

**SIMON DIEDONG DOMBO UNIVERSITY OF BUSINESS AND
INTEGRATED DEVELOPMENT STUDIES**

**EXAMINING THE LINKAGES BETWEEN ICT ADOPTION, ICT
REGULATION, DIGITAL INCLUSION AND FINANCIAL INCLUSION**

ADOMAKO BOAHEN RAPHAEL

2024

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BY

ADOMAKO BOAHEN RAPHAEL

(PG0173022)

**A THESIS SUBMITTED TO THE DEPARTMENT OF ACCOUNTING,
SCHOOL OF BUSINESS, SD DOMBO UNIVERSITY OF BUSINESS
AND INTEGRATED DEVELOPMENT STUDIES, WA, GHANA,
IN PARTIAL FULFILMENT FOR THE AWARD OF A
MASTER OF PHILOSOPHY IN ACCOUNTING**

NOVEMBER, 2024

DECLARATION

To the best of my knowledge, no portion of this dissertation has been submitted for the award of a degree at the university or in a different institution, except for the papers cited. It is also my original work and the conclusions are the outcome of independent research. Therefore, I take complete ownership of everything in this dissertation.

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.....

ADOMAKO BOAHEN RAPHAEL

DATE

Supervisor

I at this moment attest that the supervision of this thesis followed the guidelines established by the University.

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.....

DR. EZEKIEL DAVIES

DATE

DEDICATION

I dedicate this thesis paper to my lovely mother Mrs. Agnes Boahen and my loving and supportive brother, Mr. Edward Nana Amoako.

ACKNOWLEDGMENTS

I would first like to thank the Almighty God for His guidance and protection throughout my two years program at the Simon Diedong Dombo University of Business and Integrated Development Studies, Wa-Ghana.

I would also wish to extend my gratitude to my supervisors Mr. Muftawu Dzang Alhassan and Dr. Ezekiel Davies for their contributions, guidance, and encouragement. Without you, I would not have made it this far. God richly bless you both.

Special thanks to Mr. Joseph Owusu Amoah, Dr. Bernard Bawuah, Dr. Andrews Osei Agyeman, Dr. Yaw Afriyie, Mad. Lydia Faith Nsubugah and Mad. Suboni Leticia. I cannot repay you all for what you have done in my life. God richly bless you.

I cannot end without extending my thanks to Mr. Francis Dogbe, Ms. Abigail Nti Ziemah, Karim Nasiru, Pastor Frank Opoku Afram and Justice Koomson Mensah for their guidance and encouragement, God bless you all.

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LIST OF ABBREVIATIONS

AI	Artificial Intelligence
ATM	Automated Teller Machine
AVE	Average Variance Extracted
CB-SEM	Covariance Based-Structural Equation Modelling
DI	Digital Inclusion
DOI	Diffusion of Innovations
E-Commerce	General Data Protection Regulation
GDP	Gross Domestic Product
GOF	Goodness of Fit
ICT	Information and Communication Technology
ICTA	Information and Communication Technology Adoption
PLS-SEM	Partial Least Squares Structural Equation Modeling
TAM	Technology Acceptance Model
UN	United Nation
UNESCO	United Nations Educational Scientific and Cultural Organization
WBG	World Bank Group

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ABSTRACT

Recently, governments around the globe are increasingly embracing the adoption of information and communication technologies (ICTs) as a means of promoting financial inclusion among individuals. This extensive adoption of ICTs has significantly transformed individual access to financial transactions and services. Despite the potential of ICTs in fostering financial inclusion, especially amongst people in developing countries, there is scarcity of academic research that explores the links between ICTs, digital inclusion and financial inclusion. This study therefore explores the relationship between Information and Communication Technologies (ICT), digital inclusion, and financial inclusion both developing and developed economy. Utilizing the Technology-Organization-Environment (TOE) framework, the study examines how ICT adoption, ICT regulations, and digital inclusion impact financial inclusion across both developed and developing economies. The research employs a quantitative cross-sectional design, analyzing secondary data from 107 countries to test the proposed hypotheses. The findings reveal that ICT adoption alone does not significantly enhance financial inclusion, challenging the widely held belief that technological integration inherently improves access to financial services. Factors such as digital literacy gaps and socio-economic barriers play critical roles in this relationship. The study also highlights the significant positive effects of ICT regulations and digital inclusion on financial inclusion. Specifically, ICT regulations was found to not positively mediate the relationship between ICT adoption and financial inclusion, while digital inclusion was found to significantly and positively mediate the relationship between ICT adoption and financial inclusion. This study findings therefore emphasize the need for financial institutions and technology providers to invest in user-friendly interfaces and customer support systems that facilitates ease use of digital technologies. Also, policymakers and practitioners should prioritize on enhancing digital literacy and technical support through education programmes and community engagement. Finally, there should be a Public-private-partnership and subsidy on internet prices to help provide cheap and accessible technologies, and favourable regulations on ICTs.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the pace-moving landscape of Information and Communication Technology (ICT), the linkages between ICTs, digital inclusion and financial inclusion is an area of great importance to the academic literature (Vyas & Jain, 2021). The advent of ICTs and their adoption has specifically transformed individual access to digital literacy, meaningful use and institutionalization on the way financial transactions are carried out (Gabor & Brooks, 2020; Saraf & Kayal, 2022). Past studies such as Santos and Kvangraven (2017), Pradhan, Arvin, Nair, Hall and Bennett (2021), Singh, Klarner and Hess (2020) and Xun, Guanghua, Jiajia and Zongyue (2020) have shown that the adoption of digital technologies promotes financial transactions and inclusion, especially in rural-developing economies. For example, in Ghana, the advent of mobile money services has transformed the financial services sector by fostering individuals' access, literacy, affordability and trust of digital technologies for financial services (Agyemang, Twum, Nyeadi, Amoah, & Appau, 2023). At the end of January 2023, 59.7% of the Ghanaian population aged 15 and older operated mobile money accounts (Pobee, Jibril & Owusu-Oware 2023; Atta-Aidoo, Saleh & Matthew 2023). This suggests a significant rise from the previous year's percentage of 38.9%. Furthermore, mobile money transactions for the same period stood at GHc 130.1 billion, compared with the January 2022 figure of GHc 76.2 billion (Atta-Aidoo et al., 2023). The increasing use of mobile money services has been attributed to its ability to enable users to conveniently access financial services without needing or operating a bank account, thereby promoting financial inclusion (Isukul & Tantua, 2021).

Digital inclusion according to National Telecommunications and Information Administration (2023) is defined as the extent to which individuals' and communities have equitable access to effective and robust use of ICT resources such as broadband connections, internet enabled devices to meet both individual and community needs, and the requisite skills to explore, create and partake in the digital world. When individuals and communities have equal access to digital technologies such as the mobile money, they will be willing to adopt these technologies to undertake various financial transactions (Lashitew, Van Tulder & Liasse, 2019). This will promote financial inclusion by incorporating initiatives including regulations to encourage adoption to help bridge the gap of digital divide through provision of affordable ICT resources, promoting digital literacy and resolving disparities in the socio-economic issues of a country (Jamil, 2021).

Lawrence and Tar (2018) refers to ICT adoption as the process by which individuals, organizations and communities accept, integrate and use ICT in their daily lives and operations. Gupta, Dasgupta and Gupta (2018) suggest that, ICT adoption involves the use of various digital technologies for communication, collaboration and information access. ICT adoption embraces the whole spectrum of activities from the period when individuals justify the need for adopting ICT until the period when they experience the full potential of ICT and derive benefits from them (Ziemba, 2020).

Studies by Cabeza-Garcia, Del Brio and Oscanoa-Victorio, (2019) and Sharma and Jain, (2021) have also defined financial inclusion as the availability and equality of opportunities to access financial services. Financial inclusion is the act of ensuring that individuals, particularly those from low-income and vulnerable groups, as well as all members of society, have access to suitable financial products and services. These

services should be provided at a reasonable cost, with transparency and fairness, in accordance with regulations set by monetary authorities or mainstream institutions (Chakrabarty & Mukherjee, 2021). Furthermore, financial inclusion refers to a state where there are no barriers to accessing and using financial services. It means that financial services are easily accessible to all members of society and are offered at affordable prices (David-West, Iheanachor & Umukoro, 2020). Past studies indicate the key role ICTs play in promoting financial inclusion (Andrianaivo & Kpodar, 2011; Chatterjee, 2020; Gomber, Kauffman, Parker, & Weber, 2018; Mushtaq & Bruneau, 2019). For example, the study of Sasu (2023) found that the adoption and use of digital technologies such as mobile money services promote financial inclusion among the financially excluded individuals in the society through access to financial services. Similarly, Li, Chen and Lu (2022) in their study found a positive influence of ICTs in promoting financial inclusion at the global level. Some studies, including Jack and Suri (2014), and Munyegera and Matsumoto (2016), suggest that mobile money services could be an effective tool for promoting financial inclusion. This is because mobile money services enable individuals, especially those living in financially excluded rural communities in many developing countries, to access traditional financial services without having to physically go to a bank.

Moreover, in promoting financial inclusion through ICTs and digital inclusion, there is the need to regulate the ICT environment to ensure trust, privacy and security of individual wallets, funds and information. ICT regulation is the set of laws, policies, and standards that control the deployment, use, and accessibility of ICT infrastructure and services inside a certain jurisdiction (Ali & Osmanaj, 2020). It includes attempts to maintain fair competition, safeguard consumer rights, and foster innovation in the ICT industry. However, in recent years, the advent of regulations governing the use of

mobile financial technologies such as mobile money services in developing economies such as Ghana, may have detrimental effects on financial access and inclusion (Ahmad, Green & Jiang, 2020; Amoah, Korle & Asiama, 2020). In May 2022 for instance, the government of Ghana introduced a mandatory electronic levy (e-levy) of 1.5% on all daily mobile money transactions over GHC 100 (Asamoah, Nketiah-Amponsah, & Danquah Ansong, 2023; Kwakye, Corral Rodas, Elmaleh, & Sebastian, 2023). This e-levy was an additional charge to the existing 1% fee that users had to pay to service providers for all daily mobile money transactions. According to the Ghana Economic Impact Assessment report (2023), the introduction of the e-levy has had a negative impact on the adoption and usage of mobile money services. This is because the e-levy adds an extra cost to every mobile money transaction, which can be especially burdensome for frequent users or those conducting large transactions. As a result, people may be discouraged from using mobile money altogether or may only use it for essential transactions. In addition, the e-levy may disproportionately affect certain groups, such as those with low incomes or limited access to technology, which can create a sense of unfairness and further discourage its adoption, thus derailing financial inclusion (Duho, Quansah & Atampuri 2022; Tetteh, Amoah, Kwablah, Asiama & Ahjabor 2023).

Despite the massive potential of digitalization and mobile payments services in promoting financial inclusion in both developed and developing economies, available literature indicates that the focus of existing research has largely been placed with initial adoption and use of ICTs to promote financial inclusiveness. In addition, previous studies, such as Soro and Senou, (2023), Senou, Ouattara and Acclassato Houensou, (2019) largely focused on the causality of ICT adoption and how it influences financial inclusion, which suggested that, mobile payment penetration and internet access and

usage promote financial inclusion. However, the adoption of ICTs and other digital platforms pose some security issues which past studies have failed to look at. This study, therefore, seeks to fill this gap by adopting the foundations of the Technology-Organization-Environment theory as the study lens to identify and examine the linkages between ICTs, digital inclusion and financial inclusion (Shukla & Shankar, 2022; Subramaniam, Palakkeel & Arunmozhi, 2023; Saka, Chan & Mahamadu, 2022).

1.2 Problem Statement

Despite the significant advances in Information and Communication Technology (ICT) and the emergence of digital inclusion efforts, there are still gaps in ICT adoption and financial inclusion among demographic groups and geographies. Literature, Chadha, Gera, Khera and Sharma (2024), Gabor and Brooks (2020) and Xiangling and Qamruzzaman (2024) have identified various obstacles and limitations in comprehending the complicated interaction between ICT regulation, digital inclusion, ICT adoption, and financial inclusion, emphasising the need for more research.

Existing evidence reveals that, ICT regulation plays a mediating role in creating favourable environment to promote individual and societies adoption to ICTs to financial inclusion. For example, Bauer and Erixon (2016) argued that regulatory frameworks that prioritise competition and consumer data, wallet and cash protection might improve ICT adoption by stimulating investment in ICT infrastructure and services. However, Lythreathis, Singh and El-Kassar (2022) suggest that regulatory intricacy and uncertainty may inhibit investment and hinder efforts to address digital divides. Similarly, digital inclusion initiative has been widely deployed to close the digital gap and promote fair access to ICTs. However, the efficacy of these programmes in encouraging ICT adoption and financial inclusion remains unraveled.

Deganis, Haghian, Tagashira and Alberti (2021) and Jamil (2021) argue that addressing many dimensions of digital inclusion, such as access, affordability, digital literacy, and relevance, is critical for ensuring meaningful involvement in the digital economy and society. Theoretical frameworks such as the Technology Acceptance Model (TAM) and the Diffusion of Innovations Theory offer valuable insights into the factors at the individual level that impact the adoption of ICTs. The Technology Acceptance Model (TAM) sheds light on the factors that influence individuals' decisions to adopt or reject new technologies. It focuses on the perceived ease of use and perceived usefulness of the technology in question. Similarly, the Diffusion of Innovations Theory emphasises the significance of various factors in the adoption process, including social influence, communication channels, and time. It highlights the spread of new ideas and technologies through societies. Although these models provide valuable insights, their application to different socioeconomic situations has not been thoroughly investigated.

In addition, the possible links between these frameworks and financial inclusion, which is a crucial factor in promoting economic development and social equity, have not been extensively studied. By delving into these intersections, a greater comprehension can be gained and more efficient approaches can be developed to encourage the adoption of ICT and promote financial inclusion among various populations. This, in turn, will contribute to fostering economic growth that is more inclusive and equitable. Moreover, empirical studies on the influence of ICT regulation and digital inclusion on ICT adoption and financial inclusion outcomes are few and frequently context-specific; For example, research by Evans (2018), Tay, Tai and Tan (2022) and Gabor and Brooks (2020) emphasize the importance of regulatory regimes and digital access in boosting ICT use and financial inclusion, particularly in low-income countries. Therefore, additional study is needed to determine how regulatory interventions and digital

inclusion measures might be adapted to meet the various demands and concerns of the unbanked in the underprivileged communities.

Moreover, the existing literature Bisht and Mishra, (2016), N'dri and Kakinaka, (2020) and Nyagadza, Muzira and Chuchu, (2023) indicate that when there are unfavorable regulations on ICTs, such as mobile money services, internet banking services and mobile banking services, it may have negative effect on individual adoption of these services and subsequently affect financial inclusion. This is mainly because these regulations can result in higher costs and increased complexity in operating mobile money services. As a result, individuals, particularly those in low-income or rural areas, may find it more difficult to access and afford these services (Jamil 2021; Nutassey, Agyei, Frimpong & NoKoe, 2023). However, there is limited empirical evidence on the essential role played by regulatory frameworks in determining the contributions of ICT adoption on financial inclusion (Alhassan, Kolog & Boateng 2020; Li et al., 2022). The objective of this study therefore seeks to examine the linkages between ICTs, digital inclusion and financial inclusion in both developed and developing economies.

1.3 Research Objective

With reference to the literature gap regarding the linkages between ICTs, digital inclusion and financial inclusion in both developed and developing economies, this study aimed to examine the linkages between ICTs, digital inclusion and financial inclusion.

1.3.1 Specific Objectives

The following objectives were established to guide the study;

- i. To examine the impact of ICT adoption on financial inclusion.
- ii. To investigate the effect of ICT regulations and digital inclusion on financial inclusion.
- iii. To examine the mediating effect of ICT regulations and digital inclusion on the nexus between ICT adoption and financial inclusion.

1.4. Research Questions

The study achieved its objectives by using the following research questions to answer the study research problems;

RQ1. What is the impact of ICT adoption on financial inclusion?

RQ2. What are the effects of ICT regulation and digital inclusion on financial inclusion?

RQ3. What is the mediating role of ICT regulations and digital inclusion on the nexus between ICT adoption and financial inclusion?

