a significant determiner of open banking adoption by Kenyan commercial banks.

2.2.3 Perceived Risk Theory

The perceived risk theory was originally presented by Bauer (1960) after he characterized consumer preferences as a by-product of risk-taking or risk-reducing behavior (Liao, Lin, & Liu, 2010). According to Li and Huang (2009), Perceived risk is the possibility of a loss and the subjective feelings of negative consequences contingent on the subjective vagueness of the outcomes. Lee (2009) defines perceived risk as "the subjectively determined expectation of loss by an internet bank user in contemplating an online transaction". Similarly, according to Liao et al. (2010) "perceived risk arises when an individual is engaged in situations where one is never totally certain and is concerned about the consequences of a poor or wrong decision". He adds that a person's behavior will bring forth consequences that he/she cannot predict with certainty and that is likely to be unpleasant for them. This model has been used since the 1960s to describe consumer behavior (Yaghoubi & Bahmani, 2011). Most studies maintain that consumers' perceived risk is a sort of a multi-dimensional concept. The dimensions of the perceived risk that scholars have used include performance, social, privacy/security, financial, physical, and time-loss (Yaghoubi & Bahmani, 2011).

Lee (2009) describes financial risk as to the possibility of losing money loss as a result of bank account exploitation or transaction fault. Voluminous customers are fearful of monetary loss as they transact over the internet since presently new technologies such as internet banking transactions do not provide the guarantee offered by traditional technologies via formal procedures and receipts (Kuisma, Laukkanen, & Hiltunen, 2007). Perceived performance risk denotes the user's sensitivity to the possibility of the open banking platform failing to work as envisioned or as promoted and therefore being incapable of proving the needed service (Yang, Liu, Li, & Yu, 2015). Perceived Security/Privacy Risk denotes the possible loss as a result of hacking or fraudulent deals confronting the security of new technologies (Lee, 2009). Perceived Time Risk is defined as the perceived inconveniences and probable loss of time as a result of delays and difficulties experienced while navigating through new technology applications. Physical risk is described as the perception that products/services will be harmful to adopters (Jacoby & Kaplan, 2014). Finally, Murray and Schlacter (1990) state that social risk is the potential loss of consumer esteem, respect, and/or friendship that are offered by others.

Despite having multidimensional facets, scholars such as Tan and Teo (2000) have shown perceived risk can be utilized as a unidimensional construct to inform overall risk in a model. Therefore, in this study, the overall perceived risk context is relevant as it will inform how perceived risk can be integral in determining open banking adoption. Moreover, perceived risk is one of the major determinants in influencing adoption in circumstances of possible task-related problems, making the user experience uncertainty, discomfort, concerns, or anxiety (Featherman & Pavlou, 2003). Also, the perceived risk is relevant for the present research because the risks of discomfort and uncertainty may be inevitable in open banking usage due to the third-party security concerns and unpredictable nature of intelligent applications (Pavlou, 2003).

2.2.4 Value-Based Adoption Model

VAM proposed by Kim et al. (2007) claimed that the previous TAM proposed by Davis (1995) was limited in explaining the acceptance of new technologies and that new users should not be recognized as simply technology users, but also as ‘consumers. While TAM aimed to explain the intention to use a technology based on usefulness and ease of use, VAM saw benefits (usefulness and enjoyment) and sacrifice (technicality and cost) as the main factors of perceived value and analyzed intention to use. Specifically, in regards to perceived cost, he adds that perceived sacrifices can be both monetary and non-monetary (Kim et al., 2007). Monetary spending includes the actual price of the product. Non-monetary costs include time, effort, and another unsatisfactory spending for the purchase and consumption of the product.

Additionally, VAM is based on a cost-benefit paradigm which reflects the decision-making process where the decision to adopt is made by comparing the cost of uncertainty in choosing a new technology or product (Lin, Wu, Hsu, & Chou, 2012). Factors such as loading and response time of a new technology for example mobile internet can be considered time costs. Ease of use and connectivity are considered effort and convenience costs, respectively. The technicality of the system is a combination of all the non-monetary costs. Technicality can be negatively perceived by new IT users because of time costs, extra efforts, and convenience costs. Perceived fee or cost is the evaluation by comparing the benefit of the service with the cost/price of using the service Kim et al. (2007). When users perceive that the price is greater than the benefits of a service, users will decide not to subscribe to that service. It’s noted that technical factors and price are the most significant barriers to new technology adoption. In general, cost/fee plays an important role in determining the adoption of technology among potential users.

In other words, VAM aims to explain the adoption of technology based on TAM (Davis, 1989) and the perceived value of Zeithaml (1988) by incorporating benefits (usefulness & enjoyment) and sacrifices (technicality & perceived cost) as constructs to overcome the limits of TAM in a new ICT environment. The perceived cost context from this model was relevant to this research as it informed how commercial banks will perceive the cost of technology to inform their intention to adopt open banking.

2.3 Empirical review

This section was instrumental in the review of previous empirical research papers with a focus on the various knowledge, contextual, and empirical gaps that the current research sought to solve in line with the objectives of the study.

2.3.1 Influence of Perceived Risks on Technological Innovation Adoption

According to Marafon et al., (2018), perceived risk is defined as the perceived uncertainty in a purchase situation. Risk perception influences people’s confidence in their decisions. Risky situations can be those where the probabilities of outcomes are not known and the outcome is known or unknown. A study by Kesharwani and Bisht (2011); “The impact of trust and perceived risk on internet banking adoption in India”, whose main purpose was to extend the technology acceptance model (TAM) by incorporating trust and perceived risk in the context of the internet banking adoption in India, examined the element of perceived risk to understand, explain and predict the consumer acceptance of new technologies and in particular internet banking services. The study used the TAM model as a theoretical basis while incorporating security and privacy-related issues for internet banking adoption. Additionally, taking India as the case study, the research employed a questionnaire for data collection and exploratory factor analysis and structural equation modeling for data analysis. The study discovered that perceived risk has a negative impact on the behavioural intention of internet banking adoption and trust has a negative impact on perceived risk. However, the study does not provide an understanding for enhancing knowledge on adoption intention and use of new technologies and specifically; online banking services by incorporating constructs such as cost of technology, relative advantage, and government support that could influence consumers' acceptance. Moreover, since the study's context is in India it's crucial to understand and differentiate technology acceptance across cultures to have conclusive findings in other jurisdictions such as Kenya; hence, the findings may not be replicative of the current study scope.

Likewise, a study by Yang, Liu, Li, and Yu (2014); "Understanding perceived risks in mobile payment acceptance", conducted in China confirmed that in mobile payments acceptance, perceived information asymmetry, perceived technology uncertainty, perceived regulatory uncertainty, and perceived service intangibility are the main determinants of perceived risk, while overall perceived risk (consisting of perceived performance risk, perceived financial risk, and perceived privacy risk) was found to have strong negative effects on perceived value and acceptance intention. The main aim of the study was to examine and quantify how various uncertainties result in different perceived risk dimensions that hinder mobile payment (m-payment) acceptance. The study used an uncertainty-risk-value framework based on perceived risk theory, prospect theory, and perceived value theory. Data collection was done via questionnaire and the Structural equation modelling method was used to test the research model. Although this study offers insights into how consumers perceive risks when adopting innovations, the relationship between adoption intention and other factors, i.e. cost of technology, perceived value, relative advantage, and government support, was not clarified, so it is not obvious that only one variable affects intention to adopt new technologies.

Moreover, Chauhan, Yadav, and Choudhary (2018) study; "Analysing the impact of consumer innovativeness and perceived risk in internet banking adoption" concluded that in internet banking, Perceived Risk has a significant negative influence on consumer's intention to adopt internet banking, and domain-specific innovativeness was found to negatively influence perceived risk. The study was conducted in the Indore and Bhopal districts of Madhya Pradesh, India. The researchers employed a questionnaire-based survey (487 usable responses) from Indian consumers and a two-step SEM approach (i.e. measurement model and structural model) to analyze the data and perform the study. The main objective of the study was to understand consumers' intention to adopt internet banking. However, the study is limited since it only focuses on a subset of users particular to a certain region of India, and also it does not analyze the adoption intention of new technology such as open banking while including other factors that may influence adoption intention.

2.3.2 Influence of Perceived Value on Technological Innovation Adoption

Lee and Allaway (2002) conducted a study; "Effects of personal control on the adoption of self-service" whose main aim was to investigate whether the provision of more personal control to consumers can enhance the perceived value of self-service technologies such as airline ticketing machines, automated teller machines, and computer-based shopping services, and induce greater adoption intention associated with these technological innovations in the case of America. The study utilized questionnaires for data collection and multiple analysis of covariance was employed for analysis. The study concluded that when technology innovation experiences adoption rates that are slower than expected, it is because customers cannot foresee the way it works, or it is because the customers find it too demanding, or even perhaps it is because they do not see its value as a better alternative, or all of the above consequently. Despite the findings, this research only sheds light on how to promote the adoption of self-service technologies, particularly online shopping. The research does not provide insights on the adoption intention of financial technologies such as open banking; since these technologies enable users to play the double roles of service consumer and technology user. Moreover, the study only focuses on the American context and does not sufficiently provide conclusive findings on developing markets such as Kenya.

Similarly, Hsun and Yin (2008) study;" Effects of self-service technology on customer value and customer readiness: The case of internet banking" found out that in internet banking, self-service technology characteristics (i.e. ease of use, usefulness, costs saved, and self-control) demonstrated positive effects on customer value and customer readiness. The study stated that customer readiness is positively related to customer value. Furthermore, customers are willing to use internet banking when customer value and customer readiness are high. The study employed an online survey for data collection and structural equation models (SEM) were used to examine the theoretical framework. The main objective was to investigate whether customer value (CV) and customer readiness (CR) can enhance self-service technology (SST) adoption. In addition, it aimed to inspect the effects of customer value and customer readiness in customers' continued use of Internet banking. The findings of the study were determined by only examining the factors contributing to positive effects on customers' continued use of Internet banking without investigating the effects of negative factors, such as risk and lack of government support as inhibitors that may hinder the adoption of new technologies. Additionally, the study focuses only on the context of internet banking and does not dive into other technologies such as open banking in developing economies such as Kenya.

Furthermore, Kim et al. (2007) study; "Value-based Adoption of Mobile Internet: An empirical investigation", whose main objective was to examine mobile internet adoption as a new technology in Singapore from the consumer perspective, and not just from a tech-enthusiast user perspective. Empirical data for this study was collected via an Internet survey. Analysis was done by conducting a principal component factor analysis on the four independent variables and one dependent variable (perceived value). By testing the mediating effect of perceived value on the relationship between a customer's benefit and sacrifice-related beliefs and the customer's adoption intention, the study concluded that in Singapore higher perceived value indicates a greater willingness to adopt mobile internet technology. It further stated that value perception is a major determinant of M-Internet adoption. However, the study solely analyses the Singapore market and does not provide conclusive findings on new technology adoption intention in a developing economy such as Kenya. Moreover, the study focuses on mobile internet adoption and doesn't give sufficient findings on new technologies such as open banking. Also, the study lacks moderating variables such as government support to determine the correlation between its independent variables and the dependent variables.

2.3.3 Influence of Relative Advantage on Technological Innovation Adoption

Relative advantage is defined by Rogers (2003) as "the degree to which an innovation is perceived as being better than the idea it supersedes". Thus, the adoption of innovation will be positively encouraged if its benefits are perceived as having advantages over existing practices and systems. A study by Ifinedo (2011) "Internet/e-business technologies acceptance in Canada's SMEs: the exploratory investigation" whose main objective was to investigate the influences of Canadian small and medium-size enterprises (SMEs) acceptance of internet and e-business technologies (IEBT) in their operations. Having Canada as the case study, the research sought to understand the relative importance of perceived benefits (competitive advantage), management commitment/support, and external pressure about the adoption of new e-business technologies. The study found out that all the aforementioned factors are significant and positive predictors of internet/e-business technologies acceptance. Questionnaires were used as a primary source of data collection. Multivariate analysis of covariance (MANCOVA), partial least squares (PLS), correlation, and multiple regression analysis was used to establish a relationship between the adoption of internet and e-business technologies (IEBT) and the Rogers innovation attributes. The research framework was based on the technology-organization-environment (TOE) framework as it was used to guide the research effort. Dependent factors such as perceived benefits, management commitment/support, organizational IT competence, external pressure, information systems (IS) vendor support, and availability of financial support, were used to develop relevant hypotheses. Despite the study's findings, gaps still existed since the data collected was sampled from SMEs specifically in Canada; the study's findings cannot be generalized to other jurisdictions such as Kenya. Moreover, the study primarily focused on the adoption of internet and e-business technologies and does not account for new technologies that have not yet been implemented such as open banking.

Likewise, a study by Ekong et al. (2012); "E-commerce Adoption in Nigerian Businesses: An Analysis Using the Technology-Organization-Environmental Framework" was carried out in Nigeria with a major objective to determine factors that influence the adoption of consumer-oriented e-commerce adoption in Sub-Saharan Africa and specifically, Nigeria. Taking Nigeria as the case study, questionnaires were administered to respondents and data analysis was performed using the Partial Least Squares (PLS) technique. Findings revealed that the relative advantage of e-commerce technologies, management support and IS vendor support are significant predictors of the adoption of EC in Nigerian small businesses. This is corroborated by Jeyaraj, Rottman, and Lacity (2006) who also found perceived relative advantage to be one of the most important factors for the adoption of IT in business organizations. Despite the findings presented by Jeyaraj et al. (2006) and Ekong et al. (2012) conclusions cannot be generalized to other Sub-Saharan Countries such as Kenya. Data from other countries may be different from what is reported and may present a different conclusion. Additionally, factors such as government support and the cost of technology were not considered in the above studies.

However, a study by Mairura (2016); "Relative advantage as a determinant of technology adoption among automobile mechanics in micro and small enterprises in Kenya" found out that although a larger proportion of mechanics appreciated the advantages of various auto innovations, adoption to the same was significantly quite low. Basing Kenya as the case study, the researchers used a descriptive cross-sectional survey design and employed both probability and non-probability sampling techniques to collect quantitative and qualitative data, applying the binary logistic regression analysis and using SPSS to analyze, the study. The main objective of the research study was to determine factors that influence technology adoption among automobile mechanics in micro and small enterprises in Nakuru town; Kenya. One of the specific objectives of the study was to establish the role of relative advantage, in the adoption of technology. Although the study concluded a larger proportion of the mechanics appreciated the advantages of various auto innovations, adoption of the same was significantly quite low. Since the study focused its investigation on the manufacturing industry and more specifically the automobile industry the same findings are not conclusive for a different sector such as the finance industry and it primarily focused on product innovations and not service innovations such as open banking.

2.3.4 Influence of Cost of Technology on Technological Innovation Adoption

Adoption of new technology is often very costly for various reasons, new machines need to be purchased and often the technology becomes a business asset (Hall & Khan, 2004). Moreover, employees need operational training for these new technologies which becomes an additional cost. In case there are network effects then complementary machines need to be purchased, apprised, or replaced. In addition, if the operation needs to be shut down for installation there will be a cost from lost downtime. Therefore, firms are likely to analyze the cost-benefit of adopting the innovations. Hall and Khan (2004) state that resultantly, it might not be worthwhile for them to adopt even if the technology has the potential of improving productivity or product quality and vice versa.

A study by Wanjiku, Paul, and Michael, (2017):" An analysis of factors influencing adoption of e-financing in financial institutions in Thika sub-county, Kiambu county, Kenya" sought to analyze factors influencing the adoption of e-financing in financial institutions in Thika sub-county, Kiambu County, Kenya. The study adopted a descriptive cross-sectional survey. The study was carried out among various financial institutions around Kiambu County in Kenya. The study employed questionnaires to collect data from Technical Staff and Account Clerks whereas interviews were used to collect data from Top-Level Managers. Quantitative data collected was analyzed using descriptive statistics specifically, percentages and frequencies. Hypotheses were tested using ANOVA at a 95% confidence interval with the help of SPSS (Version 23). The study established that the levels of adoption of e-financing by financial institutions are below average. Furthermore, the findings stated that acquisition costs of e-financing infrastructure, installation costs, maintenance costs, and staff training costs had a significant influence on the adoption of e-financing innovation by financial institutions. Although the findings presented by the study cannot be generalized to other regions of the country within Kenya. Data from other regions may be different from what is reported and may present different conclusions. Additionally, factors such as government support and perceived value were not considered in the study.

Also, Grandon and Pearson, (2004) study; "Electronic commerce adoption: an empirical study of small and medium US businesses" examined the determinant factors of strategic value and adoption of electronic commerce as perceived by top managers in small and medium-sized enterprises (SME) in the Midwest region of the US. They found out that Cost was an important discriminant factor for the adoption of Internet-based technologies. To validate the research findings, the study collected data from top managers/owners of SMEs by using an Internet survey. The study further found that SMEs in the region have been slow to embrace e-banking services though they agree that online services reduce expenses by a wide margin. In addition, a combination of technology investment costs, customer insecurities, and lack of market readiness have been key factors that make e-banking less embraced by consumers. Despite the findings, the limited sample size still presents a gap in an in-depth analysis of the influence of some key variables, and how they might influence risk-related attributes. For example, what role government support plays in influencing consumers' risk perceptions of new technologies such as open banking? Additionally, the study solely focuses on the American Midwest region therefore a study done in a different geographic region, may lead to conclusions different from the present study.

Further, Nyagar, Korir, and Nyangweso, 2017 study; "Cost as a determinant of technology adoption among small engineering firms in Kisumu city, Kenya" whose main aim was to explore the relationship between the perceived cost of technology and the rate of adoption based on a study of small engineering firms in Kisumu city, Kenya. Using Kisumu City, Kenya as a case study it adopted an explanatory survey research design while applying the census inquiry technique to select small engineering firms within Kisumu's central business district. The study subsequently found out that the perceived cost of technology significantly influenced technology adoption behavior. Even though the findings were substantiated in the context of Kenya they cannot be generalized to other regions of the country within Kenya. Data from other regions may be different from what is reported and may present different findings. Additionally, factors such as government support and perceived value were not considered in the study. Moreover, the study only focused on the manufacturing industry and more specifically engineering firms, it did not focus on the financial industry sector, therefore, the findings could differ based on different sectors.

2.3.5 Influence of Government Support on Technological Innovation Adoption

According to Filipkowski (2008), the lack of an effective regulatory framework makes online technologies such as internet banking vulnerable to cybercrimes such as fraud and hacking of customer bank accounts or even customer details. Features such as anonymity, non-face-to-face contacts, speed of the transactions, globalization process, new payment channels, and cross-border transactions make such services more attractive to cybercriminals. With businesses increasingly becoming globally interconnected and offering financial services such as transactions, balance inquiry, interbank transfers, there are enhanced risks of identity-related financial crime. International anti-money laundering (AML) theory holds that money launderers universally want to exploit weaknesses of financial regulation systems to combine the dirty money into a legitimate economic system, without the possibility of being monitored and detected due to the regulatory blind spots and regulatory weak points (Lixin, Fang, He, Shijie, Wei & Qiang, 2011). Therefore, internet payments, as an emerging payment instrument with loose regulation, possess huge risks to consumers as they can be exploited and consumers are generally apprehensive about the adoption of such technologies (Liu, 2010). Despite currently non-existing open banking regulations and policies; government support is not only limited to regulation but also involves creating an enabling environment for innovations, enforcing Intellectual property rights, funding innovations, creating institutions that foster the development and growth of innovations, etc. This research will therefore consider the variable as a unidimensional moderating variable of government support consisting of government regulation, implementation support, provision of a conducive environment for innovations, funding of innovations, creation of institutions that foster development and growth.

Kousar, Commer, Sci, Sami, Sabri, Zafar, and Akhtar (2017) conducted a study; "Technological factors and adoption of green innovation: Moderating role of government intervention: a case of SMEs in Pakistan". The main aim of this study was to test the moderating role of government intervention between technological factors and the adoption of green innovations. The study employed a self-administrative survey approach to collect the data through a questionnaire. A random probability sampling technique was used to collect data from managers, senior executives, and technicians of SMEs specifically in Pakistan. Multiple regression analysis was employed to measure the relationship and size of the impact of technological factors on the adoption of green technology. In addition, hierarchical regression was used to investigate the moderating role of government intervention between technological factors and the adoption of green technology. The study found that government intervention significantly moderates between complexity, relative advantages, tri-ability, and adoption of green technology. The main gaps in the study are that firstly, it focuses on the Pakistan market and the findings are based on that market segment necessarily the findings may not be consistent with the Kenyan market, additionally, the study focuses on green technology adoption and does not investigate financial tech innovations such as open banking.

Furthermore, Ln and Ho, (2011) study; "Determinants of Green Practice Adoption for Logistics Companies in China" analyzed the factors influencing the adoption of green practices in the Chinese logistics industry. The main aim of the study was to investigate determinant factors for green practice adoption for logistics companies in china. The determinants were comprised of technological, organizational, and environmental dimensions i.e. Customer pressure, regulatory pressure, governmental support, and environmental support. A questionnaire survey on the green practice adoption of Chinese logistics companies was conducted, and 322 samples were analyzed using factor analysis. The research results revealed that the relative advantage and compatibility of green practices, organizational support, quality of human resources, regulatory pressure, and governmental support have significantly positive influences on the adoption of green practices for Chinese logistics companies. However, the present study only considers the determinant factors that have been widely used in the literature on technical innovation and environmental management. The influences of other factors on different industries such as financial organization adoption intention should also be conducted. In addition, because this study focuses on the green practice adoption of Chinese logistics companies and examines their adoption of energy-saving practices, the research findings may be limited in their generalizability. Different countries and industrial sectors may lead to conclusions different from the present study.

However, Zailani, Iranmanesh, Nikbin, and Jumadi, (2014) contradicted this by conducting a study; "Determinants and environmental outcome of green technology innovation adoption in the transportation industry” in Malaysia and found that human capital, customer pressure, and environmental uncertainty significantly affect green technology innovation adoption while organizational and governmental support has an insignificant relationship with the adoption of green innovation. The main aim of the study was to investigate the antecedents and outcomes of green technology innovation adoption in transportation companies in Malaysia. For data collection, the study employed a questionnaire survey on the green technology innovation adoption of Malaysian transportation companies while for data analysis a two-step approach was utilized. The first step involved the analysis of the measurement model using partial least squares (PLS) because PLS allows the latent constructs in the proposed model to be analyzed as formative or reflective indicators, while the second step tested the structural relationships among the latent constructs. The study investigates government support as an influence on specific innovations in the field of green technology but does not investigate the moderating role of government intervention between technological factors and adoption of tech innovation such as open banking, especially in the case of the Kenyan industry. Additionally, the study is performed in the Malaysian market and does not contextualize the Kenyan financial sector. The above studies have examined the moderating role of government intervention in the context of Malaysia, China, Pakistan and concluded that government intervention plays a significant moderating role between internal factors like entrepreneurial value, management, and market strategies, and the growth performance of SMEs (Shariff, Peou &Ali, 2010) but no study investigates the moderating role of government support between adoption determinants and adoption of open banking, in the case of the Kenyan financial industry.

2.4 Summary of literature and research gaps

Earlier works in open banking by Zachariadis and Ozcan (2017);” The API Economy and digital transformation in financial services: The case of open banking”, give relevant theories that anticipate and predict implications of public APIs adoption on financial services. The study qualitatively reveals the risks that open APIs carry for developed financial markets such as the UK and EU.

Additionally, a more recent study by Sivanthu (2019); “An Empirical Study on the Intention to Use Open Banking in India” empirically analyzes the consumer intention to adopt open banking technology in emerging-market economies such as India, leveraging on the TRAM Model. The study focuses on the user’s intention and found out that for end-users to adopt open banking, optimism, innovation, insecurity, and discomfort greatly lead to perceived ease of use and perceived usefulness which subsequently affect user adoption intention of open banking. The study espouses that when open banking is simple to operate, then the end-users perceive it to be of great use, then, of course, the consumers will positively value the new technology. From the study, it’s quite evident that attachment to traditional banking negatively impacts the correlation between perceived value and user intention to open banking (Hsu & Lin, 2016; Sivathanu, 2019). The study concludes that attachment and reluctance to move away from traditional banking affects the correlation between perceived value and user intention (Sivathanu, 2019). The study postulates that a considerable number of end-users are contented with using traditional banking systems and prefer physical interaction with bank employees instead of technology-based banking. In some cases, consumers are not inclined to reveal their banking data online; hence, they prefer conventional banking systems (Sivathanu, 2019).

This research relates to Zachariadis and Ozcan (2017) as it not only tries to theoretically analyze the impact of open APIs but empirically find out the factors that will influence open banking adoption in a developing economy such as Kenya. Additionally, the study relates to Sivathanu (2019) as it similarly builds on the TRAM model. While Sivathanu (2019) uses the preference of traditional banking as a moderator construct, this study will employ government support as a moderator construct to examine the causality between perceived value, perceived risk, cost of technology, perceived relative advantage, and adoption intention.

The study by Zachariadis & Ozcan (2017) does not address certain key questions such as empirically what are the factors that will influence commercial banks to adopt open banking. Additionally, the study theoretically focuses on the context of already established financial economies i.e. the UK, and does not highlight developing economies such as Kenya.

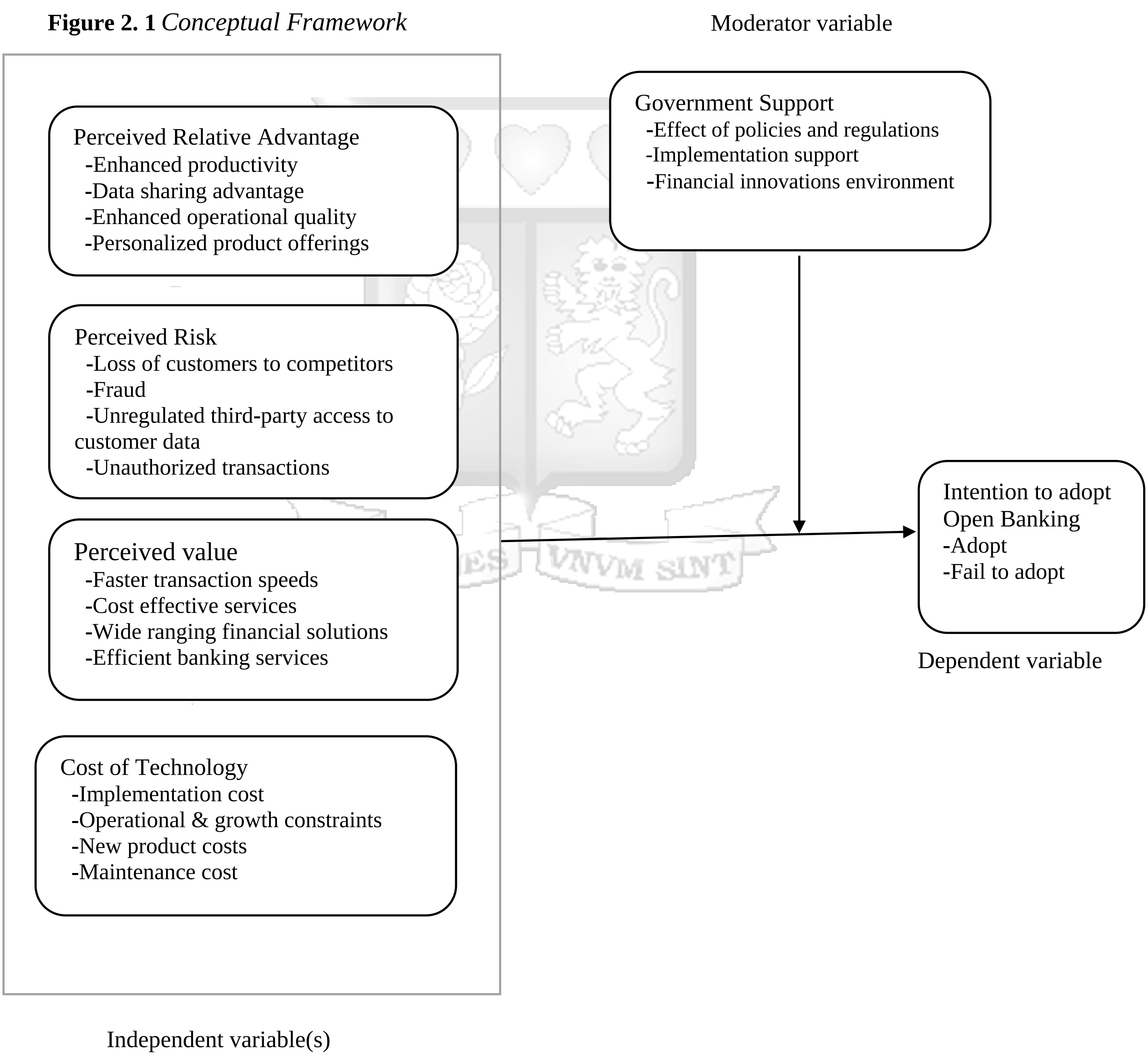
The study by Sivathanu (2019), offers no clarification between open banking adoption and other external factors such as government support (GS), perceived risk (PRSK), perceived relative advantage (PRA), perceived value (PCV), and cost of technology (COT) that affect adoption intention for new technology. Secondarily, it is crucial to analyze factors that might influence the adoption intention to open banking by the commercial banks before only explicitly converging on the end-consumer’s intention.

Based on the aforementioned gaps the study sought to empirically analyze factors that will influence commercial banks’ intention to adopt open banking in Kenya using the TAM framework incorporating government regulations (GS), Perceived Risk (PR), Cost of Technology (COT), Perceived relative advantage (PRA) as constructs to the model. Sivathanu (2019) acknowledged that stickiness (STK) to traditional banking negatively affects the user’s intention to adopt open banking (UNT). However, the practical application of this model is limited because constructs such as government support are also a factor that could moderate the relationship between PCV, PRSK, COT, PRA, and UNT. Therefore, this study empirically explored factors that will influence the intention to adopt open banking and offer an enhanced explanatory capacity for commercial banks' adoption intention.