1.5 Significance of the Study

The significance of this study can be categorized into research, policy, and practice. In research, the study was to examine the linkage between ICTs, digital inclusion and financial inclusion. This happens to be one of the areas of research which has been ignored and such scanty literature on the field. Previous studies have however focused on financial inclusion. It is not far reaching that this is the first study carried out on regulatory environment and digitalization on mobile payment and financial inclusion.

This study, therefore, augments to the scanty literature in this area of mobile payment research and financial inclusion.

To practice, the findings show that trust, accessibility and market size significantly influence the increased access to financial services, improved financial literacy lower transaction cost and economic empowerment through digital literacy, standardization and consumer protection. As a result, mobile payment service providers need to ensure that services provided continuously enable users to enjoy these forms of security (that is, enhancing their trust and reliability on these digitalization and mobile payment services). That is, when they feel secured and trust the services, they intend to patronize mobile payment services more. Therefore, this study admonishes mobile payment service providers to integrate mobile payment with some security features that will protect the individual funds and information to enhance their trust and continuance use of the services.

To policy, formulating proper ICT regulations that will create favorable ICT environment will positively influence individuals' access, adoption and usage of mobile payment services. An enabling ICT environment in the form of ICT access and infrastructure will equip individuals with the necessary tools to conduct digital payment transactions. Similarly, an enabling environment in the form of ICT regulations and policy will ensure that users' financial information is protected and secured. Thus, this study will provide policymakers, especially the financial sectors, a clear insight into the digitalization effect on individual willingness to adopt ICTs for financial services.

1.6 Scope of the Study

The study comprehensively examines the relationship between Information and Communication Technologies (ICTs), digital inclusion, and financial inclusion across both developed and developing economies. Employing the Technology-Organization-Environment (TOE) framework, it investigates how ICT adoption, ICT regulations, and digital inclusion impact financial inclusion, leveraging a quantitative cross-sectional design to analyze secondary data from 107 countries. By addressing significant gaps in the literature and focusing on the broader socio-economic implications, the study aims to contribute valuable knowledge that could guide the development of ICT policies and digital inclusion strategies to enhance financial inclusion globally. This comprehensive scope ensures the relevance and applicability of the study's findings to a wide range of stakeholders, including policymakers, financial institutions, and development organizations.

1.7 Chapter Outline

This thesis is grouped into five chapters. Below is the detailed description of the remaining chapters aside this chapter:

Chapter two contains the review of digital inclusion, overview of financial inclusion, the state of financial inclusion, digital financial inclusion, concept of mobile payment adoption, problems in mobile payment, research gaps and future research directions and provides a justification for the model relied on for this study based on literature reviewed.

Chapter three is about the methodology adopted in this study. It presents a series of steps which include research paradigm, research methods, and the method of data analysis.

Chapter four tackles the findings and analysis of the study. First, an assessment of the measurement model for indicator reliability, internal consistency for reliability, convergent validity and discriminant validity by ensuring the application of the standard decision rules is followed. Furthermore, a structural model assessment is undertaken to show the Multicollinearity Statistics, Hypothesis Testing: Bootstrapping Direct Effect Results, and the assessment of the goodness of fit. Finally, an assessment is undertaken to examine the influence of mediators that includes regulatory quality and regulating emerging technologies on the relationship between the independent constructs and the dependent construct. Again, this chapter discusses the results from the analysis of the findings. These discussions are based on the relationship that exists between the dependent and independent variables of the model.

Chapter five is the concluding chapter, which summarizes the purpose and objectives of the study, the major findings, and conclusions. It also communicates the implications of the study conducted as well as the directions for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

As indicated in Chapter One, this study aims to identify and examine the linkages between ICTs, digital inclusion and financial inclusion at the global level. This chapter is grouped in sub-sections. The first part focused on review of literature on an overview definition of concepts and terms, Financial Inclusion, digital inclusion, ICT regulation and ICT adoption. The second part focused on nature of mobile payments, classification of mobile payments, trends of recent mobile payments and security issues surrounding mobile payments.

2.2 Definition of Terms and Concepts

2.2.1 Information and Communication Technology (ICT)

According to the United Nations Educational Scientific and Cultural Organizations (UNESCO, 2019), information and communication technology (ICT) refers to technological tools that are utilized for creating, sharing, transmitting, storing, and exchanging of information. ICT encompasses a wide range of technologies, including satellite systems, computer and network hardware and software, mobile phones and associated equipment and services like internets. Mid-Pacific ICT Centre (2014) has defined it as "skills around computing and communication devices, software that operates those, applications that run on them and systems that are built with them". As noted by Warioba, Machumu, Kulunga and Mtweve (2022), Mutitu (2023), and Kountios, Konstantinidis and Antoniadis (2023), the adoption of ICTs can be defined in this context as consisting of three distinct stages: initiation, adoption, and

implementation. Evaluating the ICT innovation is the focus of the initiation stage. The choice to embrace an ICT innovation is taken at the adoption stage. The stages of implementation are focused on integrating ICT innovation into the system. This suggests that ICTs are put to good use and improve financial services operations around the world. ICT adoption however is the use of mobile payments services to promote financial inclusion among the low-income, the unbanked and the vulnerable in various communities.

2.2.2 ICT Regulations Defined

ICT Regulations encompass a broad spectrum of laws, policies, and guidelines that govern the development, use, and distribution of information and communication technology (Al-Roweily 2020; Avotra, Chengang, Sandra Marcelline, Asad, & Yingfei 2021). These regulations cover various critical areas, including internet governance, which involves the application of shared principles and rules for the Internet's evolution and use, and data protection laws, such as the General Data Protection Regulation (GDPR), which safeguard individuals' privacy by setting strict guidelines on data handling (Laudon & Traver 2020; Fefer 2020). Cyber security regulations ensure the protection of information systems from cyber-attacks by mandating robust security measures and prompt breach reporting. Telephony regulations oversee traditional and modern telecommunication services to ensure fair competition and consumer protection (Ezeigweneme, Umoh, Ilojiana & Adegbite, 2024).

Electronic Commerce (E-commerce) regulations governing online transactions, focus on electronic contracts, consumer protection, and digital signatures, aiming to create a trustworthy online business environment. Intellectual property rights regulations protect digital works through copyright, patents, and trademarks, fostering innovation

and creativity (Al-Roweily, 2020). Additionally, regulations promoting digital inclusion and accessibility aim to bridge the digital divide by enhancing digital literacy and ensuring access to ICT for all, including marginalized communities. Cross-border data flow regulations protect data transferred across national boundaries, maintaining privacy standards across jurisdictions. Content regulation balances free expression with the need to protect users from harmful material, such as hate speech and misinformation. Furthermore, digital infrastructure development policies focus on building and maintaining essential ICT infrastructure, ensuring the availability and reliability of digital services. Overall, ICT regulations provide a framework for protecting users, fostering innovation, and ensuring that the benefits of ICT are widely distributed across society (Laudon & Traver 2020; Fefer 2020).

Table 2.1: Scholarly definitions of ICT Regulations

Authors	Definition
Chen and Wang (2021)	ICT regulations are the set of directives and controls imposed by authorities to ensure the safe, secure, and efficient use of information and communication technologies.
Singh and Sharma (2021)	The term ICT regulations refer to the structured policies and legal requirements designed to guide the proper and ethical utilization of information and communication technologies.
Garcia and López (2022)	ICT regulations are the collection of laws, policies, and guidelines that aim to control and guide the development, deployment, and usage of information and communication technologies.
Johnson and Smith (2023)	ICT regulations include the legal and policy frameworks established to ensure the equitable, secure, and efficient access and use of information and communication technologies across various sectors.
Martinez and Rodriguez (2019)	ICT regulations are defined as the statutory measures and protocols set by regulatory agencies to manage the deployment and usage of information and communication technology infrastructures.
Baker and McKenzie (2020)	ICT regulations consist of the legislations and regulatory measures that govern the digital environment, ensuring security, privacy, and efficient operation of ICT systems.

Li and Zhang (2021)	ICT regulations are the authoritative guidelines and laws designed to oversee and regulate the development, use, and management of information and communication technologies.
Ahmed and Khan (2022)	ICT regulations encompass a wide range of laws, policies, and guidelines aimed at managing the access, use, and security of information and communication technologies.
Williams and Brown (2022)	ICT regulations refer to the official rules and policies established to govern the effective and secure use of information and communication technologies within various industries.
Osei and Mensah (2023)	ICT regulations are the comprehensive set of rules and standards developed by governing bodies to control and facilitate the effective use and integration of information and communication technologies in society.

Source: Author's construction

Information and communication technology (ICT) regulations encompass laws, rules, and policies that govern how ICTs are utilized and deployed. For example, Garcia and López (2022) describe ICT regulations as laws, rules, and guidelines that govern the usage and implementation of ICTs. This broad concept includes a range of regulatory initiatives. Many studies emphasize how the government and regulatory authorities imposed these limits. Johnson and Smith (2023) highlight the legal and legislative frameworks in place to ensure equitable, safe, and effective access to ICT, while focusing on the rules and standards developed by governments or regulatory bodies to monitor ICT systems. This perspective highlights the need of authority oversight in the maintenance and enforcement of ICT regulations.

Chen and Wang (2021) and Baker and McKenzie (2020) provide definitions that prioritize security and efficiency. While Baker and McKenzie (2020) focus on laws and regulatory measures that govern the digital environment, ensuring security, privacy, and the proper operation of ICT systems, Chen and Wang (2021) emphasize directives and controls imposed by authorities to ensure the safe, secure, and efficient use of ICTs. These definitions underline the need of protecting information while ensuring that ICT systems work effectively.

Several definitions emphasize the need of utilizing ICT in an ethical and equitable way. Singh and Sharma (2021) emphasize ethical considerations and allude to legal requirements and established guidelines designed to guide the acceptable and moral usage of ICTs. Similarly, Johnson and Smith (2023) underline the importance of justice and inclusion in regulatory frameworks by adding the idea of equitable access inside their definition.

Also, Li and Zhang (2021) and Martinez and Rodriguez (2019) focus on the authoritative aspects of ICT law. Li and Zhang (2021) describe ICT regulations as authoritative recommendations and laws, while Martinez and Rodriguez (2019) define them as statutory actions and processes enacted by regulatory agencies. The definitions underline the formal and mandatory nature of these regulations. To put it in a slightly different perspective, Ahmed and Khan (2022) and Osei and Mensah (2023) describe ICT regulations as a complete set of laws, rules, and guidelines aimed at governing various aspects of ICT, such as access and security. Osei and Mensah (2023) emphasize the comprehensive nature of these rules and recommendations, suggesting a huge regulatory system that covers many facets of ICT integration in society.

Although these definitions highlight different aspects such as security, efficiency, ethical use, equitable access, and the participation of authoritative institutions, they nonetheless share the essential idea of ICT rules as important frameworks for governing ICTs. This comparative study highlights the complexities of ICT norms, which seek to achieve a balance between many needs and challenges in the digital domain. The definitions and focus areas of ICT regulations as set of directives and controls imposed by authorities to ensure the safe, secure, and efficient use of information and communication technologies may expand as technology advances in order to address new opportunities and challenges.

2.2.3 Digital Inclusion Defined

The promotion of digital inclusion for the impoverished and low-income earners has been adversely impacted by this enormous digital divide (Chitimira, Motlogeloa & Magau 2023). Digital inclusion (DI) broadly refers to individuals' access to and use of digital technologies, including mobile devices, digital payments. The term describes the equitable access to ICTs that all individuals need to engage in socioeconomic activities

including obtaining financial services and products, as well as education and work (Adam & Alhassan, 2021). According to Nascimbeni and Vosloo, (2019), digital inclusion simple means, equitable, meaningful, and safe access to use, lead, and design of digital technologies, services, and associated opportunities for everyone, everywhere" is another definition of digital inclusion provided by the United Nations (UN).

This implies that everyone, wherever they may live, should have access to digital technology and associated services at all times. It is important to remember that not everyone can be fully included in the digital economy just because they have access to ICT infrastructure like the Internet. The availability of software and hardware, a range of digital services, and programmes that support digital literacy are all included in the concept of digital inclusion. Digital inclusion measurements were created using a variety of dimensions. Sarma (2008) concentrated on the use of financial goods, bank penetration, financial service accessibility, and financial service availability. Aduda and Kalunda (2012), on the other hand, examined DI from the perspectives of use and accessibility to financial services. When evaluating DI, variables including savings, loans, payments, and risk management were noted (Kunt and Klapper, 2012); it also represented the limitations encountered (Gupta, 2015; Kunt & Klapper, 2013). While Widyastuti et al. (2019) examined digital inclusion from the fishermen's point of view, referring to the dimensions of accessibility, barriers, and utilization of digital technologies.

Table 2.2: Scholarly definitions of Digital Inclusion

Author	Definition of digital inclusion
Salemink et al. (2020)	Digital inclusion refers to efforts to ensure that everyone, regardless of their socio-economic status, has access to and can effectively use digital technologies.
Yu et al. (2021)	Digital inclusion means providing individuals and communities with the digital tools and skills needed to engage in the digital economy and society.
Van Dijk (2021)	Digital inclusion involves reducing digital inequalities by providing access to technology and fostering the skills needed to use it effectively.
Schejter et al. (2021)	Digital inclusion is the process of ensuring equal opportunities for access to digital technologies and the ability to benefit from their use.
Helsper et al. (2021)	Digital inclusion encompasses access to digital resources, the ability to use them, and the empowerment to use digital skills in meaningful ways.
Lutz (2022)	Digital inclusion refers to the efforts to ensure that all individuals have the opportunity to access and utilize digital technologies to improve their lives.
Eynon & Geniets (2022)	Digital inclusion means providing equitable access to digital technologies and the necessary literacy to utilize them effectively.

Friemel (2023)	Digital inclusion involves making digital technologies accessible to everyone and ensuring that they have the skills to use them for social and economic participation.
Ragnedda (2023)	Digital inclusion is defined as the fair distribution of digital resources and opportunities, ensuring that everyone can participate in the digital society.
Hargittai et al. (2024)	Digital inclusion refers to the equitable access to and use of digital technologies, aiming to bridge the gap between the digitally included and excluded.

Source: Author's construction

Many authors concur on the fundamental aspects of digital inclusion, which encompasses various key components. A recurring theme in many definitions is the significance of having access to digital technologies. According to various authors, including Salemin et al. (2020), and Yu et al. (2021), the importance of digital inclusion lies in providing equal access to digital tools for all individuals. It is emphasised that access is crucial for individuals to fully participate in the digital society or economy, marking it as the initial step towards inclusion. Equity and inclusion play vital roles in numerous definitions of digital inclusion. It is emphasised by various authors that addressing the needs of marginalised and underserved populations is crucial in narrowing the digital divide. As an example, Schejter et al. (2021) prioritise the accessibility of digital technologies for underserved populations, while highlighting on the importance of equal opportunities for access.

In a similar vein, Friemel (2023) explores the importance of ensuring that digital technologies are available to all individuals, emphasising the significance of fairness in

promoting digital inclusion. Another important theme is the need to equip individuals with digital literacy and the ability to effectively use technologies. According to various authors, including Eynon and Geniets (2022), and Hargittai et al. (2024), it is not sufficient to simply have access to digital technologies. They emphasise the importance of individuals possessing the necessary skills to utilise these technologies in a meaningful way. By prioritising digital literacy, individuals are empowered to maximise the advantages of their digital access and actively engage in the digital realm. Several authors emphasise the importance of digital inclusion in enabling individuals to actively engage in society.

Lutz (2022) also explore the impact of digital inclusion on individuals' ability to fully engage in society and the economy. They make the case that having access to digital technologies and the necessary skills gives individuals the power to enhance their lives and make positive contributions to their communities. However, there are significant variations in the definitions as well. Several authors, like Yu et al. (2021), highlight the significant focus on the economic advantages and consequences of digital inclusion. The authors emphasise the impact of digital access on economic participation and growth, while other definitions take a more comprehensive approach by considering social participation as well. Authors' discussions of barriers to digital inclusion also vary in their extent. There is also a distinction in emphasis between the provision of technology and the significance of skills and training. Schejter et al. (2021) and Ragnedda (2023) emphasise the fair distribution of digital resources, while Helsper et al. (2021) and Eynon & Geniets (2022) underscore the significance of cultivating digital skills and literacy.