2.5 Conceptual framework

A conceptual framework is defined as a framework that is structured from a set of broad ideas and theories that help the researcher properly identify the research problem, Smyth (2004). The researcher analyzes how to frame the study's questions/hypothesis and find suitable literature. In this study, the conceptual framework was based on stakeholders' attitudes i.e. perceived value, perceived risk, cost of technology, and perceived relative advantage which constituted independent variables whereas adoption of open banking was the dependent variable while government support was the moderating variable as shown in Figure 2.1

Figure 2. 1 *Conceptual Framework*



2.5.1 Operationalization of the study's variables

Based on the variables presented in Figure 2.1, Table 2.1 presents the variable operationalization.

Table 2. 1 *Operationalization of variables*

Variable	Variable type	Indicators	Measure of indicator	Question in questionnaire
Cost of Technology (COT)	Independent	• Implementation cost • Operational & growth constraints • New product costs • Maintenance cost	Using 5- Point Likert Type Scale (Ordinal)	Question No 1,2,3,4. Section II of the Questionnaire in Appendix III
Perceived Relative Advantage (PRA)	Independent	• Increased productivity • New value propositions • Enhanced operational quality • Personalized product offerings	Using 5- Point Likert Type Scale (Ordinal)	Question No 5,6,7,8. Section II of the Questionnaire in Appendix III
Perceived Value (PCV)	Independent	• Improved bank performance • Cost-effective transactions • Wide-ranging financial solutions • Value • Beneficial services	Using 5- Point Likert Type Scale (Ordinal)	Question No 9,10,11,12.13 Section II of the Questionnaire in Appendix III
Perceived Risk (PRSK)	Independent	• Expected performance level • Fraud • Data privacy • Los potential • Overall risk concerns	Using 5- Point Likert Type Scale (Ordinal)	Question No 14,15,16,17,18 Section II of the Questionnaire in Appendix III
Government Support (GS)	Moderating variable	• Effect of policies and regulations • Implementation support • Financial innovations environment	Using 5- Point Likert Type Scale (Ordinal)	Question No 19, 20, and 21. Section II of the Questionnaire in Appendix III
Open Banking Adoption (UNT)	Dependent	• Adopt/or Fail to adopt • Partnerships with third-parties	Using 5- Point Likert Type Scale (Ordinal)	Question No 22, 23. Section II of the Questionnaire in Appendix III

Source: Author (2022)

2.5.2 Perceived risk and Adoption Intention of Open Banking

Yang et al., (2014); states that higher levels of perceived risk imply lower levels of intention to use new technologies such as m-payment services. Kesharwani & Bisht, (2011) states that the presence of perceived risk limits the intention to use new technological innovations such as internet banking, which consequently could imply a lower or sub-utilization of new technologies such as open banking technology, thereby implying a negative effect on the intention to adopt open banking. Therefore, the higher the risk of using new technology, the more negative is the attitude toward it, and the less is the willingness to use it.

2.5.3 Perceived Value and Adoption Intention of Open Banking

Perceived Value (PCV), as discussed by Lee & Overby, (2004) is the innovation users' acknowledgment of the service value when their desired purpose and goal of availing of the service is fulfilled. PCV means the perceived preference of a product; its evaluation of performance and attributes to achieve its purpose and goal in use situations (Woodruff, 1997). Shu-Hsun & Ying-Yin (2008) postulated that PCV positively influences the adoption intention of new technologies such as internet banking. Additionally, Kim et al. (2007) conclude that PCV positively affects consumer adoption intention of new technology. Similarly, Del Río González (2005) found that perceived net value motivates organizations to adopt new technologies and earn the benefits derived.

2.5.4 Cost of Technology and Adoption Intention of Open Banking

Nyagar et al. 2017 found out that high perceived cost has a negative influence on innovation adoption. The study states that high costs can discourage the adoption and use of innovations. Consumers will accept new technologies such as mobile financial services which are useful and affordable in terms of cost (Siegrist, Gutscher & Earle, 2005). Additionally, the study by Wanjiku et al. (2017) states that the cost of technology can strongly influence banks to implement and adopt e-financing initiatives and it may affect the bank's perception of e-banking systems.

2.5.5 Perceived Relative Advantage and Adoption Intention of Open Banking

Ekong et al. (2012) showed that the relative competitive advantage of new technologies is a significant predictor of the adoption of E-Commerce in Nigerian small businesses. Other studies, for instance; Wanyoike, Mukulu, & Waititu, (2012) revealed that the relative advantage of new technology is positively related to adoption. Accordingly, if the relative advantages of innovation are greater, then companies are more willing to adopt the innovation and search for higher economic gains (Lin & Ho, 2011; Rogers, 2003).

2.5.6 Moderating effect of Government support on the adoption of Open Banking

In the Kenyan context, open banking is a fairly new and unfamiliar financial technology; government regulation, political environment, and governmental support, in general, may limit the changes required to produce benefits of such new technologies (Kousar et al., 2017). Therefore, the presence or lack thereof government support could significantly affect a new technology's perceived relative advantage, perceived risk, perceived value, cost of technology, and resultantly the commercial banks' intention to adopt open banking.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter expounds on the research approach that was utilized. It gives the methodology used to attain the study's objectives. It details the philosophy applied, research design highlighting; population and the sampling techniques applied, data collection methods, analysis of data, quality of data then finally the last section focuses on the study's ethical consideration.

3.2 Research Philosophy

This study adopted ontology, driven by a positivism approach. Saunders, Lewis, and Thornhill (2009) noted that ontology is based on the assumptions made regarding the nature of reality. An ontology consists of two fundamental principles; objectivism/positivism and subjectivism (Saunders et al., 2009). Objectivism supports the application of natural science techniques to study social reality. Bryman and Bell (2011) viewed positivism as a research model that is comparable to a data analyst who interprets data without adding value to its outcome. In this study, positivism was employed since its methodology deals with data deduction of highly-structured data and measurements that typically use quantitative methods of analysis (Harris, 2019). Furthermore, positivism stresses observations that are both quantifiable and latent which lend themselves to statistical analysis. Additionally, research based on positivism is tailored toward broad data collection methods and intends to quantify qualitative data, for instance by applying hypothesis testing to data primarily gathered from in-person interviews and questionnaire surveys.

3.3 Research Design

The research study assumed a descriptive research design. This research design is effective when analyzing non-quantifiable themes (Ethridge, 2004) such as risks and the impact of phenomena, in this case, the intention to adopt open banking. Additionally, this research design offers the researcher the ability to collectively integrate both qualitative and quantitative techniques for collecting data. Descriptive research design; specifically, a descriptive survey was chosen since it is an effective method of data collection that employs interviews and questionnaires (Orodho, 2009). Orodho and Kombo (2002) clarified that this method can be used when collecting information about people's thoughts, sentiments, practices, or any other social issues. In this study, an analysis was performed on the relationships that coexist between commercial banks' intention to adopt open banking through several determinants: perceived risk towards the new technology, perceived consumer value, relative advantage, cost of technology, and government regulation.

3.4 Population of the study

Sharma, (2004) states that a population is a unit of events, people, or things that are of interest to a researcher that he/she is willing to investigate. The target population for this research was all licensed Kenyan commercial banks. In Kenya, there are currently 43 licensed commercial banks (Central Bank of Kenya, 2019). The study got in touch with the human resource management of these banks and identified at least 5 respondents from each bank who eventually formed the unit of analysis. These employees were required to have expertise that could authoritatively provide information on technology adoption. These respondents were employees from the ICT, Finance, Operations, Audit, and Legal departments. These five departments are believed to bear the greatest responsibility in innovation adoption and implementation in a typical commercial bank. One respondent was drawn from each department. Since the study selected 43 commercial banks it informed a total number of 215 respondents. These employees were required to have knowledge and understanding of new technology implementation processes and hence provide the study with accurate and reliable data on the study problem.

3.5 Sampling Design

A sample design is the road map, that guides the selection of a survey sample while also driving many other important aspects of the survey. In a broad sense, survey researchers are interested in gathering information from a population, or universe, of interest through a survey. Therefore, a sampling frame must be defined since it represents the population of interest from which the sample will be obtained (Lavrakas, 2008).

3.5.1 Sampling Frame

A sampling frame is a source list. It is a group of items or respondents from which a sample has to be drawn, it constitutes all the components of the target population (Dempsey, 2003). In this study, the sampling frame comprised all licensed commercial banks within Kenya. The sampling frame is captured in Appendix I.

3.5.2 Sampling Technique

The study used a non-probability sampling design by applying a purposive sampling method to select the study respondents. According to Dane (2007), purposive sampling ensures an adequate selection of numbers of subjects with appropriate characteristics to the study problem. Purposive sampling is also known as judgmental, selective, or subjective sampling, it reflects a group of sampling techniques that rely on the judgment of the researcher when it comes to selecting the units (e.g. people, cases/organizations, events, pieces of data) that are to be studied (Orodho, 2009). The main objective of using purposive sampling was to focus on particular characteristics of the population that were of interest and enabled the researcher to answer the research questions (Kothari, 2008). Since the implementation of open banking is a technical discipline, purposive sampling helped in selecting respondents from the ICT, operations, finance, and legal departments with technical knowledge and experience in the implementation of new technologies within commercial banks.

3.5.3 Sample Size

Sample size is the number of units used in calculating estimates of a given population (Kothari, 2008). The study chose to examine the entire population (i.e. the total number of commercial banks in Kenya) since it's an effective technique when the size of the population is typically very small (Crossman, 2018). The sample size thus comprised 43 banks with 5 respondents per bank consisting of one respondent from the ICT, operations, audit, finance, and legal departments each respectively having at least 215 respondents in total.

3.6 Data Collection Methods

In this section, the data collection methodology used in the study is stated and justified in detail. The section includes the development of the instruments and data collection.

3.6.1 Data Collection Instruments

Yan (2017) expressed that survey questionnaires are a data collection tool that is primarily used for research information collection. The use of a questionnaire is appropriate because it offers an objective means of collecting data concerning the beliefs, knowledge, attitudes, and behaviors people have which serves the purpose of the study (Albuam & Oppenheim, 1993). A survey questionnaire was prepared to obtain data for the study, notably to capture the major variates required in the research. The closed-ended questions were evaluated, and the questionnaire was split into two sections. The first section covered the respondent's demographic representation whereas the second section measured the determinants of open banking adoption intention using a five-point Likert scale. A five-point Likert scale was utilized to examine the operationalization of the constructs with responses ranging from 1-Strongly disagree, 2-Disagree, 3-Neither agree nor disagree, 4-Agree, and finally 5-Strongly agree. A pilot test was performed to observe the research instrument's reliability and validity. According to Connelly (2008), extant literature suggested that a pilot study sample should be 10% of the sample projected larger parent study. Additionally, Isaac and Michael (1995) suggested that pilot samples with 10 to 30 respondents are more practical due to simplicity, ease of calculation, and the ability to test hypotheses, yet ignore weak treatment effects. Likewise, Hill, (1998) recommended 10 to 30 participants for pilot runs in survey research.

3.6.2 Data Quality

Albuam and Oppenheim, (1993) state that once questionnaires have been created, they should initially be issued to a selected group of respondents, improved, and then issued again to the intended respondents. A pilot study can be used as a down-scaled version or as a dry run as a prelude to the main research (Polit, Beck & Hungler, 2001). Baker (1994) pointed out that pilot studies are commonly used to preliminarily try out the research instrument. A pilot study is necessary, especially where research rules are not explicitly adhered to, or whether proposed research techniques are inappropriate or too complex (Baker, 1994). De Vaus (1993) recommends that there needs to be a verification mechanism to check if there exist uncertainties or a lack of clarity of the methods and instruments that inhibit by respondent's response to questions. Surveys are pilot-tested to prevent misleading, inadequate, or needless questions. Pilot-testing guarantees that a research instrument can be properly applied and that the data acquired is reliable. A pilot study also reveals issues such as wording problems, ambiguity, or problems with measurement (Oppenheim, 1998).

Correspondingly, a pilot study was conducted and it involved selecting 10% of the total sample population (Hill, 1998) expressly $(0.1*43) \approx 4$ banks with at least 5 respondents each totalling 20 respondents from the different banks. Respondents selected were bank employees (from the ICT, Finance, Operations, Audit, and Legal departments) and before the data collection process, adequate information about open banking was shared in form of an explanatory video and detailed explanation documentation. The respondents who were part of the pilot study were not recalled for the actual study. Data was collected through an online questionnaire via google forms. After obtaining the results from the pilot study, respondents were requested to indicate any missing factors that were not present in the questionnaire that they believed to be important in their adoption of open banking. These missing factors were analyzed and accordingly added to the final questionnaire that was used for the actual study. Similarly, to the pilot study, the actual study used self-administered questionnaires. Since, they allow respondents to answer the questionnaires at their convenience, lowers the cost of administering the questionnaires and there is less data bias (Orodho, 2009). Additionally, the researcher requested the respondents not to disclose their personal information to allow anonymity. Moreover, the researcher ensured that an introduction letter detailing the academic purpose and intention of the study was presented to the respondents. This assisted in increasing the level of response rate and hence contributed to the gathering of sufficient data.

3.6.2.1 Reliability test

Blumberg, Cooper & Schindler (2005) referred to reliability as a measure that ensures that results are consistent with equivalent values. It examines the exactness, consistency, replicability, and accuracy of research (Chakrabartty, 2013). Reliability presents the degree to which research is free from errors and hence ensures consistent measurement within the several items in the instruments in the score. The study constitutes reflective indicators that are interchangeable, highly correlated, and capable of being omitted without changing the meaning of the construct. Factor loadings or the correlations between the indicator and the construct were used to link the reflective indicators to their respective constructs. The study validated both the reliability and validity of reflective outer models. When assessing reflective outer models, this study verified both the reliability and validity. The first step was by using Cronbach's alpha α to evaluate the construct measures' internal consistency reliability. A Cronbach alpha between 0.60 to 0.70 was considered acceptable and indicated that the gathered data had a relatively high internal consistency and could be generalized to reflect the opinions of all respondents in the target population (Hair et al., 2014). Cronbach Alpha of each construct exceeded the 0.700 threshold as seen in Table 3.1.

Table 3. 1 *Reliability Pilot Statistics*

Construct	Cronbach's alpha α	AVE
COT	0.7283	0.6038
GS	0.7829	0.6605
PCV	0.7461	0.5257
PRSK	0.7001	0.5113
PRA	0.8281	0.5511
UNT	0.7976	0.6655

Source: Author computation (2022)

Where:

COT = Cost of Technology

GS = Government Support

PCV = Perceived Value

PRSK = Perceived Risk

PRA = Perceived Relative Advantage

3.6.2.2 Validity test

The second step in evaluating reflective indicators was the assessment of validity. Blumberg et al. (2005) mentioned that validity is the degree to which a research instrument examines what it purports to measure. Validity gauges the extent to which the instrument measures what it is meant to measure (Wilson, 2010). It is the extent to which a research study's results are correct (Pallant, 2007). Validity incorporates the entire experimental concept and establishes whether the results obtained fulfil all of the requirements of the quantitative research method. The average variance extracted (AVE) was computed to test the convergent validity. Hair et al., (2014) states that support for convergent validity is supported when each construct's average variance extracted (AVE) is 0.50 or higher.