Lastly, different definitions prioritise specific target populations for digital inclusion efforts. Friemel (2023) highlights the importance of prioritising marginalised communities in digital inclusion efforts. They argue that these communities are particularly vulnerable to being left behind in the digital age. On the other hand, Hargittai and Redmiles (2020) and Eynon & Geniets (2022) adopt a more inclusive perspective, emphasising the needs of marginalised communities without singling out specific groups. Ultimately, there is a general agreement regarding the fundamental elements of digital inclusion, including access, equity, skills, and participation. However, the definitions differ in terms of their focus on particular factors such as economic effects, obstacles, the balance between technology and skills, and the specific groups being targeted. The wide range of viewpoints highlights the complex nature of digital inclusion and emphasises the need to consider all these factors in order to achieve genuine digital equity.

2.2.4 Financial Inclusion Defined

The fast-growing pace of global financial inclusion has attracted the attention of several scholars (Knaack & Gruin 2017; Wei, Ahmad, Abid, & Khan 2023). These scholars have based their definition on the access, usage and quality of financial services. However, the argument on what constitute financial inclusion still remains unsettled. People, households, and businesses in a community are expected to have sufficient access to formal financial products and services, such as credit cards, payments, transactions, savings accounts, and insurance. These services must be provided in an environmentally friendly manner. Access to financial services, or financial inclusion, is becoming more widespread globally, but it is still a major concern for policymakers everywhere. Specifically, it is a significant public policy purpose that is closely related to the main goals and actions of central banks.

According to the World Bank Group (WBG), the global access to financial services and high-speed broadband internet to individuals is not universal or affordable, and that, financial technology (FinTech) is the only mode of democratizing the access to finance to help move the world towards achieving financial inclusion. Financial inclusion has been characterized in a variety of ways, each of which touches on one or more of various elements, including population access to financial services, the extent to which these services are used, and their quality and cost (Pazarbasioglu, Mora, Uttamchandani, Natarajan, Feyen, & Saal, M, 2020; Soetan, Mogaji & Nguyen, 2021). Similarly, there is a wide range of financial services available to the public, including payments, savings, credit, and insurance, and countries can differ significantly in how widely these services are made available and used (Demirgüç-Kunt, Klapper, Singer, & Ansar, 2021; Demirgüç-Kunt, Klapper, Singer & Ansar, 2022).

Table 2.3: Scholarly definitions of Financial Inclusion

Authors	Definition
Rangarajan Committee (2008)	Financial inclusion is defined by the committee on financial inclusion as "the process by which mainstream financial institutions players ensure that vulnerable groups, such as the weaker sections and low-income groups, have affordable access to financial services and timely and adequate credit when needed."
Triki and Faye (2013)	"From a supply-side perspective, financial inclusion may simply mean offering suitable, reasonably priced, and broadly available high-quality financial services to excluded groups in society".
Agyekum et al. (2016)	Financial inclusion refers to the degree to which financial resources are accessible, affordable, and available to a population.
Siddik et al. (2019)	The maxim of financial inclusion is providing accessible, transparent, and cost-effective financial services with broad economic advantages to those who are underbanked and unbanked.
McKinsey (2022)	Financial inclusion is when everyone has access to financial services such as credit, loans, equity, savings, and insurance they can all develop wealth.
Tay et al. (2022)	"Financial inclusion refers to access to cost-effective and practical financial services and products that sustainably meet their need.

World Bank Group (2022)	Financial inclusion means that individuals and businesses have access to useful and cheap financial products and services that fulfill their needs, such as transactions, payments, savings, credit, and insurance, which are offered in a responsible and sustainable manner.
Von (2023)	Financial Inclusion is the process where mainstream institutional players ensure that the vulnerable groups, such as lower-income and weaker sections of society have affordable, fair, and transparent access to appropriate financial products and services
Widyastuti et al. (2024)	Financial inclusion is a type of deeper financial services that targets the lowest-income group and allows them to access legal financial products and services through a variety of channels, such as savings accounts, loans, insurance, and cash transfers.

Source: Author's construction

As indicated in Table 2.1, Agyekum, Locke and Hewa-Wellalege (2016), World Bank (2022) and Mitchell (2024) share the same views on what financial inclusion is. According to them, financial inclusion simple means reaching out to the “vulnerable” with financial services. These include the low-income earners, the poor, the unbanked. These Authors have argued that, financial institutions increasing their customer base and gaining competitive advantage provides easy access and affordable financial services that mainly seek to include the financially excluded populace in the society. Rangarajan (2008) viewed financial inclusion as mainstream financial institution ensure the weaker section and low-income groups get affordable access to financial

services and timely and adequate credit when needed. Their definition serves as a value-added approach to Widyastuti, Respati, Dewi, and Soma (2024) other definitions of the term Financial Inclusion as it relates the timely and adequacy of the credit used in financial inclusion.

The definition of expands that of Rangarajan (2008) by emphasizing that, financial technology is not only limited to the timely and adequate credit to the weaker section when needed but also access legal financial products and services through a variety of channels, such as savings accounts, loans, insurance, and cash transfers. That is, financial inclusion widens the scope of financial service delivery, which the traditional financial services industry could not do.

This study, however, adopted the definition of Agyekum, Locke, and Hewa-Wellalage (2016) who refers to financial inclusion as the degree to which financial resources are accessible, affordable, and available to a particular population. The study leans on this definition because the focus of this study is not only limited to financial institutions that adopt modern technology to disrupt the delivery of financial services, but also the mobile network operators that have adopted modern technology to better the delivery of financial services to their customer.

2.3 Drivers of Financial Inclusion

Technology can improve financial inclusion in a countless of ways. digitalization has led to increased automation of business operations and reorganization of the financial services industry's business models as a result of current Information Technology (IT) developments (Puschmann, 2017). FinTech upends the business models of financial services companies by altering how currently operating companies develop and provide

financial services, permitting new entrants, generating a great deal of convenience and privacy, and posing difficulties for law enforcement (Philippon, 2016). Examples of financial inclusion innovations are mobile banking, digital payments, agent banking, online lending platforms, blockchain and cryptocurrency, financial education apps and crowdfunding (Kanungo and Gupta 2021). Table 2.3 gives a summary of articles reviewed on drivers of financial inclusion showing the underpinning theory and framework, research method, and setting as well as relevant gaps for future research.

Table 2.4: Drivers of financial inclusion

Authors and Year of Publication	Focus of Research	Drivers of Financial Inclusion
Ozili (2018)	Impact of digital finance on financial inclusion	<ul style="list-style-type: none"> ○ Digital finance ○ Regulatory support ○ ICT penetration
Kumar et al., (2018)	Digital financial inclusion in emerging markets	<ul style="list-style-type: none"> ○ Digital payment systems ○ Mobile banking services ○ Government policies
Asongu and Nwachukwu (2018)	Mobile banking and inclusive development in Africa	<ul style="list-style-type: none"> ○ Mobile banking services ○ ICT infrastructure
Sahay et al. (2020)	The promise of fintech: Financial inclusion in the post-COVID-19 era	<ul style="list-style-type: none"> ○ Fintech ○ Digital payment platforms

		<ul style="list-style-type: none"> ○ Supportive regulatory framework
Hinson et al., (2020)	The impact of mobile money on the financial inclusion of women in Africa	<ul style="list-style-type: none"> ○ Mobile money services ○ ICT access ○ Gender-focused ICT policies
Mbiti and Weil (2020)	Mobile banking and financial inclusion: Evidence from Kenya	<ul style="list-style-type: none"> ○ Mobile banking services ○ Mobile phone penetration ○ Supportive regulations
Khera and Singh (2021)	Digital payments and financial inclusion: Evidence from India	<ul style="list-style-type: none"> ○ Digital payment systems ○ Mobile wallets, ○ Government initiatives
Demirgüç-Kunt et al. (2021)	The Global Findex Database 2021: Measuring financial inclusion	<ul style="list-style-type: none"> ○ Mobile banking services ○ Digital financial services ○ ICT regulations
Issahaku and Abu (2021)	The role of ICT in financial inclusion in Sub-Saharan Africa	<ul style="list-style-type: none"> ○ ICT infrastructure ○ Mobile banking services ○ Regulatory environment

Allen et al. (2022)	Financial inclusion and development: The role of fintech	<ul style="list-style-type: none"> ○ Fintech innovations ○ Digital financial services ○ Regulatory support
Triki and Faye (2022)	Digital finance and financial inclusion in Africa	<ul style="list-style-type: none"> ○ Digital finance ○ ICT access ○ Supportive regulatory policies
Agyekum and Singh (2023)	Mobile money adoption and financial inclusion in rural Ghana	<ul style="list-style-type: none"> ○ Mobile money services ○ ICT access ○ Government support
Boateng et al. (2023)	Digital financial services and financial inclusion in developing countries	<ul style="list-style-type: none"> ○ Digital financial services ○ Mobile banking ○ ICT infrastructure
Onyuma and Bwire (2024)	The role of government regulations in enhancing digital financial inclusion	<ul style="list-style-type: none"> ○ Government regulations ○ Digital payment systems ○ ICT accessibility
Owusu-Ansah and Addo (2024)	Impact of digital technologies on financial inclusion in West Africa	<ul style="list-style-type: none"> ○ Digital technologies ○ ICT regulations ○ Mobile banking

Source: Author's construction

The studies described above all stress the role of ICTs and digital technologies in fostering financial inclusion, with minor differences in focus and geographical context. Ozili (2018) emphasized the importance of digital finance platforms, legislative backing, and ICT penetration, indicating a clear link between these factors and increased financial access. Similarly, Kumar, Mohanty, and Pereira (2018) stressed the role of government policies in driving financial inclusion in developing nations through the use of digital payment systems and mobile banking. Asongu and Nwachukwu (2018) also emphasized the importance of mobile banking and ICT infrastructure in promoting equitable development in Africa, echoing Sahay et al.'s (2020) findings, which identified fintech innovations and supporting regulatory frameworks as critical in the post-COVID-19 age.

Hinson, Lensink, and Mueller (2020) found that mobile money, ICT access, and gender-focused policies boosted financial inclusion significantly for African women. This is congruent with Mbiti and Weil's (2020) research in Kenya, which discovered that the usage of mobile phones and legislation that encourage them were significant determinants. Khera and Singh (2021) cited government initiatives, mobile wallets, and digital payment systems as key drivers of financial inclusion in India. Meanwhile, Demirgüç-Kunt et al. (2021) used the Findex Database to highlight the global impact of ICT laws, digital financial services, and mobile banking.

Studies in the Sub-Saharan African countries, like those by Issahaku and Abu (2021), mirrored Allen et al. (2022), who emphasized fintech innovations and digital services, by emphasizing the importance of ICT infrastructure and a supportive regulatory framework. The significance of digital finance and ICT access in Africa, bolstered by regulatory measures, was emphasized by Triki and Faye (2022). Agyekum and Singh

(2023) found that adoption of mobile money, ICT availability, and government backing were important drivers in rural Ghana. Boateng et al. (2023) found that similar factors were important in developing nations, where they also included digital financial services and mobile banking. Onyuma and Bwire (2024) investigated how laws may improve digital financial inclusion, and Owusu-Ansah and Addo (2024) concentrated on West Africa, stressing ICT laws, digital technology, and mobile banking as these studies all emphasize the value of digital financial platforms, mobile banking, ICT technology, and supporting regulatory frameworks.

However, their regional focus emphasizes the importance of a global research to better understand how these forces function throughout the world. A global viewpoint would enable the discovery of best practices, cross-national comparisons, and the development of international policy frameworks. Furthermore, it would give a broad knowledge of the relationship between ICTs, digital inclusion, and financial inclusion, taking into account various socioeconomic and cultural settings. Expanding research to a global scale allows for the creation of more effective solutions to improve financial inclusion using ICTs and digital technologies, therefore contributing to inclusive economic growth and development.

2.4 Research Gaps on Mobile Payments and Financial Inclusion

Technology can improve financial inclusion in a countless of ways. digitalization has led to increased automation of business operations and reorganization of the financial services industry's business models as a result of current Information Technology (IT) developments (Puschmann, 2017). FinTech upends the business models of financial services companies by altering how currently operating companies develop and provide financial services, permitting new entrants, generating a great deal of convenience and

privacy, and posing difficulties for law enforcement (Philippon, 2016). Examples of financial inclusion innovations are mobile banking, digital payments, agent banking, online lending platforms, blockchain and cryptocurrency, financial education apps and crowdfunding (Kanungo and Gupta 2021). Table 2.3 gives a summary of articles reviewed on mobile payments and financial inclusion showing the underpinning theory and framework, research method, and setting as well as relevant gaps for future research.

Table 2.5: Research gaps on mobile payments and financial inclusion

Author and year of publication	Focus of Research	Underpinning Theory and Framework	Relevant Gaps for Future Research
Lashitew et al. (2019)	Diffusion of mobile money innovations and financial inclusion	Diffusion of Innovations Theory	Factors influencing the diffusion of mobile money innovations
Ahmad et al. (2020)	Mobile money, financial inclusion and development: A review with reference to African experience	Development Economics Framework	Comparative analysis of mobile money services across different regions
Amoah et al. (2020)	Mobile money as a financial inclusion instrument: determinants	Determinants of Financial Inclusion	Determinants of mobile money usage in various contexts

Kirana and Havidz (2020)	Financial literacy and mobile payment usage as financial inclusion determinants	Theory of Planned Behavior	Role of financial literacy programs in mobile payment adoption
Son et al. (2020)	Mobile money, financial inclusion and digital payment: The case of Vietnam	Financial Inclusion Framework	Barriers to mobile money adoption in different socio-economic contexts
Ajouz et al. (2021)	Factors influencing mobile payment adoption and its role in promoting financial inclusion	Theory of Planned Behavior	Gender-specific barriers to mobile payment adoption
Ouyang (2021)	Cashless payment and financial inclusion	Financial Inclusion Framework	Challenges of implementing cashless payment systems in rural areas
Alrabei et al., (2022)	The impact of mobile payment on the financial inclusion rates	Diffusion of Innovations Theory	Impact of emerging mobile technologies on financial inclusion

Dharmastuti et al. (2022)	Consistency of mobile payment usage, performance, and financial inclusion	Performance Consistency Framework	Consistency and reliability of mobile payment systems
Lee et al. (2023)	Financial inclusion through mobile payment in low- and middle-income Asian countries	Sustainable Development Framework	Broader socio-economic impacts of mobile payments

Source: Author's construction

According to Alrabei et al.'s (2022) study, there is a need for research into the influence of developing mobile technologies and digital currencies on financial inclusion. Their findings, however, were consistent with Sapovadia's (2018) who studied on the financial inclusion, digital currency, and mobile technology focusing on digital financial services, and suggested that, future studies should delve more into impact of digital currencies on financial inclusion. While Alrabei et al (2022) study concentrates on the potential of new mobile technologies, Sapovadia (2018) were more concerned in the larger ramifications of digital currency. Both argue that technological improvements can drive financial inclusion, but it is critical to understand how new technologies can be properly integrated into current financial systems.

Donovan (2012) and Etim (2014) stress the necessity of longitudinal study and understanding the long-term repercussions of mobile banking and mobile money,

respectively. While Donovan (2012) however urges for more research into the long-term effects of mobile money services on financial inclusion, Etim emphasizes the importance of looking into their sustainability. These inequalities highlight the greater need for research into the long-term viability and impacts of digital financial services, rather than merely the immediate results. Kirana and Havidz (2020) and Etim (2014) discuss the importance of financial literacy and the integration of mobile banking with other digital services. Kirana and Havidz (2020) advocate for greater research into how financial literacy programmes may help people accept mobile payments, while Etim (2014) emphasizes the importance of studying how mobile banking can be integrated into other services. This reveals a knowledge gap about how educational programmes and full-service integration might improve financial inclusion.