The Fornell-Larcker Criteria (1981) was employed to calculate the discriminant validity of the constructs. The discriminant validity was substantiated by comparing the intercorrelations of the constructs with the average variance extracted (AVE). This method indicates that the construct shares more variance with its indicators than with any other construct. To test this requirement, the AVE of each construct should be higher than the highest squared correlation with any other construct (Hair et al., 2014).

From this study's data analysis, convergent validity was acceptable because the average variance extracted (AVE) was over 0.500. The results for reliability and validity for the items are presented in Table 3.1 above. Additionally, discriminant validity was assessed by the Fornell-Larcker criterion, Table 3.1 shows that the square root of AVE for the construct was greater than the inter-construct correlation. Discriminant validity was also assessed by the Heterotrait-Monotrait ratio of correlations (Henseler et al., 2015) which presented values below the threshold of 0.90 (see Table 3.3). Hence, discriminant validity was established (See Table 3.2).

Where:

COT = Cost of Technology

GS = Government Support

PCV = Perceived Value

PRSK = Perceived Risk

PRA = Perceived Relative Advantage

Table 3. 2 *Fornell-Larcker Criteria (Pilot study Results)*

Construct	**COT**	**GS**	**PCV**	**PRSK**	**PRA**	**UNT**
COT	*0.7678*					
GS	0.1411	*0.8466*				
PCV	0.6269	0.2849	*0.7589*			
PRSK	-0.4154	-0.5033	-0.6419	*0.7131*		
PRA	0.6798	0.1864	0.6741	-0.3802	*0.7520*	
UNT	0.4671	0.6088	0.5901	-0.5958	0.6220	0.8144

Note: Values in Italic represent Square-root of AVE.

Source: Author computation (2022)

Table 3. 3 *HTMT Ratio (Pilot study Results)*

Construct	**COT**	**GS**	**PCV**	**PRSK**	**PRA**	**UNT**
COT						
GS	0.3020					
PCV	0.7725	0.2849				
PRSK	0.5898	-0.5033	0.7670			
PRA	0.7659	0.1864	0.8269	0.4245		
UNT	0.6703	0.6088	0.8545	0.8467	0.8675	

Source: Author computation (2022)

3.6.2.2 Multicollinierity test

Additionally, to test for collinearity i.e. when two or more predictors measure the same underlying construct, or a facet of such a construct (Kock & Lynn, 2012), the research employed variance inflation factors (VIFs) which were generated for all latent variables in the model. The occurrence of a VIF greater than 3.3 indicates pathological collinearity and an indication that the model may be contaminated by common method bias (Kock, 2015). As indicated in table 3.3, all VIFs resulting from the full collinearity test were lower than 3.3, and the model was considered free of common method bias.

Table 3. 4 *VIF Statistics (Pilot study Results)*

Construct	VIF
COT	2.192
PCV	2.200
PRSK	1.501
PRA	1.628
UNT	1.811

Source: Author computation (2022)

3.7 Data Analysis

Since the study used a closed-ended questionnaire, quantitative data was generated. The raw data from the questionnaires was cleaned, edited, and organized per the research questions. The researcher analyzed the data using the analysis of Partial Least Squares Structural equation modeling (PLS-SEM). PLS-SEM unifies multivariate modelling techniques (Gefen, Straub & Boudreau, 2000). Additionally, another reason for using PLS-SEM was because it draws from various disciplines such as measurement theory, latent variable analysis, path analysis regression, and simultaneous equations (Schumacker & Lomax, 2004). It involves intricate, multifaceted observable constructs that are measured with errors (systematic errors and random errors), path models that include formatively measured constructs which may be incorporated as simple composite indicators (Grace & Bollen, 2008). Moreover, the study used the Partial least square structural equation model (PLS-SEM) since it approximates the correlation between latent variables and observed variables and governs the fitness of the model based on the target constructs of interest (Joe, Marko, Lucas & Volker, 2014).

Therefore, once the reliability and validity of the outer models were established, the study sought to evaluate the hypothesized relationships within the inner model. Resultantly, since PLS-SEM will not have a standard goodness-of-fit statistic, instead, the assessment of the model's quality was based on its ability to predict the dependent variable. Therefore, the study used the coefficient of determination ($\mathbf{R^2}$), cross-validated redundancy ($\mathbf{Q^2}$), path coefficients, and the effect size ($\mathbf{F^2}$). Before this quality assessment i.e. Standard goodness-of-fit statistic was performed, the study first tested the inner model for potential collinearity issues through confirmatory factor analysis. This was done because the inner model estimates significances can be subject to biases if constructs are highly correlated (Hair et al., 2014). After the test for collinearity, the coefficient of determination (R^2) was established. The R^2 is a measure of the model's predictive accuracy. R^2 represents the exogenous variable's combined effect on the endogenous variable(s). This effect ranges from 0 to 1 with 1 representing complete predictive accuracy. The study embraced the “rough” rule of thumb regarding an acceptable R^2, with 0.75, 0.50, and 0.25, respectively, describing substantial, moderate, or weak levels of predictive accuracy (Hair et al., 2011; Henseler et al., 2009). Though R^2 is a valuable tool in assessing the quality of a PLS-SEM model, Hair et al., (2014) states that too much reliance on R^2 can prove problematic. Especially, if the study attempts to compare models with different specifications of the same endogenous constructs.

Additionally, Hair et al. (2014) posits that reliance only on R^2 may result in the researcher selecting a less efficient model. For example, the R^2 will increase even if a no significant yet slightly correlated construct is added to the model. As a result, if the researcher’s only goal is to improve the R^2, the researcher would benefit from adding additional exogenous constructs even if the relationships are not meaningful. Therefore, this study’s model was based on the adjusted R^2, which penalizes increasing model complexity by reducing the (adjusted) R^2 when additional constructs are added to the model.

After the coefficient of determination was confirmed, the study sought to establish the Cross-validated redundancy **(Q^2).** The Q^2 is used to assess the inner model’s predictive relevance This measurement is based on the sample re-use technique, which incorporates omitting a portion of the data matrix, estimating the model parameters, and then predicting the excluded portion using the estimations. The smaller the difference between predicted and original values, the higher the Q^2 and consequently the prediction accuracy of the model. (Hair et al., 2014)**.** Specifically, a Q^2 score greater than zero for an endogenous construct shows the path model’s predictive relevance for said construct. Q^2 in SmartPLS software is calculated through blindfolding, this is done by omitting the nth data point of the independent construct indicator variable and estimating the effects of the remaining indicators. Hair et al. (2014), notes that while comparing the Q^2 value to zero is indicative of whether an endogenous construct can be predicted, it does not say anything about the quality of the prediction (Rigdon, 2014; Sarstedt, Ringle, Smith & Reams, 2014).

After running a PLS-SEM model, estimates are given for the path coefficients, which represent the hypothesized relationships linking the constructs. The Path coefficient values were standardized on a range from -1 to +1, with coefficients closer to +1 representing strong positive relationships and coefficients closer to -1 indicating strong negative relationships. Although values close to +1 or -1 are almost always statistically significant, a standard error must be obtained using bootstrapping to test for significance (Helm, Eggert, & Garnefeld, 2009). After verifying whether the relationships were significant, the study considered the relevance of significant relationships. Basically, were the sizes of the structural coefficients meaningful? As stated by Hair et al. (2014), many studies overlook this step and merely rely on the significance of its effects. If this important step is omitted, the study may focus on a relationship that, although significant, maybe too small to merit managerial attention Hair et al. (2014). Finally, the effect sizes for each path model will be determined by calculating Cohen's (F^2). The F^2 is computed by noting the change in R^2 when a specific construct is eliminated from the model. To calculate the F^2, the study estimated two PLS-SEM path models. The first path model was the full model as specified by the hypotheses, yielding the R^2 of the full model (i.e. R^2 included). The second model was identical, except that a selected exogenous construct was eliminated from the model, yielding the R^2 of the reduced model (i.e. R^2 excluded). Cohen, (1988) explains that based on the F^2 value, the effect size of the omitted construct for a particular endogenous construct can be determined such that 0.02, 0.15, and 0.35 represent small, medium, and large effects, respectively. That is, if an exogenous construct strongly contributes to explaining an endogenous construct, the difference between R^2 included and R^2 excluded will be high, leading to a high F^2 value. Therefore, the study shall use exploratory factor analysis for data analysis following the steps indicated above as noted by Hair et al. (2020).

For assessing the moderating effect of GS on the exogenous variable, the study created all product indicators of the interaction term, and then regressed each product indicator on all indicators of the exogenous construct and the moderator variable. Furthermore, to analyze the moderating effect of GS on the exogenous variables a simple slope analysis was plotted. Dawson, (2004) suggested that it is difficult to determine the size and precise nature of interaction effects solely by examining the coefficients, and this is especially true when one or more of the coefficients are positive, or when the standard deviations of X and Z are very different.

Figure 3. 1 *Path Analysis Model.*

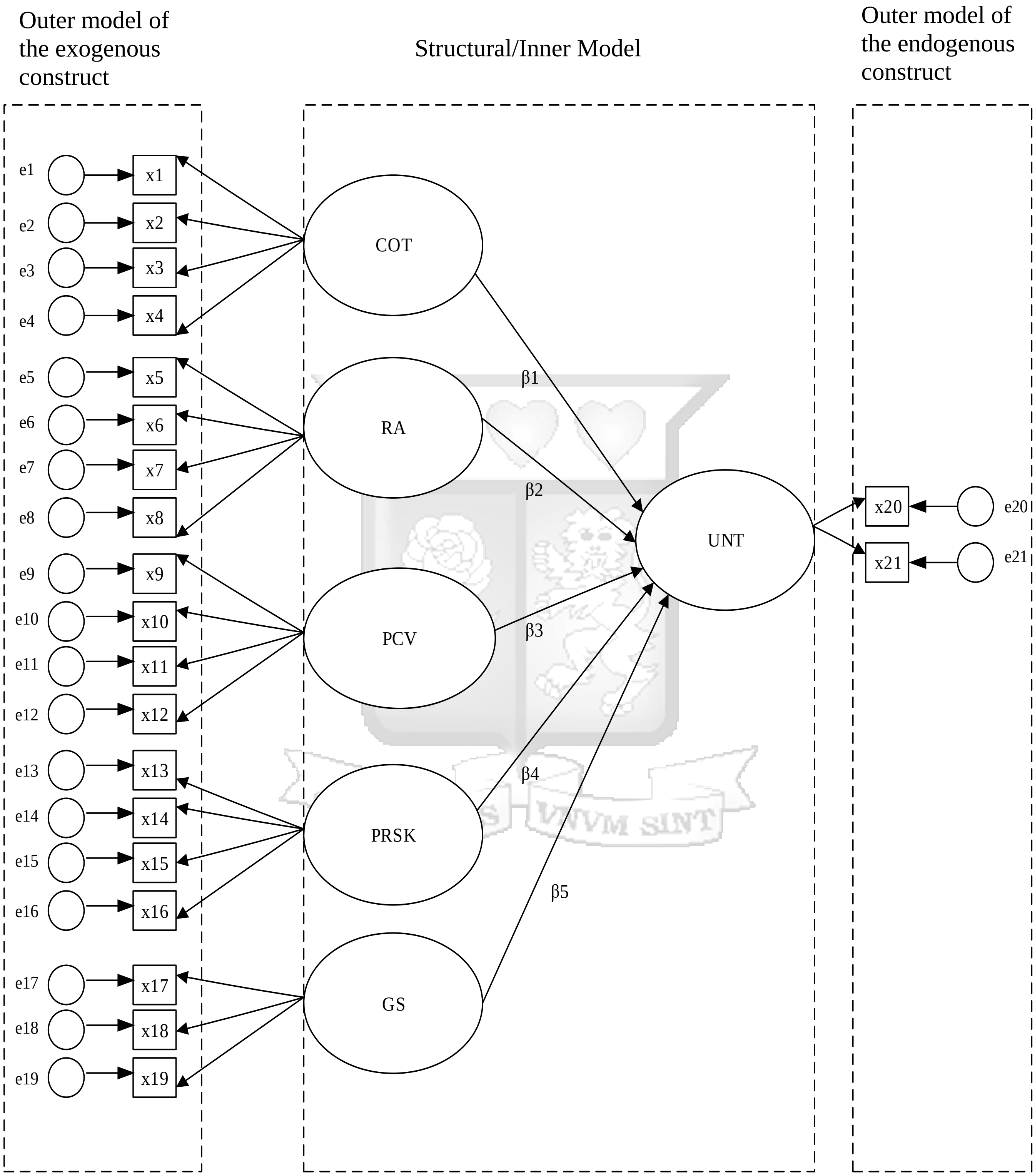


Table 3. 5 *Variable Representation*

Representation	**Meaning**
e1, e2, e3…….... e21	Error terms.
x1, x2, x3……...x21	Observable measured constructs.
β1, β2, β3, β4, β5	Path coefficients.
COT (Cost of Technology)	Exogenous variable (latent construct).
PRA (Perceived Relative Advantage)	Exogenous variable (latent construct).
PCV (Perceived Value)	Exogenous variable (latent construct).
PRSK (Perceived Risk)	Exogenous variable (latent construct).
GS (Government Support)	Moderating construct.
UNT (Intention to adopt Open Banking)	Endogenous variable (latent construct).

Source: Author (2022)

3.8 Ethical Considerations

The ethical expectations of research conduct which is; personal and professional behavior during a research activity, have recently increased especially with the high expectation of research accountability (Uhde & Held, 2006; Haggerty, 2004). Vanclay, Baines, and Taylor (2013) stressed that many institutions of higher learning require institutional ethical approval and provide ethical guidelines for students when collecting data for research.

Furthermore, numerous journals and publications conform to the Committee of Publishing Ethics (CoPE) guidelines that expect publishers to ensure research work is performed under the stipulated ethical guidelines (Committee of Publishing Ethics, 2018). In Kenya, research permits are mandated by the National Commission for Science Technology and Innovation (NACOSTI) whose primary function is to regulate and assure quality in the science, technology, and innovation sector by accrediting research institutes and approving scientific research in Kenya (Government of Kenya, 2013). Therefore, Once the proposed study was approved at the education institutional level via the Ethics Review Committee, the study proceeded to seek approval from NACOSTI. Secondly, the study upheld informed consent standards by guaranteeing participants were comprehensively aware of what they were asked, the information usage, and what would be the implications if any were present. The participants needed to present explicit and signed consent stating their willingness to partake in the research.

Thirdly the study ensured confidentiality, anonymity, and no risk of harm, it is essential that respondents remain anonymous and their data confidential. Furthermore, anonymity goes beyond securing names it also entails ensuring that there is no use of self-identifying statements and information. The study greatly considered the potential of harm to the participants, the researcher, the wider community, and the institution. Finally, the research ensured that prior relationships, conflicting interests, and previous activities by the researcher which could potentially impact the study were reported and stated within the ethics approval application for guidance. The ethical concerns of consent, risk of harm, confidentiality, anonymity, and conflict of interest will be taken into account, and the study and a plan submitted on the possible ways the study would seek to manage these ethical concerns.