According to Lee et al. (2023), Son et al. (2020), and Ajouz et al. (2021), it is critical to remove barriers to digital financial services that are particular to gender and socioeconomic status. While Son et al. (2020) stresses the importance of comprehending hurdles in various socioeconomic circumstances, Lee et al. advocate for research into the broader socioeconomic consequences of mobile payments, and Ajouz et al. concentrate on gender-specific challenges. These disparities emphasize the necessity for customized strategies that take into account the various obstacles that various demographic groups confront. Malala (2017), Kim et al. (2018), and Ouyang (2021) discuss the gaps in our knowledge of how regulatory policies affect mobile financial services. Malala focuses on regulatory issues in post-financial inclusion scenarios, Kim et al. (2018) stress the significance of comprehending how regulatory policies affect mobile financial services, and Ouyang pushes for research into the difficulties of implementing cashless payment systems in rural locations. These gaps

draw attention to the critical need for studies evaluating how laws and regulations support or impede efforts to promote financial inclusion.

Ajouz & Abuamria (2021) and Asfaw (2015) discuss the efficacy and scalability of mobile banking and payment solutions. While Ajouz (2021) and Abuamria (2020) concentrate on the efficacy of mobile payment solutions for women, Asfaw (2015) pushes for research into the scalability of mobile banking solutions. These gaps underscore the necessity of comprehending how effective digital financial services may be adjusted and expanded to meet the demands of diverse user segments. Chu (2018) and Dharmastuti et al. (2022) also highlight the need of researching the effectiveness of mobile technology in reaching underserved populations as well as the dependability and consistency of mobile payment systems. Chu (2018) encourages investigation into the potential applications of mobile technology to impoverished communities, however Dharmastuti et al. (2021) stress the importance of understanding the functionality and dependability of these systems. These differences suggest that adoption and sustained use of digital financial services are significantly influenced by behavioural and cultural factors.

There is broad consensus regarding the role that ICTs and digital inclusion play in advancing financial inclusion; however, there are still a number of unanswered questions regarding long-term sustainability, integration with other services, barriers related to gender and socioeconomic status, regulatory implications, scalability, and the influence of behavioural and cultural factors. By focusing research on these gaps, we may gain a deeper comprehension of the various scenarios in which digital technology might be effectively utilized to enhance financial inclusion.

2.5 Technology-Organization-Environment (TOE) Theory

The Technology-Organization-Environment (TOE) framework is a comprehensive model used to analyze how technological advancements are integrated within companies, considering three primary aspects: technological, organizational, and environmental contexts. This framework helps in understanding the complexities of technology adoption by factoring in the organization's internal capabilities and external influences. Discussing the application of information and communication technology (ICT) within the financial services sector, the "technological context" refers to the specific technologies available to a business, including digital platforms, mobile banking applications, online transaction processing systems, and cybersecurity protocols. This context is crucial as it determines a company's capacity to effectively adopt and implement new ICT solutions that can streamline financial transactions and services. The technological context essentially captures the current state of technology within the organization and its openness to adopting new digital solutions that could enhance financial service delivery.

Moving to the "organizational context," this involves factors like the company's size, scope, and management structure, which influence technology adoption and utilization. Larger organizations might have the capital to invest in cutting-edge ICT solutions, potentially increasing their ability to support digital inclusion. Conversely, smaller companies, despite budget constraints, might find it easier to adopt new technologies due to less bureaucratic resistance. The organizational structure also affects how ICT tools are deployed and the training provided to employees, fostering a workplace conducive to digital literacy and inclusiveness.

In terms of the "environmental context," it encompasses external factors such as market dynamics, competitive pressures, and regulatory frameworks. Regulation plays a critical role in shaping the ICT landscape by either facilitating or hindering the adoption of technologies through compliance demands. Regulations are essential for protecting consumer data, ensuring fair transaction processes, and preventing fraud, thereby building consumer trust in digital services and encouraging broader participation in the digital economy, which is crucial for financial inclusion.

Integrating these elements from the TOE framework is vital for promoting financial inclusion effectively. For instance, leveraging mobile money services, ATM services, blockchain technology and mobile financial services can enhance access to financial services and reduce transaction costs. Companies can foster inclusivity by establishing policies that enable the use of their digital platforms by diverse groups, thereby improving digital inclusivity. Regulatory facilitation is also important, as supportive legal measures ensure that ICT services are accessible, affordable, and secure for all, especially the economically disadvantaged. Guaranteeing trust in digital financial services and promoting more involvement in the digital economy are heavily reliant on regulatory assistance, which is critical for protecting consumer data and guaranteeing fair transaction procedures.

Effective regulatory frameworks are critical for building confidence between individual and financial services providers, enabling long-term involvement in digital financial services and other digital economic activity. Individuals may improve digital and financial inclusion by embracing new technologies like blockchain and mobile money services (Ahmed & Khan, 2022; Osei & Mensah, 2023). These technologies not only lower transaction costs, but also increase financial accessibility, especially for

impoverished individuals and marginalized groups. Companies play an important role in fostering economic inclusion and eliminating inequities by removing barriers to financial services and making banking and payment systems more accessible.

The Technology-Organization-Environment (TOE) paradigm offers a systematic way to identifying both possibilities and difficulties in the adoption of information and communication technologies (ICTs) across industries (Taylor & Francis, 2019; Abrahams & Jacobs, 2020). This approach takes into account the interactions between technology capabilities, organizational structures, and environmental variables including regulatory landscapes. By methodically assessing these aspects, individuals may create tailored plans that link ICT adoption with their unique demands and social goals. Embracing the TOE paradigm allows stakeholders to successfully manage the complexity of incorporating new technology into corporate operations while remaining compliant with regulatory standards (Chen & Wang, 2021; Singh & Sharma, 2021). This comprehensive strategy not only enables the adoption of ICT solutions that improve operational efficiency, but it also supports programs aimed at increasing digital and financial inclusion. Finally, utilizing regulatory support and new technologies within the TOE framework fosters inclusive economic development and social welfare by spreading the advantages of digital transformation among all individuals in the society.

2.6 Hypotheses Development

2.6.1 The relationship between ICT Adoption and Financial Inclusion

Financial transactions have advanced with the use of information and communication technology (ICT) equipment such as computers, internet connections, and mobile phones, making them more inclusive and accessible to a wider range of people (Mushtaq

& Bruneau, 2019; van Zanden, 2023). One of the most visible aspects of this transformation is the adoption of mobile money services, which have helped to reduce traditional financial barriers, particularly in underserved and rural areas (Ghosh & O'Neill, 2020; Kitimbo, 2021; Nan, Zhu, & Lynne Markus, 2021). Mobile money services have also facilitated access to financial services (Ouma, Odongo, & Were, 2017; Yu & Ibtasam, 2018).

According to N'dri and Kakinaka (2020) and Kim, Zoo, Lee, and Kang (2018), mobile money services have been effective in lowering barriers to financial services. These services, which allow transactions to be completed using mobile devices, have been a lifeline for places with a limited number of physical bank branches or none at all. This approach has had a special revolutionary influence on rural communities, where standard banking services are limited (Gomber et al., 2018). Pazarbasioglu et al. (2020) emphasize the importance of mobile money in solving the issue of financial inclusion. Mobile money allows individuals to conduct financial transactions without the use of traditional banking infrastructure. Because of this accessibility, the number of people who can participate in the financial system has significantly increased. This includes those who were previously excluded from using the system due to financial or geographic restrictions.

Okello Candiya Bongomin et al. (2018) and Upadhyay and Jahanyan (2016) did research that emphasizes the importance of digital payment systems including mobile money and online banking, as well as their interoperability. Communities and individuals who do not have easy access to traditional banking facilities might tremendously benefit from these services because they provide them with necessary financial access. Interoperability not only promotes the use and accessibility of digital

payments by facilitating smooth transactions between multiple platforms and institutions, but it also helps to advance financial inclusion(Croxson, Frost, Gambacorta, & Valletti, 2022; Malaguti, 2015; Pazarbasioglu et al., 2020). In terms of financial inclusion, it is widely acknowledged that the digital payment services sector has been successful in increasing financial inclusion.

According to Senyo and Osabutey (2020), Kim et al. (2018), and Aboagye and Anong (2020), the sector's ability to provide conveniently accessible, dependable, and convenient financial services is the major driver fueling its expansion. Individuals, particularly those who have previously been disadvantaged by the financial system, are drawn to digital payment services (Aziz & Naima, 2021). The integration of information and communication technologies into financial services has transformed the environment for financial inclusion significantly(Alam, Shichang, Muneer, Alshammary, & Zia ur Rehman, 2024; Hashemizadeh, Ashraf, Khan, & Zaidi, 2023; van Zanden, 2023). Information and communications technology have helped to empower and involve the economy by providing fundamental financial services via digital platforms(Aceto, Persico, & Pescap , 2018).

These services, however, must be further expanded and improved to help eliminate the final remaining barriers to financial inclusion and construct a more inclusive global financial system(Anakpo, Xhate, & Mishi, 2023; Tay, Tai, & Tan, 2022). This new trend emphasizes the importance of ongoing innovation, oversight, and financial support for information and communication technology (ICT) in order to ensure that the benefits of ICT continue to grow and reach an ever-increasing proportion of the global population(Altbach, Reisberg, & Rumbley, 2019; Vahdat, 2022). Hence, the hypothesis.

H1: The level of ICT adoption in a country positively influences financial inclusion

2.6.2 The linkage between ICT Adoption and Digital Inclusion

The integration of ICTs into financial services has been instrumental to bridging the digital divide through digital inclusiveness. Recent research, such as that conducted by Okello et al., (2020), highlighted on the significance of mobile money adoption, which is a kind of information and communication technology (ICT) utilization, in increasing digital consumer protection and, as a result, promoting digital inclusion. This helps provide a wider access to digital platforms and financial services, which is made possible by the widespread adoption of mobile technologies. In a similar vein, Sapovadia (2018) discusses the transformative impact that digital currencies and mobile technology have had on financial systems. The study demonstrated that technological advancements significantly foster digital inclusion by providing new means for financial engagement and inclusion of populations that are underbanked. This relationship is essential because it does not only make access easier, but it also guarantees that digital services are adapted to match the varied requirements of the majority of the world's population, which in turn increases user engagement and increases their level of happiness. Hence, the hypothesis,

H2: ICT adoption have significant and positive influence on digital inclusion.

2.6.3 The linkages between ICT Adoption and ICT Regulation

Several earlier studies conducted on ICT adoption has similar constructs including mobile tariffs, mobile phone prices and internet access (Adam and Alhassan, 2021; Khan and Krishnan, 2019; Khan, Krishnan, and Arayankalam, 2020). It is important to note that the acceptance and utilization of ICTs for mobile money services has significant influence on the initiation and implementation of legal and regulatory frameworks in the mobile payment services. As more individuals adopt ICTs for their

mobile payment services, there is possible threat of information security and fraudsters. Therefore, the need for regulatory policies that aimed at protecting individual wallets, cash and data become becomes key.

According to Khan, Krishnan, and Arayankalam (2020) the formulation and implementation of legislation that is specifically tailored to the management and protection of digital financial platforms is very sensitive. In addition to ensuring the safety of financial transactions and the compatibility of digital financial services with one another, these regulations address a wide range of concerns, including the protection of personal information. According to Merhi (2020), the policies of a nation's government have a direct impact on the degree to which its citizens accept information and communication technologies (ICTs) within that nation. The adoption of information and communication technologies (ICTs) is significantly improved by policies that are favourable, such as those that support the creation of digital infrastructure or that offer incentives for digital innovation and data privacy. The implementation of these regulations has the potential to lower the barriers to entry for new users and to encourage existing users to enhance their utilization of digital financial services.

Also, the regulatory framework has a substantial influence on the level of trust that clients have in financial services, which is a key component of the acceptance of these services. When consumers are given the assurance that legal safeguards are in place to protect their personal information and ensure the safety of their financial transactions, they are more likely to embrace and make regular use of digital financial services. This is because they are more likely to feel comfortable using these services. According to Adam and Alhassan (2021), regulations are implemented to strengthen the security of

users' wallet, cash and data. Again, users are safeguarded by rules that have been meticulously crafted, and these constraints also contribute to the development of an environment that is conducive to the growth of financial inclusion.

These services are more appealing to potential users, particularly those persons who have previously been excluded from the financial system. This is because the laws that are in place to assure the dependability and safety of mobile money services and other digital financial platforms make these services more appealing. Through the provision of reassurances of security and privacy, these technologies make it possible for a wider section of the general public to interact with them, which in turn widens the breadth of financial inclusion. Moreover, the regulatory environment for information and communications technologies (ICTs) is a crucial component in the process of supporting the secure and widespread adoption of these technologies for the facilitation of the provision of financial services.

Effective regulations that prioritise user security and trust can significantly accelerate the speed of financial inclusion. These rules can make digital financial services more accessible and trustworthy, hence accelerating the pace of financial inclusion. It is because of this that a greater number of people are able to gain access to financial services. In light of this, it is of the utmost importance for legislators, technology providers, and consumers to engage in a continuous conversation in order to ensure that rules are able to keep pace with the rapid advancements in technology and address any previously unknown challenges that may arise. This strategy not only helps to promote the growth of the digital economy, but it also contributes to the progress of the goals that governments all over the world have set for themselves in terms of financial inclusion. Hence, the hypothesis.

H3: The level of ICT adoption in a country positively influences ICT regulation

2.6.4 The association between Digital Inclusion and Financial Inclusion

Several scholarly literatures (Okello et al., 2020; Jia and Kanagaretnam 2024; Natile 2020) have highlighted on the transition from digital inclusion to financial inclusion as a natural progression. Afroze and Rista (2022) investigated the ways in which mobile financial services (MFS) not only promote digital inclusion but also enhance customer retention and perceptions, all of which are essential for the achievement of sustainable financial inclusion measures. This study highlighted the significance of digital platforms in boosting the stability and attractiveness of financial services, which is crucial for the retention of users over the long term and for the modification of financial behaviour. There is a substantial role that digital platforms play in enhancing the stability and attraction of financial services, which are essential for maintaining user engagement and promoting changes in financial behaviours over time.

The research underlines the significant impact that digital platforms play in this regard. Furthermore, Jia and Kanagaretnam (2024) study on peer-to-peer lending, throws light on how digital platforms greatly assist in breaking down financial barriers for populations that are considered to be underrepresented. Furthermore, according to Ifediora, Offor, Eze, Takon, Ageme, Ibe and Onwumere (2022), financial inclusion is an essential component in the construction of inclusive growth. Pradhan, Arvin, Nair, Hall and Bennett (2021) and Liu, Luan, Wu, Zhang and Hsu (2021) prove, through the use of the generalized method of moment (GMM), that the distribution of mobile phones considerably stimulates economic growth in Africa because it encourages financial inclusion.

Digital financial services are currently being developed in the majority of African countries, and they are promoting growth at both the business and national levels. This is in support of the assumption that sustained growth may be achieved through increased financial inclusion. By providing opportunities such as branchless banking, the Department of Financial Services (DFS) makes it possible for those who have little or no access to the official financial sector to engage in financial activities at a minimum cost. According to the findings of the research (Khan, Zafar, Okunlola, Zoltan and Robert 2022; Singh and Stakic 2021; Ifediora et al., 2022) conducted up to this point, technological deepening thus; digital inclusion deepens the financial process even more and finally leads to inclusivity. Therefore, the hypothesis,

H4: Digital inclusion significantly and positively influences financial inclusion.

2.6.5 The nexus between ICT Regulation and Financial Inclusion

The legal and regulatory frameworks that are now in place have a considerable impact on the adoption of information and communication technologies (ICTs) for financial services. According to studies conducted by Adam and Alhassan (2021), Khan and Krishnan (2019) and Khan, Krishnan, and Arayankalam (2020), the formulation and implementation of regulations tailored to the management and protection of digital financial platforms play a significant part in determining the adoption rates of information and communication technologies (ICTs). These regulations cover a variety of concerns, including the protection of personal information, the safety of financial transactions, and the compatibility of digital financial services among individuals. According to Merhi (2020), the acceptance of information and communication technologies (ICTs) by a country is directly influenced by the policies of the government.

The adoption and utilization of information and communication technologies (ICTs) is considerably boosted by policies that are favourable, such as those that encourage the construction of digital infrastructure or that offer incentives for digital innovation. The adoption of these regulations has the potential to reduce the barriers to entry for new users and to encourage existing users to increase their utilization of digital financial services.

Trust from customers is an essential component of the uptake of financial services, and the regulatory framework has a significant impact on this element. Users are more inclined to adopt and make frequent use of digital financial services when they have the assurance that legal measures are in place to safeguard their personal information and ensure the safety of their financial transactions. Adam and Alhassan (2021) emphasize that rules that improve the security of individuals' wallets, cash, and data are essential for the development of this trust. Users are protected by regulations that have been carefully crafted, and these restrictions also help to create an atmosphere in which financial inclusion can flourish (Oyewole, Oguejiofor, Eneh, Akpuokwe, & Bakare, 2024; Suzor, 2019). The laws that are in place to ensure the dependability and safety of mobile money services and other digital financial platforms make these services more appealing to potential users, particularly those individuals who have historically been excluded from the financial system (Ahmad, Green, & Jiang, 2020; Pazarbasioglu et al., 2020). According to Ferrari (2022), providing reassurances of security and privacy, these technologies make it possible for a larger portion of the public to interact with them, which in turn expands the scope of financial inclusion.

The regulatory environment for information and communications technologies (ICTs) is an essential component in fostering the secure and widespread adoption of these

technologies for the provision of financial services (Chatterjee, 2020; van Zanden, 2023). By making digital financial services more accessible and trustworthy, effective rules that prioritize user security and trust can dramatically accelerate the pace of financial inclusion. This helps to ensure that more people have access to financial services. For this reason, it is vital for legislators, technology providers, and consumers to maintain an ongoing discourse in order to guarantee that regulations are able to keep up with the rapid improvements in technology and handle any new difficulties that become apparent. This strategy not only helps to foster the expansion of the digital economy, but it also contributes to the advancement of the objectives of countries all over the world regarding financial inclusion. Hence, the hypothesis.

H5: The level of ICT regulation has a positive influence on financial inclusion

2.6.6 The mediating effect of digital Inclusion on the impact of ICT Adoption on Financial inclusion

It is imperative that digital inclusion plays a mediating role in the interaction between ICT adoption and financial inclusion to guarantee that everyone, especially underserved and unbanked individual, may benefit from technology. Digital inclusion is more than simply giving people access to digital technologies; it also includes making sure they have the abilities, information, and assistance they need to utilize them efficiently. Having access to training in digital literacy and receiving high-quality technical assistance are two essential elements of digital inclusion. These are essential to influencing individuals to adopt ICTs for financial services. To equip people with the skills they need to utilize digital financial services, access to digital literacy training is crucial. Individuals may learn how to utilize mobile money services, internet banking platforms, and mobile banking apps by enrolling in training programs by the service providers.

Park and Jang's (2020) research, for instance, emphasizes the significance of digital literacy in raising the use of digital financial services. They discovered that those who had instruction in digital literacy are more likely to make efficient use of online and mobile banking services, which enhances financial inclusion. Again, individuals adopt mobile money services, online payment services and internet banking services when they presume there is high-quality technical assistance. Individuals may get the help they need from technical support to fix problems that could occur while using digital technology. This keeps Momo users' interest and confidence in digital financial services requires ongoing technical assistance. According to research by UNESCO in 2021, continuous technical assistance greatly lowers user annoyance and boosts trust in digital financial networks. People are better equipped to use digital financial services efficiently when they obtain training in digital literacy and high-quality technical assistance. Education and training on technologies technical assistance are two factors that drives the difference between individual adoption to technology and utilizing it effectively for financial services.

Chen and Cheng (2019), for instance, discovered that financial inclusion is significantly predicted by digital literacy. According to their study, those with a higher level of digital literacy are more likely to utilize internet and mobile banking services, which promotes broader financial inclusion. In a similar vein, ongoing technical assistance guarantees that consumers can get beyond technical obstacles, continue using digital financial services, and develop confidence in these platforms. The connection between ICT adoption and financial inclusion is significantly mediated by digital inclusion. Digital inclusion guarantees that people have access to high-quality technical assistance and training in digital literacy, enabling them to utilize ICT efficiently. More financial inclusion results as a result of this increasing the uptake and use of digital financial

services including internet banking, mobile money, and mobile banking. Therefore, to promote the adoption of ICTs for financial inclusiveness, it is imperative to create an inclusive financial environment where everyone has access to basic financial services, through the implementation of effective digital inclusion programs. Therefore, the hypothesis,

***H6:** Digital inclusion significantly and positively mediates the impact of ICT adoption on financial inclusion*

2.6.7 The mediating role of ICT Regulation on the effect of ICT Adoption on Financial inclusion

Furthermore, this study argues that ICT regulation significantly mediate the nexus between ICT adoption and financial inclusion. The effectiveness of regulations governing ICT adoption has a considerable impact on their uptake in financial services. Deposits, withdrawals, remittances, and bill payments are examples of digital payment systems that make financial services more accessible and cheaper to a wider range of individuals, especially the poor and disadvantaged. A well-regulated ICT environment increases ICT adoption and financial inclusion (Bibri, Alexandre, Sharifi, & Krogstie, 2023; Botterman, Cave, & Doria, 2020; Mensah, Chuanyong, & Zeng, 2020). Positive ICT regulations increase trust and confidence in these technologies, encouraging individuals to use digital payments such as mobile money, internet payments, mobile banking, and ATMs for financial transactions. Regulatory facilitation is also crucial as supportive legal measures ensure that ICT services are accessible, affordable, and secure for all, particularly for economically disadvantaged individuals. For example, regulations that cap transaction fees for digital payments can make these services more affordable for low-income users.

Similarly, policies that mandate the provision of free basic internet services can ensure that everyone has access to the digital economy. The adoption of ICTs for financial services is deeply tangled with the effectiveness of the regulatory environment. Positive ICT regulations that enhance security, promote innovation, and ensure affordability are essential for building trust and confidence in digital financial services. By fostering digital inclusion and supporting the adoption of ICTs, these regulations can significantly enhance financial inclusion, providing underserved and vulnerable populations with access to essential financial services. The TOE framework offers a comprehensive approach to understanding the interplay between technology, organization, and environment, highlighting the critical role that regulations play in creating an inclusive financial ecosystem. Again, Srivastava and Teo (2010) suggest that robust regulations by both government and service providers considerably lower the risks of fraud and loss of cash, benefiting both public and individual. Hence, the hypothesis:

H7: ICT regulation significantly and positively mediates the relationship between ICT adoption on financial inclusion

Based on the discussions above, the study's research model is presented in figure 1.

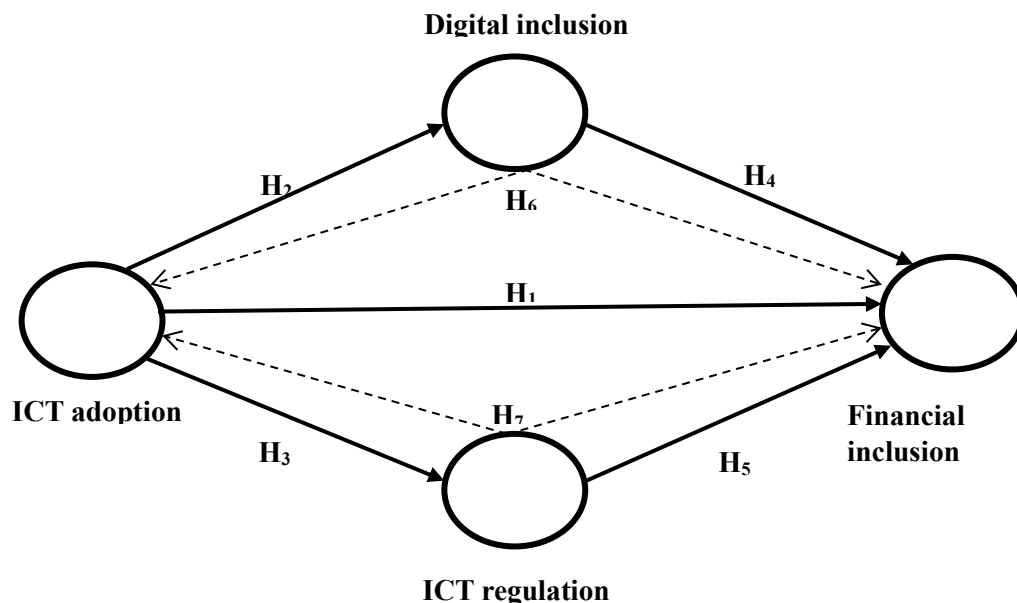


Figure 2.1: Conceptual framework of the research

2.7 Chapter Summary

This chapter examines the research on ICT regulation, digital inclusion, ICT adoption, and their effects on financial inclusion. It begins with definitions of essential terms including ICT, ICT adoption, ICT laws, and digital financial inclusion. ICT is defined as technology tools used to create, share, and exchange information. ICT adoption entails employing gadgets and networks to connect to the internet. ICT regulations include rules and guidelines that govern the use and dissemination of ICT. Digital financial inclusion refers to fair access to ICTs that enable participation in socioeconomic activities, including financial services.

The chapter examines the development of financial inclusion, highlighting notable advancements in mobile money services and digital payments. Key digital technologies supporting financial inclusion include mobile money, online banking, mobile banking, cryptocurrencies, ATMs, and artificial intelligence (AI) in financial services. Access to

financial services has changed as a result of these advancements, particularly for underprivileged groups. Notwithstanding the progress made, obstacles like security worries, legal issues, and disparities in digital literacy continue to exist. The long-term effects of mobile technologies, their integration with other digital services, and barriers pertaining to gender and socioeconomic status are among the research gaps that have been found. To bridge these gaps, focused research is needed to determine how digital technologies might best advance financial inclusion in various settings.

The chapter further discussed the research model that was adopted for the study. This study however adopted the Technology-Organization-Environment framework in order to examine the linkages between ICTs, digital inclusion and financial inclusion in both developed and developing economies. This theory was selected over theories such as the technology acceptance model, digital divide, unified theory of acceptance and use of technology and the diffusion of innovation because it aided the research to incorporate both technology, organization and environment constructs in the research model. In addition, the theory supports post-adoption studies in the field of IS.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The previous chapter focused on the literature review theory and hypothesis development of this study where Technology-Organization-Environment (TOE) framework was reviewed. This chapter continues with research methodology position by examining the linkages between ICTs, digital inclusion and financial inclusion. The chapter focuses on further discussions on the research paradigm, research method, participants sitting, data source, data and method of the data analysis technique.

3.2 Research Approach

The research approach refers to the overarching strategy or plan that guides how the study is conducted. According to Hunziker and Blankenagel (2024), a research method is a set of procedures, tools, and techniques used to collect and analyze data. Azevedo et al., (2024) stated that there are three main categories of research methods that are widely used by researchers. They are Qualitative, Quantitative and Mixed Techniques. Qualitative research is used to describe variation, explain relationships, describe individual experiences, and describe group norms (Hennink, Hutter & Bailey, 2020). Qualitative research entails the deliberate use of collected data for the purposes of describing, explaining, and interpreting it. According to Wisdom, Cavaleri, Onwuegbuzie, and Green, (2012), Qualitative research is less structured in description and helps to build and formulate new theories. Apuke (2017), on the other hand, defined quantitative research as a research approach that builds upon existing theories, making it specific in its surveying and experimentation. Data is used to objectively measure

reality in quantitative research because the research is independent of the researcher and it helps to create meaning as a result of the objectivity revealed in the collected data

Finally, the mixed methods approach to research is an extension of, not a replacement for, the quantitative and qualitative research approaches (Wisdom, Cavaleri, Onwuegbuzie, & Green, 2012). Collins, Onwuegbuzie, and Johnson (2012) went on to say that the goal for researchers using the mixed methods approach is to capitalize on the strengths of quantitative and qualitative research approaches while minimizing their weaknesses. The mixed-methods approach to research enables researchers to combine data collection and analysis methods from quantitative and qualitative research approaches in a single research study (Creswell & Creswell, 2017). However, for the purpose of this study, quantitative research method was adopted, specifically the cross-sectional design. Quantitative research allows for the precise measurement of variables such as the extent of ICT usage, levels of digital inclusion, and indicators of financial inclusion (Bermeo 2019). These variables can be quantitatively assessed through surveys, usage data, and other statistical data, providing a clear and objective measurement framework. The use of statistical analysis is a core strength of quantitative methods, facilitating the examination of relationships and effects between different variables, such as statistically analyzing how variations in digital inclusion impact financial inclusion metrics (Wang & Guan 2017). This is crucial for identifying and understanding trends, correlations, and causations within large datasets. Again, quantitative design was adopted against other designs since the research involved a larger sample size as a representative of broader population and its appropriate design for a larger sample size (Lohr, 2021; Mthuli, Ruffin, & Singh, 2022). Also, the topic involves potentially complex interactions between ICT, digital inclusion, and financial inclusion. Therefore, quantitative method was appropriate since it enable the

formulation and testing of specific hypotheses regarding these interactions. For instance, you might hypothesize that increased access to ICT leads to higher levels of financial inclusion through digital means. Quantitative methods allow for rigorous testing of such hypotheses through structured experimental or observational study designs (Leavy, 2022).

This is because it unquestionably enables the researcher to gather and analyze numerical data and it stands the test of objectivity and replicability, and allows the test for hypothesis of the existing theory.

3.3 Research Design

According to Kothari, (2004), a research design means setting up the parameters for data collection and analysis to give the research objective significance and relevance. This strategy offers a comprehensive framework for gathering data for the research. That is, it is a plan for selecting subjects, research sites and data collection procedures to answer the research question and obtain reliable results. Mafuwane, (2012) outlined the study plan as a deliberate sequence of steps meant to establish a connection between the research questions and the strategy's execution. It is a schedule that directs the selection of sources of data and categories in accordance with research questions (Cooper and Schindler, 2014). For the purpose of this study, a cross-sectional research design was employed, which aligns with the quantitative research approach. A Cross-sectional study allow researchers to collect data at a single point in time from a larger sample size, making it a suitable choice when examining the relationships between variables across a broad population (Lohr, 2021; Mthuli, Ruffin, & Singh, 2022).

This design is particularly relevant for assessing the linkages between ICT adoption, ICT regulation, digital inclusion, and financial inclusion because it enables the researcher to gather data from a representative sample and perform statistical analyses to test hypotheses. For instance, one could hypothesize that increased ICT access enhances financial inclusion through greater digital participation. Cross-sectional design allows for such hypotheses to be examined in a structured, time-bound manner, facilitating clear insights into the relationships between these variables (Leavy, 2022).

Additionally, the design's ability to manage large datasets while ensuring objectivity and replicability makes it ideal for identifying correlations, causality, and trends in the data. This ensures that the findings are both robust and generalizable across a wider population, allowing for greater confidence in the results.

3.4 Population of the Study

The study population is made up of all the 131 countries listed on the Network Readiness Index report with available data for 2022. This comprise of both developed and developing countries across the globe with data on performance in the area of technology, people, governance and impact. The 131 countries for the 2022 index include 49 high-income economies, 32 upper-middle-income economies, 36 lower-middle-income economies and 14 low-income economies (NRI 2022). The study population of 131 countries listed on the NRI 2022 data base is justifiable since data for three of the research constructs (ICT Adoption, ICT Regulation and Digital Inclusion) both draw their data from the NRI 2022 report (Soon, Rui & Ei 2023).

3.5 Sampling and Sampling Techniques

A convenient purposive sampling approach was used to select 107 countries from 131 developed and developing economies available on the 2022 NRI report (Meer 2023). A selection criterion was developed to facilitate the sampling. These include; data availability and accessibility on financial inclusion on the global financial development report on the world development indicator database for the scope of the study, thus the year 2022. Therefore, economies among the 131 economies on the NRI report for 2022 that had data on the financial inclusion indicators for the research were selected for the analysis ((Varsha Pramod & Ramachandran 2023). The list of these selected 107 economies that met the criteria are presented in the Appendix 1 of this report.