CHAPTER FOUR

PRESENTATION OF RESEARCH FINDINGS

4.1 Introduction

The chapter presents the findings of the study on determinants of open banking among Kenyan commercial banks. The specific objectives included; finding out the influence of perceived value, perceived risks, cost of technology, and perceived relative advantage on the adoption intention of open banking and also determining the moderating effect of government support on the adoption intention of open banking among Kenyan commercial banks. The study had a sample size of 215 respondents to whom questionnaires were administered as indicated in Table 4.1

4.2 Response rate

A total of 215 questionnaires were administered to the sampled respondents, out of which approximately 157 questionnaires were properly filled and returned. This represented an overall successful response rate of 73 %. According, to Mugenda and Mugenda, (2003) a response rate of 50% or more is adequate. Babbie, (2020) also asserted that return rates of 50% are acceptable to analyze and publish, 60% is good and 70% is very good.

Table 4. 1 *Response Rate*

Gender	Frequency	Percent
Returned	157	73
Unreturned	58	27
Total	**215**	**100**

Source: Author computation (2022)

4.3 Demographic Characteristics

This section consists of information that describes basic respondent characteristics. They include gender, age educational level, department, and working experience.

4.3.1 Age of the respondents

The respondents were asked to indicate their age bracket. The results are shown in Table 4.2. The results indicated that the majority of the respondents that is 43% were below 30years, followed by 36% between ages 31-40 years, 13 % were between 41-50 years and finally, 7% were over 50 years of age.

Table 4. 2 *Age of respondents*

Age Bracket	Frequency	Percent
30 years and below	69	44
31-40 years	56	36
41-50 years	21	13
Over 50 years	11	7
Total	**157**	**100**

Source: Author computation (2022)

4.3.2 Gender of the respondents

The respondents were asked to indicate their gender bracket. The results are shown in Table 4.3. According to the analysis of the findings, it emerged that a majority of the respondents were male accounting for 52.22% while the female counterparts were 47.77%.

Table 4. 3 *Gender of Respondents*

Gender	Frequency	Percent
Male	82	52.22
Female	75	47.77
Total	**157**	**100**

Source: Author computation (2022)

4.3.3 Education level of the respondents

The respondents were asked to indicate their highest level of education. The results are shown in Table 4.4. Results indicate that majority of the respondents 53% had attained a university level of education (Bachelor’s Degree), 20% had Tertiary College (Diploma) education level. On the other hand, 22% had gone up to Post Graduate Degree (Master’s Degree) level, with only 5% of the respondents attaining Post Graduate Degree (Ph.D.).

Table 4. 4 *Education Background*

Education Background	Frequency	Percent
Tertiary College (Diploma)	31	20
University (Bachelor's Degree)	83	53
Post Graduate Degree (Master's Degree)	35	22
Post Graduate Degree (PhD)	8	5
Total	**157**	**100**

Source: Author computation (2022)

4.3.2 Departments of the respondents

Concerning the roles of the study participants in their respective commercial banks, the study established the distribution of the respondents (as presented in Table 4.5) Information technology/innovations department (22%), operations department (21%), Audit department (20%), the Finance department (20%) and Legal department (17%). Therefore, the study benefited from good quality data based on the broad range of expertise in the banking sector.

Table 4. 5 *Participants Departments*

Department	Frequency	Percent
ICT	35	22
Operations	33	21
Audit	31	20
Finance	31	20
Legal	27	17
Total	**157**	**100**

Source: Author computation (2022)

4.3.2 Work experience of the respondents

The study established that 45% of the respondents had worked in the banking sector between 0-5 years, 32% for 6-10 years, and 15% for 11-15 years while 8% had worked for over 16 years. From the findings, it was deduced that the majority of the respondents had extensive work experience and therefore had a substantial understanding of banking technologies such as open banking and could therefore provide high-quality data on the study subject (see Table 4.6).

Table 4. 6 *Work experience*

Work experience	Frequency	Percent
0 -5 years	71	45
6 – 10 years	50	32
11 – 15 years	24	15
16 years and above	12	8
Total	**157**	**100**

Source: Author computation (2022)

4.4 Descriptive Statistics

This section presents the descriptive results of the factors that influence the adoption intention of open banking among Kenyan commercial banks through the measurement of predetermined variables i.e. (perceived ease of use, perceived relative advantage, cost of technology, and perceived risks) while determining the moderating effect of government support on these exogenous latent constructs.

4.4.1 Adoption of Open Banking

The study sought to establish commercial banks' intention to adopt open banking by analyzing the cost of technology, perceived value, perceived relative advantage, perceived risks, and the moderating effect of government regulation. The responses were rated on a Likert scale and the results are presented in Table 4.7. The findings indicated that the majority of the respondents, 24%, strongly agreed, 34% just agreed, 18% were neutral while 24% disagreed that their organization will intend to adopt/implement open banking solutions. The mean was 3.5 with a standard deviation of 1.24 indicating that the respondents agreed with that statement and that the responses were not highly varied.

Approximately 58% agreed, 16% were neutral while 26% percent disagreed that their bank would be willing to partner with interested third parties and fintech firms to adopt open banking solutions. The statement had a mean of 3.48 while the standard deviation was 1.30 indicating that the responses were varied. The overall mean response of 3.49 implied that respondents agreed with the statements regarding willingness to adopt open banking among Kenyan commercial banks while a standard deviation of 1.17 denoted that there was some variation in the responses on the same statements.

Table 4. 7 *Intention to adopt open banking questionnaire results*

Item	Percentage						
	SD	D	N	A	SA	Mean	STD
Our organization will intend to adopt/implement open banking solutions (UNT_1)	8	16	18	34	24	3.50	1.24
Our bank will be willing to partner with interested third parties and fintech firms to adopt open banking solutions (UNT_2)	10	16	16	32	26	3.47	1.17

Source: Author computation (2022)

4.4.2 The influence of perceived value on the adoption of open banking among Kenyan commercial banks

The study sought to determine the influence of perceived value on the adoption of open banking among Kenyan commercial banks. The responses were rated on a Likert scale and the results are presented in Table 4.8.

Table 4. 8 *Perceived Value Questionnaire Results*

Item	Percentage						
	SD	D	N	A	SA	Mean	STD
The use of open banking solutions will improve our bank's performance. (PCV_1)	10	18	20	28	24	3.40	1.31
Open banking solutions will reduce transaction costs. (PCV_2)	12	14	18	30	26	3.44	1.33
Open banking will offer a wide range of solutions to solve our customers' financial problems. (PCV_3)	10	12	16	32	30	3.60	1.30
Considering the cost, risk, and benefits, I think open banking services would be valuable. (PCV_4)	8	14	22	30	26	3.52	1.24
There are greater benefits than drawbacks of open banking (PCV_5).	10	14	22	28	26	3.46	1.28

Source: Author computation (2022)

The study results indicated that the majority, 52%, of the respondents agreed with 28% disagreeing with the idea that the use of open banking solutions will improve their bank's performance. The mean for the statement was 3.40 while the standard deviation was 1.31. Furthermore, the majority of the respondents, 56%, agreed that open banking solutions will reduce their transactional costs. The mean and the standard deviation for this statement were 3.44, while the standard deviation was 1. 33. Additionally, the study also established that the majority, 52% of the respondents agreed that they think open banking services would be valuable. to the organization having considered the cost, risk, and benefits Their mean was

3.60 while the standard deviation was 1.30. Moreover, 55% of the respondents agreed that; considering the cost, risk, and benefits, I think open banking services would be valuable. The mean of the statement was 3.52 and the standard deviation was 1.24. Lastly, the majority of the respondents, 54%, agreed with the statement that there are greater benefits than drawbacks of open banking. The mean for this statement was 3.46 while the standard deviation was 1.28 implying low variation in responses. The average mean for the constructs was 3.48, indicating that the majority of the respondents just agreed that open banking offers a high perceived value. The standard deviation was 1.16, indicating that there was some variation in responses.

4.4.3 The influence of perceived risks on the adoption of open banking among Kenyan commercial banks.

The study sought to find out the influence of perceived risks on the adoption intention of open banking among Kenyan commercial banks.

Table 4. 9 *Perceived Risks Questionnaire Results*

	Percentage						
Item	SD	D	N	A	SA	Mean	STD
Initially, open banking solutions will perform as well as expected (PRSK_1)	24	28	22	14	12	2.62	1.31
There is minimal risk of fraud while using open banking solutions. (PRSK_2	28	28	20	16	8	2.48	1.27
Privacy information will not be misused, inappropriately shared, or sold. (PRSK_3)	24	30	22	14	10	2.54	1.28
There will be minimal technology failure to deliver its anticipated outcome a its consequent loss is also negligible (PRSK_4)	26	36	12	20	6	2.46	1.27
Currently, Open banking would safeguard our bank from overall risk. (PRSK	26	28	16	20	10	2.60	1.34

Source: Author computation (2022)

The responses were rated on a Likert scale and the results are presented in Table 4.9. Following the findings, the majority of the respondents, 52% disagreed with the statement that initially open banking solutions will perform as well as expected whereas 22% were neutral and 26% agreed with that statement. The mean response for this statement was 2.62 indicating that the majority of the respondents just disagreed with the statement. However, there was some variation in responses to this statement given the standard deviation of 1.31. The study also found out that a majority of the respondents 56% disagreed with the statement that there is minimal risk of fraud while using open banking solutions, indicating a risk perceived. 20% of the respondents were neutral on that statement. The mean response was 2.48, indicating that the majority of the respondents did not agree with the statement, while the standard deviation of 1.27 indicated variances in responses.

It was further established that approximately 54% of the respondents disagreed with the statement that private information will not be misused, inappropriately shared, or sold indicating a risk perceived in open banking. The mean response to the statement was 1.27, showing that the majority of the respondents disagreed with that particular statement. The standard deviation was 1.28 indicating that there was a variation of responses despite the majority disagreeing. On the other hand, about 62% of the respondents disagreed with the statement that there is minimal technology failure to deliver its anticipated outcome and its consequent loss is also negligible indicating a risk perceived in open banking. The mean response for the statement was 2.54 showing that the majority of the respondents disagreed with the information. The standard deviation was 1.27 showing variation in responses. Furthermore, 52% of the respondents disagreed with the statement that, currently, open banking would safeguard their bank from overall risk. The mean response to the statement was 2.46, showing that the majority of the respondents disagreed with that particular statement. The standard deviation was 1.27 indicating that there was a variation of responses despite the majority disagreeing. Lastly, 54% disagreed that open banking would safeguard their bank from overall risk. Indicating a risk perceived in open banking. The mean for the statement was 2.6, indicating that the majority of the respondents disagreed with the statement, while the standard deviation was 1.34 implying variation in responses. The overall mean for all the variable constructs was 2.54, indicating that most of the respondents perceived open banking as being risky. However, the responses were somewhat highly varied, as shown by an overall standard deviation of 1.29.

4.4.4 The influence of the cost of infrastructure on the adoption of open banking among Kenyan commercial banks.

The study sought to determine the influence of the cost of infrastructure on the adoption of open banking among Kenyan commercial banks. The responses were rated on a Likert scale and the results are presented in Table 4.10.

Table 4. 10 *Cost of Infrastructure Questionnaire Results*

Item	Percentage						
	SD	D	N	A	SA	Mean	STD
The initial cost of implementing open banking services will be affordable. (COT_1)	10	18	14	34	24	3.46	1.27
Open banking solutions will reduce operational constraints on our banks operations and propel technological growth.(COT_2)	10	14	20	30	26	3.48	1.28
Open banking services will significantly decrease the cost of producing new product offerings. (COT_3)	8	22	20	36	14	3.24	1.21
The maintenance cost for open banking services will be manageable and sustainable (COT_4)	12	14	18	30	26	3.50	1.28

Source: Author computation (2022)

The responses were rated on a Likert scale and the results presented in Table 4.8 show that a majority, 58% of the respondents were in agreement with the opinion that the initial cost of implementing open banking services would be affordable. The mean for this statement was 3.46 while the standard deviation was 1.27. Similarly, the results indicated that the majority that is 56% of the respondents agreed that ideally, open banking solutions would reduce operational constraints within their organization. The mean for the construct was 3.48 while the standard deviation was 1.28. A majority of the respondents, 60%, also agreed with the statement that open banking services would significantly decrease the cost of producing new product offerings. The mean for this statement was 3.24 while the standard deviation was 1.21.

Moreover, the majority of the respondents 56% agreed with the statement that maintenance costs for open banking would be manageable and sustainable. The mean for the statement was 3.50, while the standard deviation was 1.28, implying that most respondents agreed with some variation. Considering the overall mean responses, 3.45, it could be deduced that the majority of the respondents agreed that the cost of infrastructure is a significant factor that would influence open banking adoption among Kenyan commercial banks. However, the responses had some variation, hence a standard deviation of 1.26.

4.4.5 The influence of perceived relative advantage on the adoption of open banking among Kenyan commercial banks.

The study sought to determine the influence of perceived relative advantage on the adoption of open banking among Kenyan commercial banks. The responses were rated on a Likert scale and the results are presented in Table 4.11.

Table 4. 11 *Perceived Relative Advantage Questionnaire Results*

	Percentage						
Item	SD	D	N	A	SA	Mean	STD
Through open banking services, our bank will have a competitive the advantage over our competitors who do not adopt open banking due to increased productivity. (PRA_1)	10	18	20	28	24	3.40	1.31
Open banking solutions would give us an advantage through new value proposition streams such as data sharing agreements with Fintechs and Other non-financial institutions. (PRA_2)	12	14	18	30	26	3.44	1.33
Open banking will offer a wide range of solutions to solve our customers' financial problems. (PRA_3)	10	12	16	32	30	3.60	1.30
Open banking services will offer consumers more personalized and suitable product offerings than traditional financial services. (PRA_4)	8	14	22	30	26	3.52	1.24

Source: Author computation (2022)

As indicated, the majority of the respondents, 52%, agreed with the statement that through open banking services their banks would have a competitive advantage over competitors who do not adopt open banking due to increased productivity. 20% were neutral while 28% disagreed with this statement. The mean for this item was 3.40 while the standard deviation of 1.31 which meant there was variation in responses. The results further indicated that the majority of the respondents, 56%, agreed with the statement that Open banking solutions would give them an advantage through new value proposition streams such as data sharing agreements with Fintechs and other non-financial institutions. The findings also indicated that 18% of the respondents were neutral on this statement and 28% disagreed with the statement. The mean was 3.44 while the standard deviation was 1.33 showing some variation. On the other hand, most of the respondents, 52% of the respondents were in agreement with the statement that open banking will offer a wide range of solutions to solve their customers' financial problems. The mean for this statement was 3.60 while the standard deviation was 1.30. Approximately 56% of the respondents agreed with the statement that open banking services will offer consumers more personalized and suitable product offerings than traditional financial services. The mean was 3.52 while the standard deviation was 1.24. The overall mean for all the items regarding the effect on the customer's social influence was 3.49, indicating that the majority of the respondents agreed with this statement. However, the responses had some variations yielding an overall standard deviation of 1.29.

4.4.6 The moderating effect (interaction effect) of government support on the adoption of open banking among Kenyan commercial banks.

Since the study sought to determine the moderating effect of government support on the adoption of open banking among Kenyan commercial banks latent variables of this moderator variable were measured and the responses were rated on a Likert scale the results are presented in Table 4.12.