3.6 Sample Size

According to Hair Jr, Hult, Ringle, and Sarstedt, (2016), the minimum sample size required for this study will be 10 times the construct with the highest number of reflective indicators. Therefore, the 10-times rule was used to determine the minimum sample size for this study. That is, the minimum sample size must be 10 times the construct with the most reflective indicators (i.e., ICT adoption and financial inclusion with 6 indicators each). Following the recommendations by Peng and Lai (2012), the minimum required sample size for the study was $10 \times 6 = 60$. Therefore, the 107 countries used in this study as a sample size was deemed appropriate **Table 3.1** summarizes the constructs and their associated indicators used in this study.

3.7 Data Source

Consistent with prior studies in ICTs for digital inclusion and financial inclusion, Adam et al., (2020); Dash, Singh, Panda, & Sharma (2023); Yu, Jin, Zhang, & Chong, (2023), this study utilized data from secondary sources for 107 countries across the globe. The data on ICT adoption, digital inclusion and ICT regulation were drawn from a secondary data source (the Network Readiness Index Report (NRI) (2022), which is an index published annually by the World Economic Forum in collaboration with INSEAD, as part of their annual Global Information Technology Report (Barboutidis, & Stiakakis, 2022). It aims to measure the degree of readiness of countries to exploit opportunities offered by information and communications technology.

Also, data on financial inclusion was drawn from Global Financial Development Report (2022) of the World Development Indicator Database which has its theme as financial inclusion. The Global Financial Development Database is a comprehensive collection of financial system characteristics for 214 economies. It includes annual data that covers numerous elements of financial institutions and markets. Due to the large number of countries used as well as resource and time constraints, it was not feasible for the researchers to collect primary data across global countries.

The use of these secondary data sources provided a reliable database for this study. The conceptual model (see Figure 1) comprises four (4) latent constructs, that is., ICT adoption, ICT regulation, Digital inclusion and Financial Inclusion. The measurement items for ICT adoption, ICT regulation, Digital inclusion was drawn from the NRI 2022, whilst the indicators for Financial Inclusion was drawn from the Global Financial Development Report (2022). First, ICT Adoption is measured by six (6) items that includes, mobile tariffs, handset prices, FTTH/building Internet subscriptions,

population covered by at least a 3G mobile network, International Internet bandwidth, and Internet access in schools., ICT Regulation use has five (5) indicators: Regulatory quality, regulatory environment, Regulation of emerging technologies, e-commerce legislation, and privacy protection by law content.

Digital Inclusion is also measured by five (5) items that includes E-Participation, Socioeconomic gap in use of digital payments, Availability of local online content, Gender gap in Internet use and Rural gap in use of digital payments. Finally, the dependent construct, Financial Inclusion is measured by six (6) indicators: Account at a formal financial institution, Account for receiving government payments, Account used to receive remittances, Account used to receive wages, Mobile phone used to pay bills and Mobile phone used to send money.

Table 3.1. Summary of construct, indicators, and source

S/N	Construct	Indicator	Acronym	Sources of data
1a	ICT Adoption	Mobile tariffs	ICTA1	Network Readiness Index Report (2022)
1b		Handset prices	ICTA2	
1c		Building internet subscriptions	ICTA3	
1d		3G mobile network	ICTA4	
1e		International Internet bandwidth	ICTA5	
1f		Internet access in schools	ICTA6	
2a	ICT Regulation	Regulatory quality	ICTR1	
2b		regulatory environment	ICTR2	

2c		Regulation of emerging technologies	ICTR3	
2d		e-commerce legislation	ICTR4	
2e		privacy protection by law content	ICTR5	
3a	Digital Inclusion	E-Participation	DI1	
3b		Socioeconomic gap in use of digital payments	DI2	
3c		Availability of local online content	DI3	
3d		Gender gap in Internet use	DI4	
3e		Rural gap in use of digital payments	DI5	
4a	Financial Inclusion	Account at a formal financial institution	FIM1	Global Financial Development Report (2022)
4b		Account for receive government payments	FIM2	
4c		Account used to receive remittances	FIM3	
4d		Account used to receive wages	FIM4	
4e		Mobile phone used to pay bills	FIM5	
4f		Mobile phone used to send money	FIM6	

Source: Author's construction

3.8 Method of Data Analysis

Partial Least Squares- Structural Equation Modelling (PLS-SEM) with the help of SmartPLS version 4 was utilized for the analysis of the data. Unlike other approaches to SEM such as the Covariance Based SEM (CB-SEM), PLS-SEM is an approach to SEM with no data distribution assumptions (Vinzi, Chin, Henseler, & Wang, 2010). According to Hair, Risher, Sarstedt, and Ringle, (2019), when estimating complex models with several constructs, indicator variables, and structural linkages, PLS-SEM is a helpful technique. Furthermore, in research including mediator and moderator analysis, PLS-SEM is helpful (Hair, Ringle, & Sarstedt, 2011; Hair, Risher, Sarstedt, & Ringle, 2019).

Structural Equation Modelling (SEM) is a multivariate data analysis technique that has been widely adopted by IS research for construct validation and testing the relationships between constructs (Islam, Mofiz Uddin, & Rahman, 2024). SEM is “a class of approaches that aims to represent hypotheses about the means, variances, and covariances of observed data in terms of a smaller number of "structural" parameters defined by a hypothesized underlying model (Marrelec & Giron, 2024)”. There exist two main approaches to SEM. That is, Covariance based SEM (CB-SEM) using software packages such as Mplus, AMOS, LISREL, etc. and Partial Least Squares SEM, which centers on the analysis of variance and can be undertaken using software packages such as SmartPLS and ADANCO (Hair, Risher, Sarstedt, and Ringle, 2019; Wong, 2019).

This study adopted the PLS-SEM approach. This was mainly because, unlike CB-SEM, PLS-SEM is an approach to SEM with no assumptions about data distribution (Vinzi, Chin, Henseler, and Wang, 2010). That is, PLS-SEM is useful in research projects

where there are limited respondents and data distribution is skewed (Wong, 2011). In addition, the researcher adopted PLS-SEM because the objective of the study was to examine the relationship between dependent constructs and the independent constructs using the effect size and predictive relevance which is not offered using CB-SEM (Astrachan, Patel and Wanzenried, 2014).

The first step in evaluating or assessing results in PLS-SEM demands examining the measurement models. Essentially, the assessment or estimation of the measurement model aids the researcher to compare the theory adopted for the study and the real data collected for the study as well.

The applicable criteria for assessing measurement models differ for formative and reflective constructs (Hair, Risher, Sarstedt, and Ringle, 2019; Urbach and Ahlemann, 2010). This study comprised of constructs that were reflective, a test for reliability and validity of the measurement model before an assessment of the structural model was required. This study assessed for indicator reliability, internal consistency for reliability, convergent validity and discriminant validity by ensuring the application of the standard decision rules (Hair et al., 2019). After the measurement model had been validated successfully, the next step was to assess the structural model (Hair et al., 2019; Urbach and Ahlemann, 2010). The following five essential steps were used to assess the structural model as suggested by (Hair et al., 2019; Urbach and Ahlemann, 2010). That is an assessment of the structural model for collinearity issues, assessment of the significance and relevance of structural model relationships, assessment of the Goodness of Fit (GOF), assessment of the effect size (f-square) and assessment of the predictive relevance (q-square). After the assessment of the measurement and structural model was completed, a multi-group analysis was performed in order to examine the

effect of moderating variable (ICT regulation) on the relationship between independent construct and the dependent construct.

3.9 Ethical Consideration

In conducting the research on *"Examining the Linkages Between ICT Adoption, ICT Regulation, Digital Inclusion, and Financial Inclusion,"* ethical considerations play a crucial role in ensuring the responsible and transparent use of secondary data from the NRI (Network Readiness Index) report and GFD (Global Financial Development) report. Since the study relies on secondary data from established sources, it is essential to ensure the integrity and accuracy of the information. The research carefully verified that the data used were current, reliable, and properly sourced to avoid any inaccuracies that could lead to misleading conclusions or flawed findings.

Proper acknowledgment of the data sources was another important ethical consideration. The research strictly adheres to citation guidelines, giving due credit to the original sources of the secondary data. This ensure academic integrity and prevent plagiarism, which is vital when using publicly available datasets such as the NRI report and GFD database. Transparency regarding how the data is selected and processed is also necessary. The study clearly explains the data selection process, ensuring that the analysis is aligned with the study's objectives and that the conclusions drawn are rooted in the accurate use of secondary information.

Although the study uses publicly available data, the ethical use of this information remains a key focus. It is important to ensure that the data are not manipulated or misrepresented in any way to achieve specific results. The research adheres to ethical standards by objectively using the data and reporting findings based solely on the

analysis, avoiding bias or distortion of the information. While the data are aggregated and do not involve personal interactions, respect for the privacy of the entities or countries represented is essential. The study ensure that no sensitive information is misused or presented in a way that could harm the reputations of those indirectly connected to the data.

Additionally, the research complied with all legal and institutional guidelines governing the use of secondary data. This includes respecting the terms and conditions set forth by the NRI and GFD databases, as well as following the ethical guidelines of the institution overseeing the research. By addressing these ethical considerations, the study guarantees that the use of secondary data is carried out responsibly and transparently, adhering to the highest academic and ethical standards.

3.10 Chapter Summary

This chapter discussed the research methodology adopted to answer the research questions of this study. The research paradigm chosen was discussed and justified, as well as the research method, data source, and analysis method.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION

4.1 Introduction

This chapter reports how the proposed research model is evaluated and tested using PLS-SEM. This chapter has three parts. The first part reports the assessment of the measurement model for indicator reliability, internal consistency for reliability, convergent validity and discriminant validity by ensuring the application of the standard decision rules. The second part focuses on the assessment of the structural model for multicollinearity issues, goodness of fit, significance of coefficient, effect size and predictive relevance. The final part assessed the influence of the mediating; digital inclusion and ICT regulations on the relationship between the independent constructs and the dependent constructs.

4.2 Assessment of Measurement Model

The first step in the evaluation of results in PLS-SEM requires the examination of the measuring models. All the constructs in this study were reflective as such, the need to test the measurement model's reliability and validity before a structural model assessment can be carried out. Thus, this study evaluated the reliability of the indicator, internal consistency for reliability, convergent validity and discriminatory validity by ensuring that the standard decision rules are applied (Hair et al., 2019; Urbach & Ahlemann, 2010).

4.2.1 Indicator Reliability

In order to check for the indicator reliability, reflective indicator loadings are monitored. Indicator loadings of 0.708 and above are recommended because they show that the construct or latent variable explains more than 50 percent of the variance of the indicator and thus ensures acceptable reliability of the item. (Hair et al., 2019). Not all indicators, however, were significantly loaded on their corresponding latent variables. As a consequence, they were removed from the model (Gefen and Straub, 2005). That is, when the analysis was first run, some of the indicators were less than the minimum required threshold.

Specifically, ICTR2 (0.684), ICTR4 (0.539) and ICTR5 (0.471), for measuring ICT regulation were deleted. Also, for ICT adoption, ICTA3 (0.262), ICTA4 (0.615) and ICTA5 (0.634) did not meet the threshold of 0.708 and were deleted. DI4 (0.447) as a measure of digital inclusion was also deleted, and FIM2 (0.566), FIM3 (0.200) and FIM6 (0.331) as indicators for measuring financial inclusion were deleted as its indicator loading were below the threshold. All other indicators loaded significantly on their corresponding latent variables. This meant indicators satisfied the minimum threshold requirement. This means they were a good measurement of the latent variables. Results were then extracted in order to conduct an assessment and evaluation of the measurement and structural model. **Figure 4.1** shows the indicator loadings after ICTR2, ICTR4, ICTR5, ICTA3, ICTA4, ICTA5, DI4, FIM2, FIM3 and FIM6 was deleted and the model re-run using the PLS algorithm.

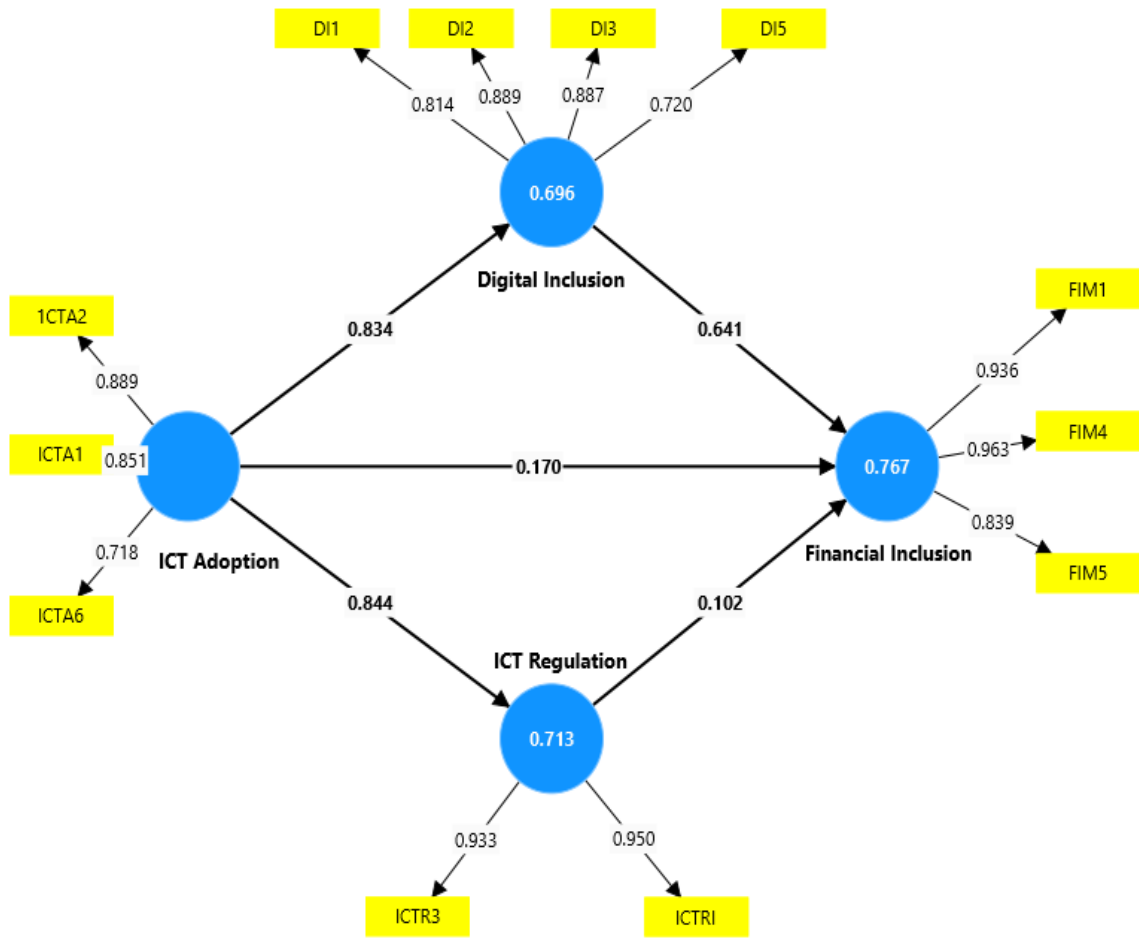


Figure 4.1: Results of PLS analysis

4.2.2 Internal Consistency Reliability

The second step, after testing for the accuracy of the indicator, is to use Cronbach's alpha to test internal consistency quality. The high alpha value of Cronbach's indicates that the scores of all indicators in a latent variable are of the same range and meaning (Cronbach, 1951). The minimum threshold for Cronbach's alpha is 0.70 (Nunnally, 1978). All latent variables or constructs had an Alpha value of over 0.70 for Cronbach's as shown in Table 4.1. It should be noted that researchers have criticized the Cronbach's alpha for showing lower values and being a less accurate measure of reliability as the items are unweighted (Hair et al., 2019; Urbach & Ahlemann, 2010). As such, an alternative measure was suggested for indicator reliability. That is Joreskog's (1971)

composite reliability. Joreskog (1971) Composite reliability was introduced to address the shortfalls of Cronbach’s alpha (Urbach & Ahlemann, 2010).