Table 4. 12 *Government Support Questionnaire Results*

	Percentage						
Item	SD	D	N	A	SA	Mean	STD
Guiding policies and regulations generally affect the adoption of new Fintech technologies such as open banking.	14	18	16	34	28	3.34	1.41
The government encourages and promotes new financial technologies such as open banking.	14	20	16	30	20	3.22	1.35
The government has provided a conducive environment for financial technology innovations such as open banking	16	14	18	30	22	3.28	1.37

Source: Author computation (2022)

As indicated, the majority of the respondents, 52%, agreed with the statement guiding policies and regulations generally affect the adoption of new Fintech technologies such as open banking.16% were neutral while 32% disagreed with this statement. The mean for this item was 3.34 while the standard deviation of 1.41 which meant there was variation in responses. The results further indicated that the majority of the respondents, 50%, agreed with the statement the government encourages and promotes new financial technologies such as open banking. The findings also indicated that 16% of the respondents were neutral on this statement and 34% disagreed with the statement. The mean was 3.22 while the standard deviation was 1.35 showing some variation. On the other hand, most of the respondents, 52% of the respondents were in agreement with the statement that open banking will offer a wide range of solutions to solve their customers' financial problems. The mean for this statement was 3.60 while the standard deviation was 1.30. Approximately 56% of the respondents agreed with the statement that the government has provided a conducive environment for financial technology innovations such as open banking. The mean was 3.28 while the standard deviation was 1.37. The overall mean for all the items regarding government support was 3.28, indicating that the majority of the respondents agreed with this statement. However, the responses had some variations yielding an overall standard deviation of 1.38.

4.5 Measurement Model Assessment

The research model was assessed using a two-step process: one was the assessment of the measurement model; and, two the assessment of the structural model. The main aim of model validation was to determine whether both the measurement and the structural model meet the quality criteria for empirical research. The following subsections discuss the guidelines used in this dissertation to assess both measurement and the structural model additionally the dissertation also assesses the moderation/interaction relationship proposed in the research model.

4.5.1 Assessment of the measurement model

Firstly, the outer loading for all the items was higher than the minimum threshold value of 0.5. The AVE values are more than the minimum threshold value of 0.5 so the convergent validity for all the constructs is verified as shown in Table 4.13.

Table 4. 13 *Outer loading statistics*

Item	Outer Loadings
COT	0.8540
GS	0.8070
PCV	0.7923
PRSK	0.7840
PRA	0.8930
UNT	0.8256

Source: Author computation (2022)

4.5.2 Multicollinierity Test

Table 4.14 presents the VIF values for each of the indicators. It is noted that the VIF values are below the recommended threshold, therefore indicating that measurement variables were free from collinearity or common method bias.

Table 4. 14 *VIF statistics*

Construct	VIF
COT	2.578
PCV	2.643
PRSK	1.786
PRA	1.698
UNT	1.956

Source: Author computation (2022)

4.5.3 Reliability Analysis

The results for Cronbach Alpha are presented in Table 4.15. The Cronbach alpha ranged from 0.908 to 0.789. The indicator of reliability has reliability statistics over the required threshold of 0.70. Therefore, construct reliability was established. Additionally, by using PLS-SEM, construct validity is established when there is convergent validity and discriminant validity.

Table 4. 15 *Construct Reliability Statistics*

	Cronbach's Alpha	Average Variance Extracted (AVE)
COT	0.900	0.769
PCV	0.908	0.731
PRSK	0.789	0.553
PRA	0.796	0.620
UNT	0.830	0.767

Source: Author computation (2022)

Convergent validity results based on the AVE statistics show that all the constructs except PRSK and PRA have slightly lower AVE. However, the Cronbach alpha values for all the constructs were greater than 0.70. Hence convergent validity is not an issue. Table 4.15 shows the AVE value for each of the constructs. Discriminant validity was assessed by the Fornell-Larcker criterion, Table 4.16 shows that the square root of AVE for the construct was greater than the inter-construct correlation. Discriminant validity was also assessed by the Heterotrait-Monotrait ratio of correlations which presented values below the threshold of 0.90 (see Table 4.17). Hence, discriminant validity was established.

Table 4. 16 *Fornell-Larcker Criterion*

Construct	COT	PCV	PRSK	PRA	UNT
COT	*0.877*				
PCV	0.827	*0.855*			
PRSK	-0.811	-0.751	*0.743*		
PRA	0.859	0.829	-0.742	*0.787*	
UNT	0.723	0.680	-0.717	0.6220	0.8759

Note: Values in Italic represent Square-root of AVE

Source: Author computation (2022)

Table 4. 17 *HTMT Ratio*

Construct	COT	PCV	PRSK	PRA	UNT
COT					
PCV	0.6678				
PRSK	0.8398	0.8198			
PRA	0.7659	0.8874	0.7245		
UNT	0.7891	0.8493	0.8267	0.8003	

Source: Author computation (2022)

4.5.4 Structural Model Analysis

Based on PLS-SEM, the study used the following criteria to assess the hypothesis model. To ascertain the goodness of fit /model's predictive capabilities, the coefficient of determination (R^2), effect sizes (F^2), and the predictive relevance measure (Q^2) were assessed. Path coefficients (β) were interpreted as standardized beta coefficients and were calculated in ordinary least squares regression. Bootstrapping technique was used to determine the significance of the path coefficients, along with their T-statistics. Table 4.18 presents the path coefficients, T-statistics, and significance level for all construct relationships.

Table 4. 18 *Path coefficient analysis*

Construct	Std.Beta (β)	Std.Error	Standard Deviation (STDEV)	T-Statistic (O|STDEV)	P-Values
COT->UNT	0.321	0.308	0.096	3.320	0.001
PCV->UNT	0.332	0.336	0.073	4.543	0.000
PRSK->UNT	-0.118	-0.299	0.081	3.163	0.022
PRA->UNT	0.274	0.273	0.077	3.536	0.007

Note: **$p < 0.05$

Source: Author computation (2022)

As shown in Table 4.18, the cost of technology (COT) significantly contributes to the intention to adopt open banking technology ($\beta = 0.305$, $p < 0.05$). This implies that respondents possess optimism towards the cost of technology for open banking technology, so it positively influences intention to adopt open banking, hence indicating that the cost of infrastructure will affect the adoption intention of open banking among Kenyan commercial banks. Equally, perceived value (PCV) is seen to be a significant predictor of intention to adopt open banking technology ($\beta = 0.332$, $p < 0.05$). Since the study established that a unit increase in the perceived value of open banking led to a significant (5% level) increase will lead to the adoption of open banking by 0.332 units holding other factors constant therefore explaining that perceived value would affect the adoption of open banking among Kenyan commercial banks.

Additionally, it is found that perceived risk (PRSK) negatively contributes to the intention adoption of open banking technology ($\beta = -0.318$, $p < 0.05$). The effect was found to be statistically significant at all levels thereby affirming that perceived risks would affect the adoption of open banking among Kenyan commercial banks. It was also noted that perceived relative advantage (PRA) is a significant predictor of intention to adopt open banking technology ($\beta = 0.274$, $p < 0.05$) and therefore significantly affects UNT. This confirmed that perceived relative advantage affects the adoption of open banking among Kenyan commercial banks.

Further, to confirm that the exogenous variables have an impact on the intention to adopt open banking, the effect sizes of the constructs toward intention to adopt open banking (UNT) were calculated and presented in Table 4.19. According to the results, COT (F^2=0.318), PRSK (F^2=0.084), PRA (F^2=0.278), and PCV (F^2=0.421) predict significantly that commercial banks intend to adopt open banking. In particular, PCV showed to be the best predictor, followed by the COT. Accordingly, f^2 values of 0.02, 0.15, and 0.35 represent small, medium, and large effect sizes, respectively. The f^2 effect size on UNT was medium to large for most variables, while PRSK had a small to medium effect size. Generally, the results imply a significant contribution of the variables whose hypotheses were confirmed.

Table 4. 19 *Construct effect sizes*

Construct	f^2
COT	0.318
PCV	0.421
PRSK	0.084
PRA	0.278

Source: Author computation (2022)

Furthermore, to confirm that all the model's constructs have a significant effect on the intention to adopt open banking. Cross-validated redundancy **(**Q^2**)** was used to determine the predictive relevance of the constructs while the coefficient of determination (R^2) was determined to determine the predictive accuracy of the model. Results of the structural model (presented in Table 4.20) show that COT, PRA, PRSK, and PCV explain 75.1 % of the variance in intention to adopt open banking (R^2 = 0.751). As seen in Table 4.20, the R^2 criterion is met and the structural model is considered to have adequate predictive ability.

Table 4. 20 *Predictive analysis results*

Construct	R^2	R^2 Adjusted	*1-SSE/SSO* (Q^2)
UNT	0.751	0.723	0.62

Source: Author computation (2022)

Extant research states that Q^2 values with higher than 0 values suggest that the construct has predictive relevance and values less than 0 suggest that the construct lacks predictive value. As seen in Table 4.20 the model has a Q^2 value equal to 0.62 indicating predictive relevance. The model's goodness of fit indicates that there is a significant overall influence of PRSK, PRA, COT, and PCV on the dependent variable UNT.

4.5.5 Moderation Analysis

Moderation analysis was done to assess the moderating effect of government support on cost of technology, perceived relative advantage, perceived risk and perceived value towards intention to adopt open banking. The results (see Table 4.21) give a standardized beta of 0.381 from cost of technology to intention, 0.307 from PRSK to intention -0.109, from PCV to intention, and finally 0.314 from PRA to intention with a total R^2 of 0.83. Further, Table 4.21 presents interaction effects of GS*COT (β = -0.134, $p < 0.05$), GS*PCV (β = -0.121, $p < 0.05$), GS* PRSK (β = 0.166, $p < 0.05$) and GS*PRA (β = -0.118, $p < 0.05$) towards UNT.

Table 4. 21 *Results of the Moderation analysis*

Construct	**Std.Beta (β)**	**Std.Error**	**Standard Deviation (STDEV)**	**T-Statistic (O|STDEV)**	**P-Values**
COT->UNT	0.381	0.313	0.141	2.707	0.006
PCV->UNT	0.327	0.341	0.095	3.219	0.000
PRSK->UNT	-0.109	-0.135	0.112	2.167	0.036
PRA->UNT	0.314	0.248	0.097	3.102	0.001
GS->UNT	0.243	0.259	0.086	3.241	0.000
GS*COT->UNT	-0.121	-0.128	0.057	2.154	0.020
GS*PCV->UNT	-0.101	-0.105	0.054	2.329	0.017
GS*PRSK->UNT	0.166	0.179	0.064	2.594	0.007
GS*PRA->UNT	-0.118	-0.124	0.045	2.715	0.005

Note: **p< 0.05

Source: Author computation (2022)

Thus, these results imply that one standard deviation increase in government support will not only impact intention by 0.243, but it would also decrease the impact of the cost of technology on the intention from 0.381 to 0.26. Therefore, this confirmed that government support has a significant moderating effect on the cost of technology. Likewise, it was deduced that one standard deviation increase in government support on perceived relative advantage would not only affect adoption intention by 0.243 but influence the impact of perceived relative advantage to UNT from 0.314 to 0.196. With regards to perceived risks, we can see that the interaction between PRSK and GS is positive at 0.166. Thus we can say that the negative relationship between perceived risk and intention to adopt open banking would be stronger when government support is lower and vice versa. Finally, we can infer that one standard deviation increase in government support would decrease the impact of perceived value on the intention from 0.327 to 0.226. Based on the moderation analysis, it was established that government support had a significant moderating effect on COT, PCV, PRSK, and PRA. However, it's noted that despite lower standardized beta values than the main effects model (see Table 4.18), the moderation model had a higher R^2 value of 0.83 and Q^2 of 0.71 respectively as presented in Table 4.22. The R^2 change of 0.08 indicates that with the addition of one interaction term, the R^2 has changed about 0.8% (additional variance). This demonstrated that with GS as a moderating variable on PRSK, COT, PRA, and PCV the model has a higher predictive ability thereby indicating that GS has a significant moderating effect on the exogenous variable.

Table 4. 22 *Predictive analysis results*

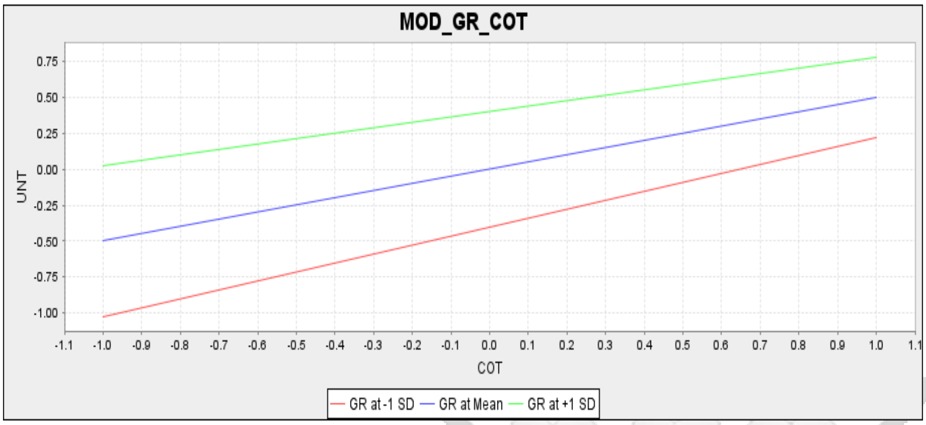
Construct	**R^2**	**R^2 Adjusted**	***1-SSE/SSO* (Q^2)**
UNT	0.831	0.827	0.71

Source: Author computation (2022)

Simple slope analysis was plotted to further analyze the moderating effects of GS on the endogenous variables. The three lines shown in the simple slope analysis represent the relationship between COT, PRSK, PCV, PRA (x-axis), and UNT (y-axis). The middle line represents the relationship for an average level of the moderator variable GS. The other two lines represent the relationship between COT, PRSK, PRA, and PCV for higher (i.e., mean value of UNT plus one standard deviation unit) and lower (i.e., mean value of UNT minus one standard deviation unit) levels of the moderator variable GS.

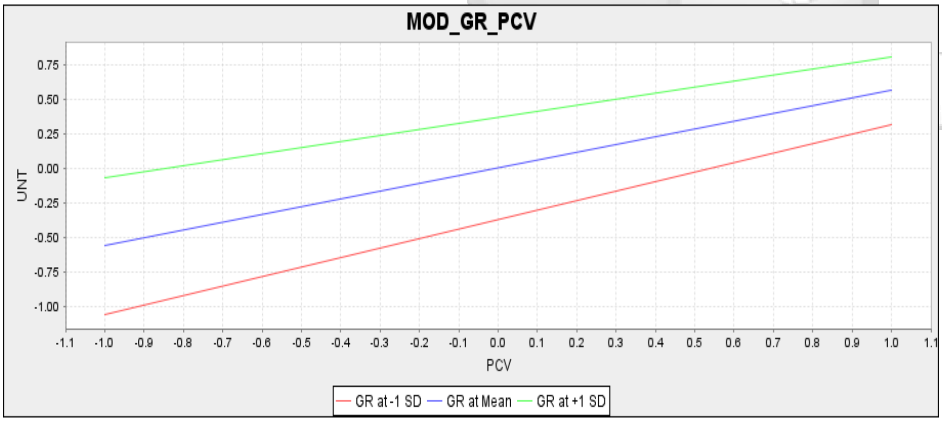
As can be seen in Figure 4.1, GS moderates the relationship between COT and UNT such that a higher level of GS would strengthen the positive relationship between COT and UNT. Consequently, at lower levels of GS, COT was found to have a higher negative impact on intention to adopt open banking.