Composite reliability on the other hand assumes, unlike Cronbach's alpha, that all indicators have different loadings (Henseler, Ringle, and Sinkovics, 2009), and this serves as a better measure of indicator reliability (Chin, 1998). Higher values indicate higher reliability levels, i.e. reliability values between 0.60 and 0.70 are considered to be "acceptable to exploratory research". In addition, values between the ranges of 0.70 and 0.90 indicate “satisfactory to good” and values 0.95 and above are regarded as problematic as they show that the items are more than what is required, thereby leading to a reduction in construct reliability (Diamantopoulos, Sarstedt, Fuchs, Wilczynski, & Kaiser, 2012). Composite reliability values from the results range from 0.862 to 0.940 which indicates “satisfactory” to “good” as indicated in **Table 4.1**. In addition to composite reliability, Rho_C is considered an alternative to measure consistency reliability (Dijkstra & Henseler, 2015). Rho_C values of 0.70 are recommended. All latent variables possess Rho_C values of more than 0.70 as indicated in **Table 4.1**.

Table 4.1: Construct Reliability

Constructs	Cronbach's alpha	rho_A	rho_C
Digital Inclusion	0.848	0.868	0.898
Financial Inclusion	0.902	0.935	0.938
ICT Adoption	0.759	0.783	0.862
ICT Regulation	0.873	0.884	0.940

4.2.3 Convergent Validity

Average Variance Extracted (AVE) is the criterion used to assess convergent validity (Fornell & Larcker, 1981). To measure the AVE, each indicator loading on a construct

must be squared and the mean value determined. The threshold for AVE is 0.50 (Hair et al., 2019). This means that the latent factor or construct explains at least 50 percent of the variability of its items and thus demonstrates sufficient convergent validity (Hair et al., 2019; Urbach & Ahlemann, 2010). Table 4.2 shows AVE values above the minimum threshold of 0.50 and therefore adequate convergent validity was achieved.

Table 4.2: Convergent Validity (Average variance extracted)

Constructs	Average variance extracted (AVE)
Digital Inclusion	0.690
Financial Inclusion	0.836
ICT Adoption	0.677
ICT Regulation	0.887

4.2.4 Discriminant Validity

The fourth step is to evaluate discriminant validity. Hair et al. (2019) defines discriminant validity as the “extent to which a construct is empirically distinct from other constructs in the structural model”. Two measures are commonly used in PLS-SEM to determine or evaluate discriminant validity. The first calculation is the cross-loading resulting from the combination or comparison of each latent variable score with all other items (Chin, 1998). Where each indicator loading is higher for its construct than for any other construct and each of the constructs or latent variables loads highest with its indicators or assigned items, it can be generalized that, the indicators of the latent variable or construct are discriminant of each other. That is, they are not interchangeable. From Table 4.3, it can be inferred that the latent variables are

discriminant of each other as they load the highest on their assigned constructs than any other construct (s).

Table 4.3: Indicator item cross loading

Measurement item	Digital inclusion	Financial inclusion	ICT adoption	ICT regulation
DI1	0.814	0.710	0.714	0.693
DI2	0.889	0.783	0.687	0.672
DI3	0.887	0.761	0.853	0.839
DI5	0.720	0.611	0.460	0.456
FIM1	0.884	0.936	0.797	0.753
FIM4	0.834	0.963	0.782	0.796
FIM5	0.620	0.839	0.551	0.517
ICTA1	0.748	0.689	0.851	0.666
ICTA2	0.759	0.693	0.889	0.817
ICTA6	0.529	0.560	0.718	0.582
ICTRI	0.799	0.792	0.825	0.950
ICTR3	0.736	0.647	0.762	0.933

The Fornell and Larcker (1981) criterion is the second measure for discriminant validity. Fornell and Larcker (1981) suggest that a latent variable should share more variance with the indicators assigned to it than with any other latent variable in order to achieve discriminant validity. In a nutshell, the AVE of each latent variable should surpass the highest square correlation of the latent variable with other latent variables. From Table 4.4, it can be seen that the various latent variables share more variance with their assigned indicators than with other latent variables. This is denoted by bolding the

numbers in the Table. It can also be seen that the bold numbers show the highest values in both rows and columns. In this case, we can infer that discriminant validity has been met.

Table 4.4: Discriminant validity (Fornell-Larcker Criterion)

Constructs	Digital	Financial	ICT	ICT
	Inclusion	Inclusion	Adoption	Regulation
Digital Inclusion	0.830			
Financial Inclusion	0.866	0.914		
ICT Adoption	0.814	0.790	0.823	
ICT Regulation	0.817	0.769	0.844	0.942

5.3 Structural Model Assessment

After a positive validation of the measurement model, the next step is to test the structural model (Hair et al., 2019; Urbach & Ahlemann, 2010). Five essential steps were used to evaluate the structural model as suggested by (Hair et al., 2019; Urbach & Ahlemann, 2010). These steps are discussed in the subsections below:

4.3.1 Assessing Structural Model for Multicollinearity Issues

As part of the structural model evaluation, the first step is to examine multicollinearity. Multicollinearity occurs when there is a combination among predictors in a multiple regression analysis (O'Brien, 2007). Multicollinearity was assessed by analyzing the variance inflation factor (VIF) for each independent construct. A minimum threshold of 5 or lower is needed to avoid issues of collinearity (Hair, Ringle, & Sarstedt, 2011). If this threshold is met, it means that the construct under consideration is almost a perfect linear combination of independent variables already in the equation (Hair et al., 2011;

Hair et al., 2016; Mansfield et al., 1982). From **Table 4.5**, all VIF values are below 5, indicating that there are no issues with collinearity in this study.

Table 4.5: Multicollinearity Statistics (Inner VIF)

Constructs	Digital Inclusion	Financial Inclusion	ICT Adoption	ICT Regulation
Digital Inclusion		3.849		
Financial Inclusion				
ICT Adoption	1.000	4.460		1.000
ICT Regulation		4.078		

4.3.2 Assessing Structural Model for Path Coefficient

After examining collinearity, it is imperative to evaluate the significance of the path coefficient between the model’s latent variables (Na et al., 2024). To do this, we run a bootstrapping algorithm in SmartPLS using a large number of 5000 subsamples while using a 0.1(10%) two-tailed distribution. Bootstrapping is a “non-parametric resampling procedure that assesses the variability of a statistic by examining the variability of the sample data rather than using parametric assumptions to assess the precision of the estimates” (Streukens and LeroiWerelds, 2016). Because PLS-SEM does not show that data is normally distributed, it is necessary to run a non-parametric test using SmartPLS (da Silva, Martins, Rodríguez, & Ferreir, 2024). The bootstrapping method produces t-statistics for the analysis of the direct and indirect effects (Hair et al., 2016). The findings are shown in Table 4.6. Since a 95% confidence interval is assumed, a minimum critical value of 1.65 as ideal for a significance level of 10% (two-tailed) (Hair et al., 2011). From **Table 4.6**, and **Table 4.7**, it can be seen that, out of 7

hypotheses, four are supported, that is, these hypotheses have a critical t-value of 1.65 and above. The same results are also shown in Figure 4.2.

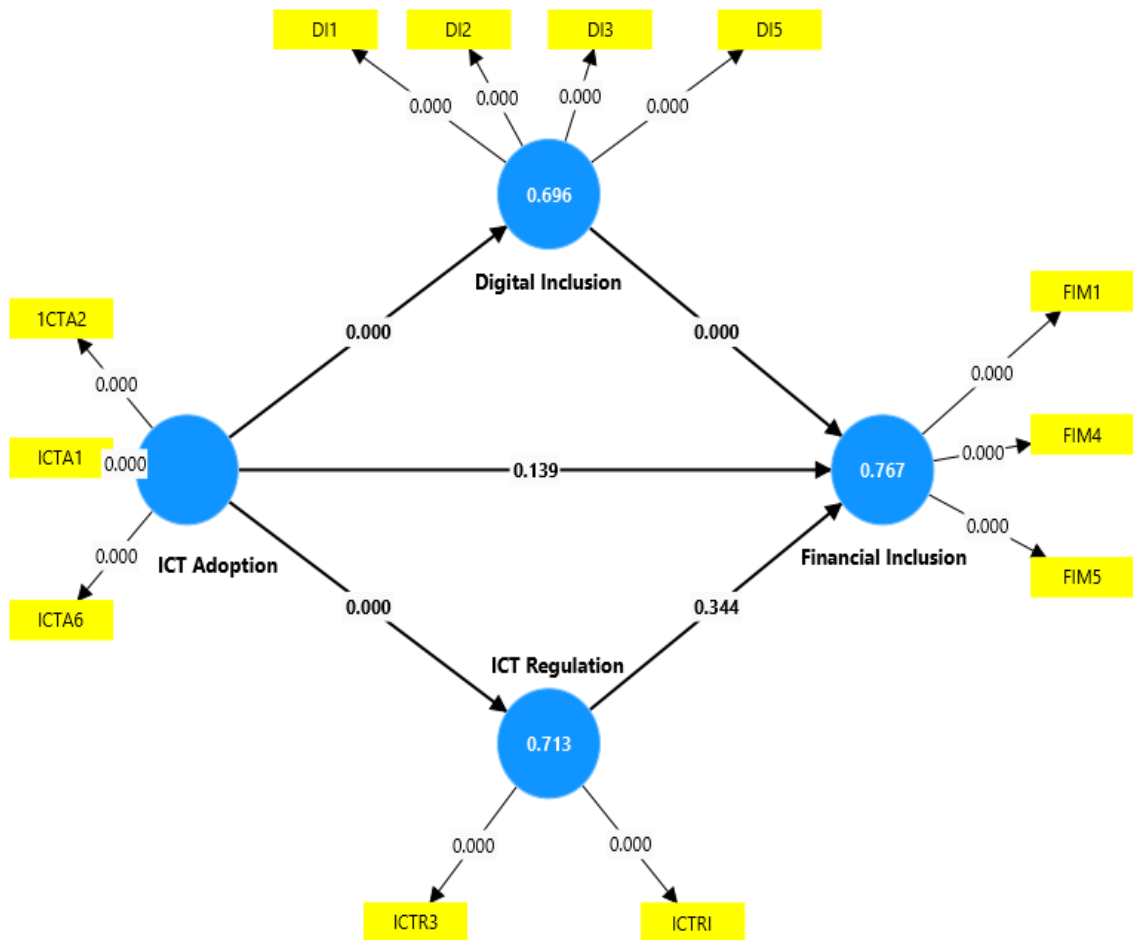


Figure 4.2: Hypotheses Testing for Direct Effect

Table 4.6: Direct Relationship for Hypothesis Testing

Hypotheses	Relationship	Path coefficient	T-values	Decision	95% CI LL	95% CI UL
H1	ICT Adoption->Financial Inclusion	0.170	1.479	Not supported	- 0.066	0.384
H2	ICT Adoption>Digital Inclusion	0.834	36.655	Supported	0.789	0.878
H3	ICT Adoption-> ICT Regulation	0.844	33.811	Supported	0.792	0.890
H4	Digital Inclusion ->Financial Inclusion	0.641	7.356	Supported	0.483	0.827
H5	ICT Regulation -> Financial Inclusion	0.102	0.946	Not supported	- 0.114	0.299

Table 4.7: Mediating effect results

Hypotheses	Relationship	Path coefficient	T values	Decision	95% CI LL	95% CI UL
H6	ICT Adoption->Digital Inclusion ->Financial Inclusion	0.535	6.923	Supported	- 0.015	0.306
H7	ICT Adoption->ICT Regulation->Financial Inclusion	0.086	0.944	Not supported	0.415	0.654

4.3.3 Assessing the Goodness of Fit

Following an evaluation of the structural model for the significance of the path coefficient, an evaluation was conducted to determine the model's goodness of fit (GOF). The assessment of this indicates whether the model is well-fitted or ill-fitted

(Čuta et al., 2024). The GOF test also helps the researcher to identify misspecifications of the measurement and structural model (Dijkstra & Henseler, 2015). The R-square determination coefficient (R^2) is the most widely used criteria (Hair et al., 2019). R-square measures the model's explanatory power. It represents the combined effects of the exogenous latent variables on the endogenous latent variable (Hair, Sarstedt, Hopkins, and Kuppelwieser, 2014). R-square varies from 0 to 1 with higher explanatory power values. As a guide, R-square values of 0.25, 0.50 and 0.75 can be termed as weak, moderate and substantial respectively (Hair et al., 2011; Henseler et al., 2009). In accounting research, Chin (1998) considers R-square values of 0.190 and lower as weak, values around 0.333 as average and approximate values of 0.670 as substantial. From **Table 4.8**, the R-square of the model is 0.666 (which is considered substantial in accounting research). It means that the combined exogenous latent variables account for 67% of the endogenous factor variations. (Hair et al., 2019; Urbach & Ahlemann, 2010).

Table 4.8: R Square

Independent Construct	R-square	R-square adjusted
Digital Inclusion	0.696	0.693
Financial Inclusion	0.767	0.761
ICT Regulation	0.713	0.710

In PLS-SEM, Henseler, Hubona, and Ray (2016) advocated for one of the following criteria to be used in determining a model's GOF. They are the standardized root mean squared residual (SRMR), the unweighted least squares discrepancy (dlus) and the geodesic discrepancy (dG). Each of these three can be used to evaluate a model's GOF. In this study, the SRMR was used. This is because SRMR has been widely used and

accepted by considerable studies as an appropriate measure for assessing the goodness of fit in PLS-SEM (Bailey et al., 2017; C. S. Lee & Ma, 2012; Pappas, 2017). With this criterion, the rule of thumb indicates that the lower the SRMR the better the model's fit. A perfect fit is realized when SRMR is zero. However, an SRMR value of 0.08 or lower is acceptable or advisable (Henseler et al., 2016). An SRMR value of above 0.08 indicates the absence of fit. From **Table 4.9**, the estimated SRMR value is 0.016 which is less than the threshold of 0.08. This, therefore, indicates that the model is well fit and there are no measurement or structural model misspecifications.

Table 4.9: Goodness of Fit (SRMR criteria)

	Estimated model value
SRMR	0.065

4.3.4 Assessing the Effect Size

After evaluating the structural model's GOF, the next step required is to assess the effect size of each path in the SEM through Cohen's f-square (Cohen 1988). The effect sizes measure if an independent construct has a significant impact on the dependent construct (Cohen, 1988). That is, it measures the degree of significance of the dependent construct on the independent construct (Urbach & Ahlemann, 2010). Using SmartPLS, the f-square values are arrived at when the PLS algorithm is run. The f-square values are presented in **Table 4.10**. f-square values between 0.020 and 0.150, between 0.150 and 0.350 and above 0.350 show that the exogenous latent variable or the independent construct has a small, medium or large effect on the dependent construct respectively (Chin, 1998; Cohen, 1988; Gefen et al., 2000). Therefore, from **Table 4.9**, the independent constructs ICT adoption and mediating construct ICT regulation are regarded to have a medium effect on the dependent construct which is, financial inclusion. Also, digital inclusion is termed to have a large effect on financial inclusion.

Table 4.10: F-square

Constructs	Digital Inclusion	Financial Inclusion	ICT Adoption	ICT Regulation
Digital Inclusion		0.459		
Financial Inclusion				
ICT Adoption	2.291	0.028		2.486
ICT Regulation		0.032		

4.4 Discussion of Results

The study objective was to examine the linkages between ICTs, digital inclusion and financial inclusion. The study specifically explored the mediating effect of ICT regulation and digital inclusion on the nexus between ICT adoption and financial inclusion. This area of study has been ignored by present research. bridging this gap, this study empirically tested the effects of ICTs, digital inclusion and financial inclusion by relying on data 107 countries globally. Of the seven hypotheses formulated in this study, five (4) were supported and three (3) were not supported. Specifically, digital inclusion was shown to have significant effect on financial inclusion. Also, ICT regulation was discovered to have significantly influenced ICT adoption. Additionally, ICT adoption was found to have significant effect on digital inclusion. Lastly, the mediating role of digital inclusion was discovered to have significant effect on the relationship between ICT adoption and financial inclusion. The outcome of the supported hypothesis can be seen in Table 4.6 and Table 4.7.