Figure 4. 1 *Interaction effect of GS and COT toward UNT*



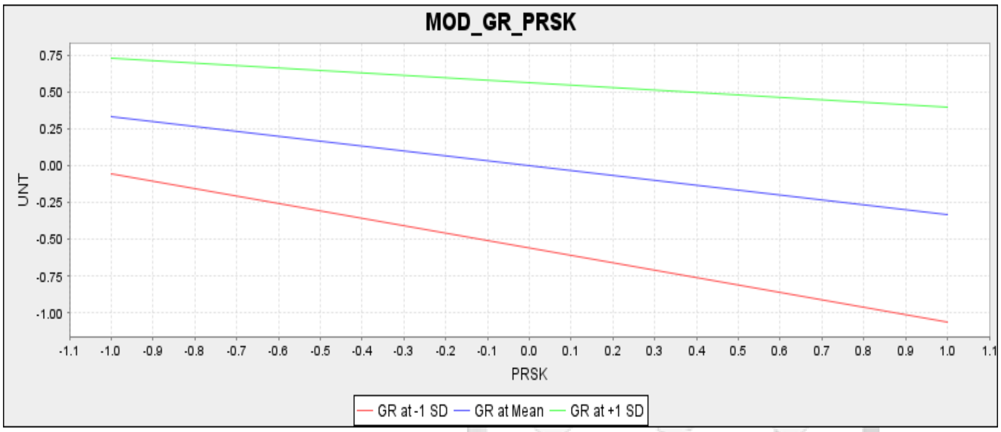
Moreover, Figure 4.2 reveals that a higher level of GS would strengthen the positive relationship between PCV and UNT. Consequently, at lower levels of GS, COT was found to have a higher negative impact on intention to adopt open banking.

Figure 4. 2 *Interaction effect of GS and PCV toward UNT*



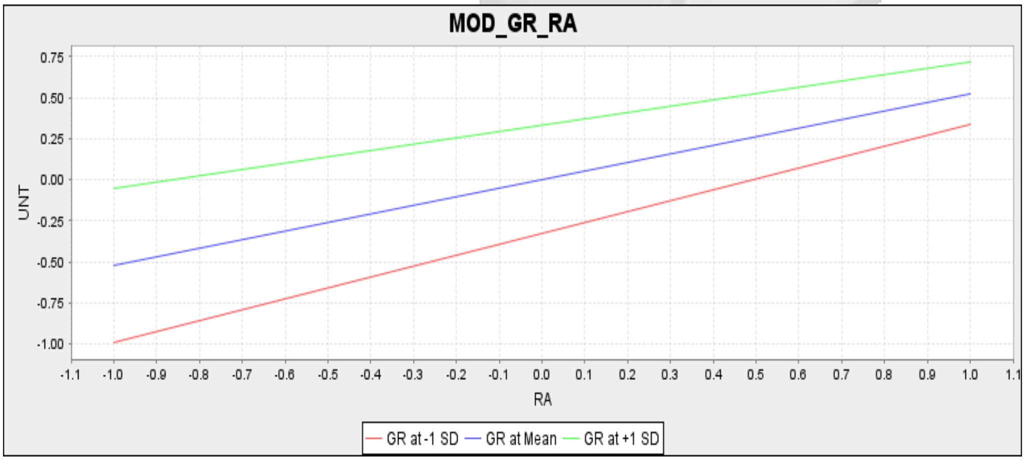
Similarly, Figure 4.3 shows that GS moderates the relationship between PRSK and UNT such that a higher level of GS would weaken the negative relationship between PRSK and UNT. Consequently, the results revealed that at lower GS, PRSK was found to have a stronger negative impact on UNT.

Figure 4. 3 *Interaction effect of GS and PRSK toward UNT*



Further, Figure 4.4 shows that GS moderates the relationship between PRA and UNT such that a higher level of GS would strengthen the positive relationship between PRA and UNT. Consequently, the results revealed that at lower GS, PRA was found to have a weaker positive effect on UNT.

Figure 4. 4 *Interaction effect of GS and PRA toward UNT*



In summary, it's established that government support significantly moderates the relationship between the cost of technology, perceived value, perceived relative advantage, and perceived risk on intention to adopt open banking.

CHAPTER FIVE

DISCUSSIONS, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

The chapter presents a discussion of the findings obtained in the previous chapter. The findings related to modeling are discussed. It further blends the findings into the reviewed literature.

5.2 Discussion

The study was carried out with the main objective of establishing factors that influence the adoption of open banking among Kenyan commercial banks. The following discussion results are based on the direction and significance of the aforementioned factors that will influence open banking adoption intention i.e. Cost of Technology, Perceived Risk, Perceived Value, and Perceived Relative Advantage, and how government support would moderate intention to adopt open banking. From the findings, most of the respondents agreed with most of the statements regarding the adoption of open banking in Kenya by commercial banks, giving an overall mean response of 3.48 with some variation in the responses

5.2.1 Perceived Value of Open Banking

The consumer's overall assessment of the utility of a product is based on perceptions of what is received and what is given (Zeithaml, 1998). Considering the overall mean responses of 3.48 concerning the perceived value of open banking, it could be deduced that the majority of the respondents agreed that there is perceived value. On correlation, it was found that adoption intention of open banking was positively correlated (0.332) with perceived value at 5% levels. Moreover, the study established that perceived value lead had a significant influence (f^2=0.318), on the adoption intention of open banking. The effect was found to be statistically significant at all levels, with a 5% level of significance.

According to Kim et al, (2007) higher perceived value indicates greater willingness to adopt new technologies such as mobile internet banking. Findings obtained by this study corroborated this fact since perceived value demonstrated a positive effect on the adoption of open banking. Moreover, when the open banking technology is easy to use, and the customers perceive that it is useful, then surely consumers have a positive perceived value for the open banking technology (Lee & Allaway, 2002).

5.2.2 Perceived Risk of Open Banking

As demonstrated earlier, the intention to adopt open banking can be influenced by perceived risk which involves security and privacy that the technology affords to commercial banks. On perceived risk, the overall mean for all the variables was 2.54, indicating that most of the respondents perceived open banking as being risky. The responses were varied, as shown by an overall standard deviation of 1.29. The correlation coefficient of the relationship between adoption of open banking and perceived risk of open banking was found to be negative (-0.118). The relationship was however significant given a p-value of 0.003. Similarly, estimation established that the perceived risk of open banking would lead to a decline in adoption intention. The effect was also found to be statistically significant at all levels. The degree of risk associated with a given behaviour is generally considered to represent the likelihood and consequences of harmful effects that result from that behaviour Kesharwani and Bisht, (2011). The study assessed the following items; whether open banking will be a safe place to transmit sensitive financial information, if open banking will ensure secure means through which financial data will be shared, whether the bank's financial privacy information will be misused, inappropriately used or sold, whether open banking will have a risk of fraud as well as whether open banking will safeguard banks from overall financial risk. The empirical evidence is in line with the findings obtained by Coursaris et al. (2003) who found the perceived risk was more likely to affect the new technology innovation adoption negatively. Likewise, the findings of this study were consistent with previous studies conducted by Yang et al. (2015) and Kesharwani and Bisht, (2011) that stated that higher levels of perceived risk imply lower levels of intention to use new financial technologies such as m-payment services and internet banking.

5.2.3 Cost of Infrastructure of Open Banking

The study's analysis it's indicated there was a significant relationship between the cost of infrastructure and the adoption intention of open banking. The relationship was positive and statistically significant at a 5% significance level (β=0.305, p-value=0.001). Theorizing that, for every unit increase in the cost of infrastructure, it's expected that open banking intention among commercial banks would increase by 0.0.305 holding other factors constant. COT was statistically significant at 5% level of significance (T value = 3.320, p-value=0.001 < 0.05). This shows that cost of infrastructure influences the adoption intention of open banking by commercial banks. Therefore, analysis from the research showed that there was a significant relationship between open banking adoption intention and the cost of infrastructure.

The findings of this study agree with Nyagar et al. 2017 who found that the perceived cost of technology has a significant influence on innovation adoption. As well, the findings of the study are almost consistent with Wanjiku et al. (2017) and Siegrist et al. (2005) who found that cost of technology has a significant influence on banks' intention to implement and adopt e-financing initiatives and it may affect the banks' perception towards e-banking systems.

5.2.4 Perceived Relative Advantage of Open Banking

As perceived relative advantage is defined as the technology that is perceived as aiding the better performance of tasks while offering cost benefits (cost can also be in the form of time) is expected to have a higher rate of adoption (Venkatesh et al., 2003). On the perceived relative advantage, the overall mean for all the variables was 3.49, indicating that most of the respondents perceived open banking to have a relative advantage over other forms of traditional banking. The responses were varied, as shown by an overall standard deviation of 1.29. The correlation coefficient of the relationship between adoption of open banking and perceived relative advantage of open banking was found to be positive (0.274). This indicated that for every unit increase in perceived relative advantage, intention to adopt open banking adoption among commercial banks is expected to increase by 0.274 holding other factors constant.

PRA was seen to be statistically significant at 5% level of significance (T value = 3.536, p-value = 0.001 < 0.05). The analysis of the research showed that the respondents agreed with the perceived relative advantage of influencing open banking adoption. The findings of this study are almost consistent with previous studies that had similar findings where the elements of PRA have a significant influence on the adoption of technology innovations in banking (Ravichandran et al., 2016). The study, however, differs from the findings that indicated that perceived relative advantage did not affect financial technology innovations (Joubert & Belle, 2013).

5.2.5 Moderating Effect of Government Support on Open Banking Adoption.

This study sought to determine the moderating effect of the relationship between government support and cost of infrastructure, perceived relative advantage, perceived risk, and perceived value on the adoption intention of open banking among Kenyan commercial banks. As stated by Chin et al. (2003), even a small interaction effect can be meaningful under extreme moderating conditions, if the resulting beta changes are meaningful, then it is important to take these conditions into account. Therefore, based on the partial least squares effects model, findings showed that in moderation, the cost of technology significantly influences the intention to adopt open banking. Likewise, it was inferred that government support would influence the impact of perceived relative advantage on adoption intention from 0.381 to 0.27. However, with regards to perceived risks, we can see that government support's moderation on perceived risk also significantly influences the adoption intention of open banking. Thus we can say that the negative relationship between perceived risk and intention to adopt open banking would be stronger when government support is lower. Finally, we can deduce that government support would affect the impact of perceived value on adoption intention from 0.327 to 0.226 and have an impact of 0.243 on UNT. It is noted that despite lower standardized beta values than the main effects model (see Table 4.18), the moderation model had a higher R^2 value of 0.83 and Q^2 of 0.71, which implied that the introduction of government support would impact other factors and resultantly lead to an increased adoption intention of open banking by commercial banks. Hence, this demonstrates that government support significantly affects the impact of perceived risk, cost of infrastructure, perceived relative advantage, and perceived value on the adoption intention of open banking.

The study contradicted Zailani et al. (2014) whose study found that organizational and governmental support has an insignificant relationship with the adoption of technology innovations, particularly green technology innovations. However, the findings of the study are comparable with Kousar et al. (2017) whose study established that government intervention significantly moderates complexity, relative advantages, tri-ability, and adoption of new technology.

5.3 Conclusions

This section reviewed the findings from the analysis of the structural constructs meant to establish the relationship existing between the explanatory variables (factors) and commercial banks' intention to adopt open banking and made some conclusions. Regarding the adoption of open banking in Kenya, the overall mean response meant that respondents agreed on most of the statements while a standard deviation denoted that there was some variation in the responses on the same statements. Secondly, the average mean for the constructs showed that the majority of the respondents also agreed that they would intend to adopt the open banking technology. However, the standard deviation obtained indicated that there was some variation in responses.

The study demonstrated that most of the respondents perceived open banking as being risky to the overall financial institutions' operations. The responses were not highly varied. Also, the overall mean for all the items regarding the influence of perceived consumer value stated that most of the respondents agreed that the value perception of open banking was a significant factor that would influence their organizations' intention to adopt open banking. Moreover, the overall mean for all the items regarding the effect of the cost of infrastructure, indicated that the majority of the respondents agreed on most items. As well, a conclusion is made that the perceived relative advantage by commercial banks significantly affects their adoption intention of open banking.

On the other hand, the study established that the majority of the respondents agreed that government support for innovations such as open banking significantly impacts the adoption intention of open banking. On the structural model, the study established that perceived relative advantage, cost of infrastructure, perceived consumer value and government support influence would have a positive and significant influence while perceived risk would have a significant negative effect on the adoption intention of open banking.

5.4 Recommendations

This section presents both practical implications as well as theoretical implications concerning the conclusions drawn from the relationship between the cost of infrastructure, perceived relative advantage, perceived risk, perceived consumer value, and government support toward the adoption of open banking by commercial banks. The study made the recommendation for the adoption of open banking in Kenya which should be explored by both government regulators and financial institutions, specifically commercial banks.

Based on the study findings, that higher perceived value indicates greater willingness to adopt new technologies, the study recommends that commercial banks should collaborate with fintech firms through partnerships to enable banks to scale up a wide variety of user efficient and cost-effective innovations through adoption of innovations such as open banking. Banks can leverage the wide range of offerings while increasing their potential to boost revenue streams and expand their market reach. Additionally, banks should invest in innovations such as open banking so that they can position themselves as gatekeepers for the most important asset in open banking which is data. They already possess an advantage over other sector players simply because through traditional forms of banking they currently act as data custodians for their consumers. Moreover, commercial banks should identify ways in which open banking can drive value not only for their consumers but also within their operations and identify what sort of return on investment they can expect not only in terms of revenue but also in terms of customer loyalty, referrals, and increased market share. Likewise, given the findings that perceived relative advantage has a significant influence on the adoption of technology innovations, it is suggested that government agencies and banks should increase awareness of the benefits of open banking technologies so that more commercial banks would be positively encouraged to accept such technologies.

Despite, recommendations to financial institutions, the findings suggest that government support significantly moderates the determinants of open banking towards adopt intention, therefore government regulators should ensure that there is a well-defined regulatory approach that is suitable to the specifics of open banking concerning the financial market. This is so due to the regulatory uncertainty of open banking, which significantly increases commercial banks' privacy and financial concerns as is also evident from the perceived risk construct. The current regulation deficiencies of privacy protection in open banking would make it difficult for commercial banks to seek redress in case of fraud, security breaches, and misuse of consumer data among other security concerns.

Further, the study established that perceived risk and cost of infrastructure would have a significant effect on adoption intention of open banking respectively, hence government should seriously consider policies that promote safe open banking practices and set up regulations that will encourage innovation through cost reduction initiatives such as subsidies on technological infrastructure, tax credits on technology firms, and government-funded fintech programs. In addition, based on the perceived value finding, government and regulators must provide knowledge and information about innovations such as open banking, and other various digital modes both to commercial banks and to their consumers to increase awareness and consequent uptake. This can be done through facilitating awareness talks, technology boot camps, technology workshops, and even the addition of financial technology subjects to school curriculums.

Also, the study helps policymakers and regulators to further identify gaps in the full implementation of already laid down policies such as the data protection act, 2019. Financial technology in Kenya may be considered one of the backbones of the financial sector, resultantly having a myriad of strict policies. The success rate of these policies can be further increased by adopting and implementing innovations such as open banking systems, especially in a country like Kenya where gradually technology is an integral part of the financial sector. It's without a doubt that there are certain challenges that digital financial services face some of them are related to the high risk that financial institutions face, cyber security concerns, and financial intermediation which incur the cost of adopting the new technology. Consequently, government regulators should work on the established model and identify the weak areas, so that new policies and initiatives can be made to promote the adoption of fintech innovations such as open banking that can spur the growth of the financial sector in the country. Hence, the policy implication could be that government support required for open banking will multiply the effect of financial inclusion within Kenya's financial sector.

5.5 Limitations of the Study

There exist many extant studies on different banking technologies such as mobile banking, internet banking; however, this is the first study on the intention to adopt open banking technology among Kenyan commercial banks which is new in the context of a developing country like Kenya This study has quite a few limitations. Firstly, this cross-sectional research is geographically limited to the context of a developing economy such as Kenya. Secondly, the study examines the intention to adopt rather than the actual adoption of open banking. Further studies can be conducted in the future on the 'actual adoption' of open banking in Kenya, once open banking technology is implemented. Moreover, the conceptual framework of this research may be extended by scholars to incorporate other constructs such as "stickiness" towards traditional banking operations, open banking service quality, consumer financial inclusion, and consumer financial literacy to investigate the performance of open banking and build a more robust model.

5.6 Areas of further study

This study concentrated on establishing factors that would influence the adoption of open banking among Kenyan commercial but was limited to commercial banks only. A similar study is required considering other financial institutions such as Savings and Credit Cooperatives (SACCOs) and Microfinance banks to give a clear and exact estimate of intention to adopt open banking by all financial institutions within Kenya. Additionally, factors in other relevant theories such as the Unified Theory of Acceptance and Usage of Technology (UTAUT) which are anchored on technology fit about innovation adoption could as well be employed in future studies to examine the adoption of open banking. Similarly, further studies may be carried out in the context of financial institutions' consumers' uptake rather than only focusing on commercial banks' intention to adopt open banking. Likewise, studies may also be conducted in other developing economies to ascertain the influence of demographic and socio-cultural variables on the intention to adopt open banking. Comparative studies to understand commercial banks' intention in the developed and emerging economies in the context of open banking may also be conducted to build valuable insights in the future.

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APPENDICES

APPENDIX I: LIST OF LICENSED COMMERCIAL BANKS IN KENYA

1. Absa Bank Limited
2. African Banking Corp. Ltd
3. Bank of Africa Kenya Ltd
4. Bank of India
5. Bank of Baroda (K) Ltd
6. Stanbic Bank Ltd
7. Chase Bank (K) Ltd (In Receivership)
8. Citibank N.A.
9. Consolidated Bank of Kenya Ltd
10. Co-operative Bank of Kenya Ltd
11. Credit Bank Ltd
12. Development Bank (K) Ltd
13. Diamond Trust Bank (K) Ltd
14. Dubai Bank Ltd (In Receivership)
15. Dubai Islamic Bank (Kenya) Ltd
16. Ecobank Limited
17. Spire Bank
18. Equity Bank Ltd
19. Family Bank Ltd
20. Guaranty Trust Bank
21. First Community Bank Ltd
22. Guardian Bank Ltd
22. Gulf African Bank Ltd
24. Habib Bank A.G. Zurich
25. HFC Ltd
26. Imperial Bank Ltd (In Receivership)
27. I & M Bank Ltd
28. Jamii Bora Bank Ltd
29. KCB Bank Kenya Ltd
30. Mayfair Bank Ltd
31. Middle East Bank (K) Ltd
32. M Oriental Bank Ltd
33. National Bank of Kenya Ltd
34. NCBA Bank Kenya
35. Paramount Universal Bank Ltd
36. Prime Bank Ltd
37. Sidian Bank
38. Standard Chartered Bank (K) Ltd
39. SBM Bank (Kenya) Ltd
40. Transnational Bank Ltd
41. FirstRand Bank Ltd
42. UBA Kenya Bank Ltd
43. Victoria Commercial bank Ltd

Source: CBK (2019)

APPENDIX II: QUESTIONAIRE LETTER OF INTRODUCTION.

Strathmore
UNIVERSITY
BUSINESS SCHOOL

P.O. Box 59857 –
00200,
Ole Sangale Road,
Madaraka Estate,
Nairobi, Kenya.

Respondent,

Dear Sir/Madam,

RE: RESEARCH QUESTIONNAIRE.

I am a graduate student at Strathmore University Business School currently pursuing a Master of Science Degree in Development Finance. You are invited to participate in a research study whose purpose is to examine the factors that would influence open banking adoption by licensed commercial banks in Kenya. This research study is a requirement for partial fulfillment of the degree.

The findings of this study will greatly provide both commercial banks, and regulatory bodies with an understanding of the factors that would impact the adoption of this new financial technology known as open banking. The information will be important for these organizations as well in making decisions on the best strategies to use to enhance the uptake of the open banking platform.

The information provided in the questionnaire will be held in confidence and for academic purposes only. Your participation in this study is voluntary and you are free to withdraw your participation from this study at any time. Kindly access the questionnaire using the link below.

https://docs.google.com/forms/d/15y0Dlo54KRXKQLNenQccFoPmwZ054fznGDohmintNzQ/viewform?edit_requested=true&fbzx=4871418207575537827

It should take approximately 10 minutes. We would greatly appreciate your participation.

Sincerely yours,

Kevin Rutto.

APPENDIX III: QUESTIONAIRE

SECTION I :(Demographic information).
Fill in the provided spaces.

(i). **Please tick** (✓) the most appropriate option to indicate your response.

1. Gender.

   - o Male
   - o Female

2. Age.

   - o 0 - 20 years
   - o 21 – 30 years
   - o 31 – 40 years
   - o 41 – 50 years
   - o 51 years and above

3. Education level

   - o Diploma
   - o Professional level
   - o Bachelor's Degree
   - o Master's Degree
   - o Doctorate Degree

4. Department.

   - o ICT
   - o Operations
   - o Legal
   - o Audit
   - o Finance

5. Working experience.

   - o 0 -5 years
   - o 6 – 10 years
   - o 11 – 15 years
   - o 16 years and Above

SECTION II: (Determinants of Open Banking Adoption).

What follows are the items used to measure constructs in the model. They are grouped according to the constructs for easy reference.

Using the scale of 1-5 where; 1= Strongly Disagree (SD), 2=Disagree (D), 3=Neither Agree nor Disagree (NA/D), 4=Agree (A), and 5=strongly agree (SA).

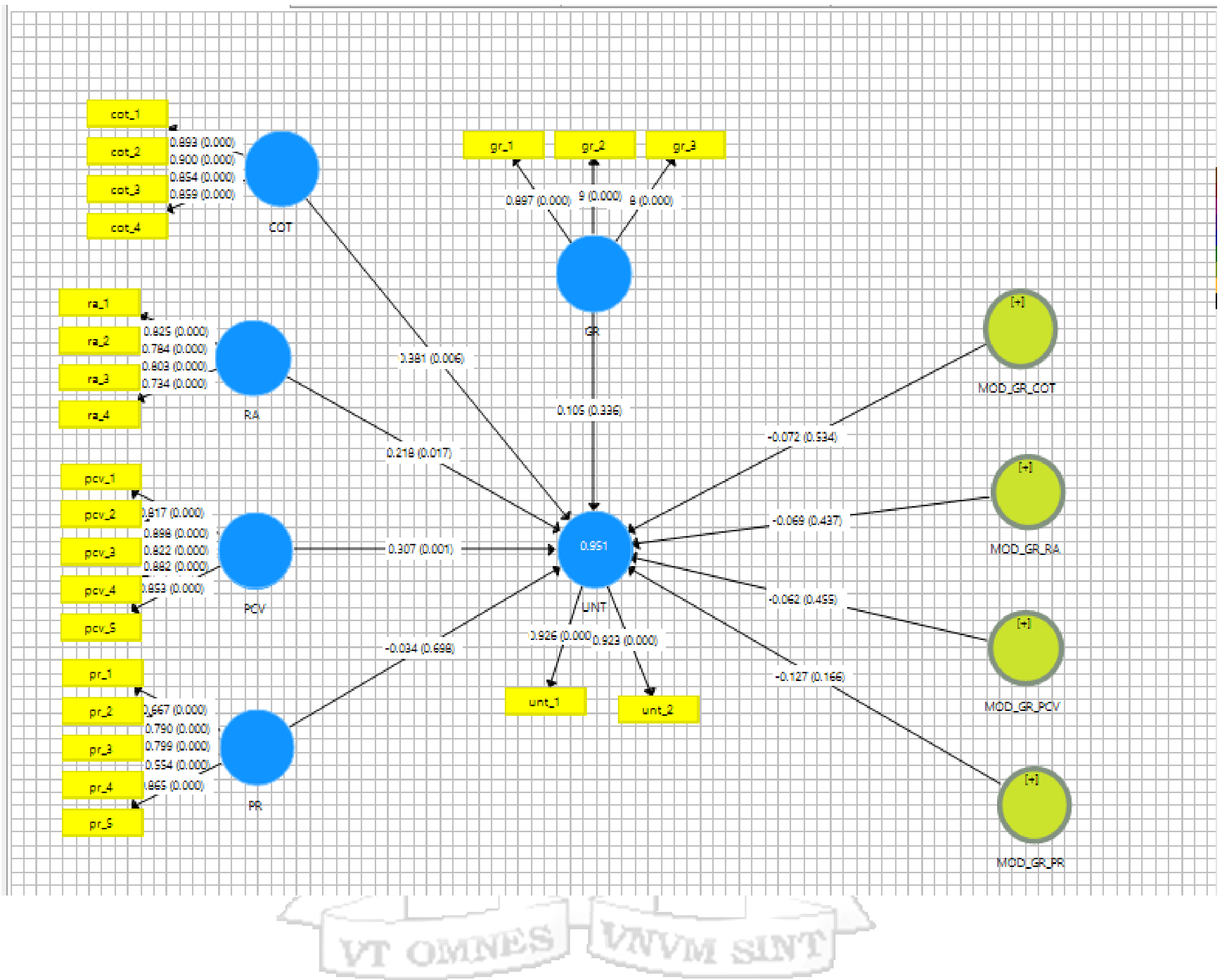
(i). **Please tick** (✓) the most appropriate option to indicate your response.

(ii). NAME OF THE INSTITUTION……………………………………….……..…

Cost of Technology (COT).	SD	D	NA/D	A	SA
1. The initial cost of implementing open banking services will be affordable.	1	2	3	4	5
2. Open banking solutions will reduce operational constraints on our banks' operations and propel technological growth.	1	2	3	4	5
3. Open banking services will significantly decrease the cost of producing new product offerings.	1	2	3	4	5
4. The maintenance cost for open banking services will be manageable and sustainable	1	2	3	4	5
Perceived Relative Advantage (PRA).	SD	D	NA/D	A	SA
5. Through open banking services our bank will have a competitive advantage over our competitors who do not adopt open banking due to increased productivity.	1	2	3	4	5
6. Open banking solutions would give us an advantage through new value proposition streams such as data sharing agreements with Fintechs and other non-financial institutions.	1	2	3	4	5
7. Open banking solutions would improve the quality of our operations.	1	2	3	4	5
8. Open banking services will offer consumers more personalized and suitable product offerings than traditional financial services	1	2	3	4	5
Perceived value (PCV).	SD	D	NA/D	A	SA
9. The use of open banking solutions will improve our banks performance.	1	2	3	4	5
10. Open banking solutions will reduce transaction costs.	1	2	3	4	5
11. Open banking will offer a wide range of solutions to solve our customers' financial problems.	1	2	3	4	5
12. Considering the cost, risk and benefits, I think open banking services would be valuable.	1	2	3	4	5
13. There are greater benefits than drawbacks of open banking.	1	2	3	4	5
Perceived Risk (PR).	SD	D	NA/D	A	SA
14. Initially open banking solutions will obviously perform as well as expected.	1	2	3	4	5
15. There is minimal risk of fraud while using open banking solutions.	1	2	3	4	5
16. Privacy information will not be misused, inappropriately shared or sold	1	2	3	4	5
17. There is minimal technology failure to deliver its anticipated outcome and its consequent loss is also negligible	1	2	3	4	5
18. Currently, Open banking would safeguard our bank from overall risk.	1	2	3	4	5
Government Support (GS).	SD	D	NA/D	A	SA
19. Guiding policies and regulations generally affect the adoption of new Fintech technologies such as open banking.	1	2	3	4	5
20. The government encourages and promotes new financial technologies such as open banking.	1	2	3	4	5
21.The government has provided a conducive environment for financial technology innovations such as open banking	1	2	3	4	5
Intention to Adopt Open Banking (UNT).	SD	D	NA/D	A	SA
22. Our organization will intend to adopt/implement open banking solutions.	1	2	3	4	5
23. Our bank will be willing to partner with interested third parties and fintech firms to adopt open banking solutions.	1	2	3	4	5

END OF QUESTIONNAIRE

APPENDIX IV: PATH ANALYSIS MODEL FOR ADOPTION OF OPEN BANKING AMONG KENYAN COMMERCIAL BANKS



APPENDIX V: ETHICAL REVIEW APPROVAL

Strathmore
UNIVERSITY

25th October 2021

Mr Rutto Kevin,
kevin.rutto@strathmore.edu

Dear Mr Rutto,

RE: Determinants of Open Banking Adoption Among Kenyan Commercial Banks

This is to inform you that SU-IERC has reviewed and approved your above SU- master's research proposal. Your application reference number is **SU-IERC1178/21**. The approval period is **25th October 2021 to 24th October 2022.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-IERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-IERC within 48 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-IERC within 48 hours
v. Clearance for export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days upon completion of the study to SU-IERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and also obtain other clearances needed.

Yours sincerely,

for: Prof Fred Were,
Chairperson; SU-IERC

STRATHMORE UNIVERSITY INSTITUTIONAL ETHICS REVIEW COMMITTEE
(SU-IERC)
25 Oct 2021
TEL: +254 (0)70303400
P.O BOX 59857-00200
NAIROBI-KENYA

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

APPENDIX VI: NACOSTI RESEARCH PERMIT

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: 614173

Date of Issue: 15/November/2021

RESEARCH LICENSE

This is to Certify that Mr.. Kevin Mwiti Rutto of Strathmore University, has been licensed to conduct research in Nairobi on the topic: DETERMINANTS OF OPEN BANKING ADOPTION AMONG KENYAN COMMERCIAL BANKS for the period ending : 15/November/2022.

License No: NACOSTI/P/21/14177

614173

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

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APPENDIX VII: PLAGARISIM REPORT

Ouriginal

Document Information

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Submitted by	
Submitter email	kevin.rutto@strathmore.edu
Similarity	3%
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