4.4.1 ICT Adoption and Financial inclusion

From the analysis of the results, it was discovered that ICT adoption has no significant influence on financial inclusion. This discovery challenges the widely accepted notion that technology integration enhances access to financial services. Recent studies, however, present mixed evidence on this relationship. According to a study by Xu and Chen (2021), while ICT adoption is generally seen as a driver of financial inclusion, its impact varies significantly across different regions and demographic groups. In some contexts, the mere presence of ICT infrastructure does not automatically translate into increased financial inclusion due to factors such as digital literacy gaps and socio-economic barriers. For instance, a study by Kumar and Prasad (2022) indicated that in regions where digital literacy is low, the adoption of ICT (mobile money, mobile banking, internet banking, and ATMs) alone does not significantly improve access to financial services.

Users in these areas may struggle to utilize digital platforms effectively, thereby limiting the potential benefits of ICT in promoting financial inclusion. Furthermore, a study by Li et al. (2023) found that in certain developing countries, the high cost of internet access and digital devices can prevent significant segments of the population from participating in the digital economy, thus nullifying the potential benefits of ICT adoption on financial inclusion. Moreover, Barasa and Mugo (2023) argue that while ICT adoption is a necessary condition for financial inclusion, it is not sufficient on its own. Complementary measures such as financial education, affordable internet access, and user-friendly digital financial services are crucial to translate ICT adoption into tangible financial inclusion outcomes. This perspective underscores the complexity of the relationship between ICT and financial inclusion, suggesting that a complicated

approach is needed to connect the full potential of technology in enhancing financial inclusion.

4.4.2 ICT Adoption and Digital Inclusion

Again, the analysis of findings revealed that the hypothesis of individual ICT adoption, being positively associated with digital inclusion, was supported. ICT adoption, encompassing the integration and use of information and communication technologies in everyday activities, is very key in enhancing digital inclusion. According to Kumar and Prasad (2022), the widespread adoption of ICT tools such as smartphones, tablets, and internet services significantly increases individuals' access to digital resources and services, thereby promoting digital inclusion. They found that regions with higher ICT adoption rates exhibit greater levels of digital participation, as people can more readily access information, communicate, and perform various tasks online. Moreover, Barasa and Mugo (2023) highlight that ICT adoption lowers barriers to entry for marginalized populations, enabling them to engage with digital platforms that were previously inaccessible.

This engagement is vital for activities such as online banking, e-commerce, and mobile banking, which contribute to overall socio-economic development. Their study emphasizes that effective ICT adoption strategies, including affordable access to technology, comprehensive digital literacy programs and digital support systems, are key drivers of digital inclusion. Li, Zhang, and Wang (2023) further support this view by demonstrating that ICT adoption facilitates the deployment of digital infrastructure, which is essential for inclusive access to digital services. They argue that investments in ICT infrastructure, coupled with policies that promote widespread adoption, lead to more equitable access to digital tools and resources. This inclusive access helps bridge

the digital divide, ensuring that more individuals and communities can benefit from the digital economy.

4.4.3 ICT Adoption and ICT Regulation

The results indicate that the level of ICT adoption in a country significantly influences the degree of ICT regulations. As more people rely on ICT tools such as digital payments for financial transactions, it creates multiple avenues for fraudulent activities. Akomea-Frimpong, Andoh, Akomea-Frimpong, and Dwomoh-Okudzeto (2019) found that the growth in mobile payment services in developing countries has led to significant increases in fraud. As people heavily utilize mobile payment services, fraudsters find new ways to access users' funds and financial information. Consequently, governments need to develop appropriate policies to protect users' funds and financial information from fraudsters and encourage the continuous adoption of ICTs for mobile money and online payment services to promote financial transactions.

Recent studies support this view. For instance, Kumar and Prasad (2022) emphasize that robust regulatory frameworks are essential to mitigate risks associated with digital financial services, such as unauthorized access and cyber-attacks. Without adequate regulations, user confidence can be severely undermined, hindering the broader adoption of these technologies. Effective ICT regulations should include stringent security protocols, mandatory reporting of fraudulent activities, and public awareness campaigns to educate users about safe practices in digital transactions (Li et al., 2023). Additionally, regulatory measures should focus on enhancing the capacity of financial institutions and service providers to detect and respond to fraudulent activities promptly. This includes investing in advanced fraud detection technologies and training personnel to handle cybersecurity threats (Barasa & Mugo, 2023). By doing so,

financial institutions can better protect their customers and mitigate the risks associated with digital payments.

4.4.4 Digital Inclusion and Financial Inclusion

The hypothesis that digital inclusion positively influences financial inclusion is strongly supported by empirical evidence and theoretical frameworks. Digital inclusion, defined as the access to and effective use of digital technologies, plays a critical role in enabling individuals to participate fully in the financial system. A robust relationship between digital inclusion and financial inclusion is evidenced by the results indicating a strong direct influence (Johnson & Arnold, 2012). This positive correlation suggests that improvements in digital access and literacy can significantly enhance individuals' ability to use financial services, and further reinforces the reliability and consistency of this relationship across different contexts (Smith et al., 2020). This substantial impact can be attributed to several factors inherent in digital inclusion. For instance, access to mobile banking and digital payment systems can lower transaction costs, provide greater convenience, and facilitate better financial management (Demirguc-Kunt et al., 2018).

When individuals can access and efficiently use these digital tools, they are more likely to open bank accounts, save money, obtain credit, and make investments, thus enhancing their overall financial inclusion. Additionally, digital inclusion fosters financial literacy by providing access to online resources and educational tools that help individuals understand and navigate financial products and services. According to Kim, Park, and Choi (2020), digital literacy is a significant mediator in the relationship between digital access and financial inclusion, as it empowers users to make informed financial decisions and utilize digital financial services effectively.

4.4.5 ICT Regulation and Financial Inclusion

The hypothesis that ICT regulation has significant influence on financial inclusion was not supported. This finding again challenges the conventional wisdom that robust regulatory frameworks are essential for enhancing financial access. Recent studies present mixed evidence regarding this relationship. For example, Li, Zhang, and Wang (2023) found that in some developing countries, stringent ICT regulations do not significantly impact financial inclusion due to poor enforcement and lack of infrastructure. In these contexts, regulations alone cannot drive financial inclusion without complementary measures such as improving digital literacy and access to technology. Moreover, research by Barasa and Mugo (2023) highlights that while regulations are necessary to safeguard against fraud and ensure security, they do not automatically translate into higher financial inclusion rates.

In some cases, overly stringent regulations may even hinder the adoption of digital financial services by creating barriers to entry for smaller fintech companies and discouraging innovation. This perspective suggests that the mere presence of ICT regulations is insufficient to foster financial inclusion. Additionally, Kumar and Prasad (2022) argue that financial inclusion is more directly influenced by factors such as digital literacy, affordability of digital services, and the availability of user-friendly financial products. Their study indicates that without addressing these fundamental issues, ICT regulations alone cannot significantly enhance financial inclusion. Therefore, the need for a holistic approach that combines favourable regulatory measures with initiatives to improve digital literacy and expand access to affordable technology is highly recommended.

4.5 Effect of Mediating of Construct

This section explores the influence of mediating constructs for this study on the relationships between the independent constructs and the dependent constructs. This study adopted two mediators, that is, ICT regulation and digital inclusion. Present research in the ICTs and individual financial inclusion has called for research to examine the effect of these mediators on the relationship between the independent constructs and the dependent (Bhuvana and Vasantha, 2019; Lontchi, Yang and Su, 2022; Vyas and Jain, 2021). In view of this, the discussion under this section focuses on the effects of these mediating constructs on the Technology-Organization-Environment Theory.

4.5.1 The Mediating Effect of ICT Regulation on the nexus between ICT Adoption and Financial Inclusion

On the mediating effects of ICT regulation on the linkages between ICT adoption and financial inclusion, results presented in Table 5.7 shows no support for the mediating effects of ICT regulation on the impact of ICT adoption on financial inclusion. Recent studies provide mixed insights into this relationship. According to Kumar and Prasad (2022), while ICT adoption is a critical driver of financial inclusion, the role of regulation is more complex and context-dependent. Their research indicates that in some regions, ICT regulations do not enhance the positive effects of ICT adoption on financial inclusion, primarily due to ineffective enforcement and a lack of complementary infrastructure. Barasa and Mugo (2023) further elaborate that ICT regulations, though necessary for ensuring security and trust in digital financial services, do not necessarily translate into increased financial inclusion.

These studies found that overly stringent regulations could even hinder the growth and adoption of digital financial services by creating barriers for smaller fintech companies

and discouraging innovation. This suggests that the mere presence of regulations does not mediate the relationship effectively; instead, a balanced approach that fosters innovation while ensuring security is required. Li, Zhang, and Wang (2023) also highlight that financial inclusion is more directly influenced by factors such as digital literacy, affordability of digital services, and the user-friendliness of financial products. They argue that without addressing these fundamental issues, ICT regulations alone are insufficient to significantly enhance financial inclusion. Therefore, while ICT adoption is crucial for financial inclusion, regulations do not mediate this relationship effectively without a supportive ecosystem that includes education, infrastructure, and affordable access.

4.5.2 The Mediating Effect of Digital Inclusion on the nexus between ICT Adoption and Financial Inclusion

The hypothesis "Digital inclusion significantly mediates the impact of ICT adoption on financial inclusion" posits that digital inclusion plays a crucial intermediary role in the relationship between ICT adoption and financial inclusion. This means that even though ICT adoption alone does not enhance financial inclusion, but the presence of digital inclusion characterized by access to digital technologies, digital literacy, and technical support can cause ICT adoption promote digital inclusion. For instance, adoption of digital technologies including mobile money and mobile banking alone may not be sufficient to achieve extensive or global financial inclusion; therefore, digital inclusion may ensure individuals, especially those underserved and unbanked are effectively utilizing the digital technologies for financial services. For instance, individuals with higher digital literacy and access to continuous technical assistance are more likely to use digital financial services like mobile money and online banking, leading to broader financial inclusion. This is supported by studies of Park and Jang (2020) and Chen and Cheng (2019) by highlighting the importance of digital literacy and technical assistance

in promoting the use of digital financial services, thereby confirming the mediating role of digital inclusion.

4.6 Chapter Summary

This chapter provided an analysis of data gathered in both developed and developing economies on ICT adoption, ICT regulation, digital inclusion and financial inclusion. Analysis of the collected data helped to meet this study's research goals. The study examined the impact of ICT adoption on financial inclusion, the effect of ICT regulations and digital inclusion on financial inclusion. And the mediating effect of ICT regulations and digital inclusion on the nexus between ICT adoption and financial inclusion. The impact of ICT adoption on financial inclusion was revealed. The chapter again revealed the effects of the mediators (ICT regulation and digital inclusion) on the nexus between the independent construct and the dependent construct. This chapter also focused on the discussions regarding the nexus between the proposed hypotheses and its significant to ICT adoption and financial inclusion. This assessment aimed to discover the degree to which the stated hypothesis influenced financial inclusion among individuals in both developed and developing economies. In addition, the influence of mediators (i.e, ICT regulation and digital inclusion) on the model was assessed.

CHAPTER FIVE

SUMMARY OF FINDINGS, CONTRIBUTIONS AND CONCLUSION

5.1 Introduction

The previous chapter concentrated on discussing the analysis of empirical findings and dealt with the research questions in relation to literature reviewed. Therefore, this chapter focuses on concluding the study by providing a summary of the study's key findings based on the objectives and discussing the implications of the research findings on research, policy, and practice.

5.2 Summary of Findings

The results of this study are presented on the basis of the research objectives. First, the impact of ICT adoption on financial inclusion. Second, findings on the effects of ICT regulation and digital inclusion on financial inclusion. Finally, the mediating effects of ICT regulation and digital inclusion on the nexus between ICT adoption and financial inclusion. Details of these are given in the three subsections below.

5.2.1 The Impact of ICT Adoption on Financial Inclusion

As part of the hypothesis, ICT adoption being positively associated financial inclusion was not supported. The finding goes in line with previous studies (Chatterjee, 2020); (Hussain, Gul, & Ullah, 2023); (Wellalage, Hunjra, Manita, & Locke, 2021) that found ICT adoption does not significantly influence financial inclusion. This discovery challenges the widely accepted notion that technology integration enhances access to financial services. Recent studies, however, present mixed evidence on this relationship. According to a study by Xu and Chen (2021), while ICT adoption is generally seen as a driver of financial inclusion, its impact varies significantly across different regions and demographic groups. In some contexts, the mere presence of ICT

infrastructure does not automatically translate into increased financial inclusion due to factors such as digital literacy gaps and socio-economic barriers. For instance, a study by Kumar and Prasad (2022) indicated that in regions where digital literacy is low, the adoption of ICT (mobile money, mobile banking, internet banking, and ATMs) alone does not significantly improve access to financial services. Users in these areas may struggle to utilize digital platforms effectively, thereby limiting the potential benefits of ICT in promoting financial inclusion. Furthermore, a study by Li et al. (2023) found that in certain developing countries, the high cost of internet access and digital devices can prevent significant segments of the population from participating in the digital economy, thus nullifying the potential benefits of ICT adoption on financial inclusion.

5.2.2 Effects of ICT Regulation and Digital Inclusion on Financial Inclusion

Literature review reveal the effects of ICT adoption on financial inclusion and mediating role of ICT regulation and digital inclusion on the impact of ICT adoption on financial inclusion. Not all this hypothesis influences financial inclusion. Two of the hypotheses significantly influence financial. That is, ICT adoption and digital inclusion were found to influence financial inclusion.

5.3 Mapping out Research Objectives with Research Findings and Contribution

Research Purpose: This study aims to identify and examine the impact of ICT regulation and digital inclusion on ICT adoptions and financial among individuals at the global level. Table 5.1 gives a brief summary of the findings of the study in line with the study's objectives. Furthermore, the contributions, implications, and recommendations of the study are outlined.

Table 5.1: Mapping Research Objectives to Findings and Contributions

Research Objectives	Research Findings	Supporting Literature	Contribution, Implications, and Recommendations
The impact of ICT adoption on financial inclusion.	The findings indicate that ICT adoption does not positively influence financial inclusion	Chatterjee, (2020); Hussain et al., (2023); Wellalage et al., (2021)	This study adds to the existing knowledge regarding ICT adoption and financial inclusion at a global level. Furthermore, this study responds to the gaps identified in literature considering that fewer studies have been carried out from a global context.
The effects of ICT regulation and digital inclusion on financial inclusion.	The findings indicated that ICT regulation does not positively influence financial inclusion	Ahmad, Green, Jiang, & Murinde, (2023); Evans, (2018); Akpaku, Arku, & Boateng, (2023) Shen, Hueng, & Hu, (2020); Ahmad,	This study relied on technology organization environment framework. Arguably, this is the first study to follow the concept of technology, organization environment framework in ICTs, digital inclusion and financial inclusion research. Previous studies have largely adopted theories such as TAM, UTAUT, DOI, and Digital Divide Theory. Therefore, this study adds to literature by giving a different perspective on ICTs, digital inclusion and financial inclusion using technology, organization and environment framework. Moreover, extent literature has largely relied on data from single countries and conducted in the developed country context and thus limiting their findings to such contexts

	Digital inclusion positively influences financial inclusion	Majeed, Khan, Sohaib, & Shehzad, (2021); Yang & Geng, (2022);	
The mediating effects of ICT regulation and digital inclusion on the nexus between ICT adoption and financial inclusion	<p>The mediating role of digital inclusion on the impact of ICT adoption on financial was supported.</p> <p>The hypothesis on the mediating role of ICT regulation on the relationship between ICT adoption on financial was not supported.</p>	Okello Candiya Bongomin & Ntayi, (2020); Adam & Alhassan, (2021), Thatsarani & Jianguo, (2022); Pratiwi & Krisnawati, (2021)	<p>Arguably, the first study to be carried out on the mediating effects of ICT regulation and digital inclusion on the nexus between ICT adoption and financial inclusion</p> <p>It is important to indicate the implications of the results of this study on the ICTs, digital inclusion and financial inclusion.</p> <p>There are three ways to communicate the contribution of this study. That is research, practice, and policy.</p> <p>With respect to research, this study aims to identify and examine the impact of ICT regulation and digital inclusion on ICT adoptions and financial among individuals at the global level. This has largely been ignored by previous research. This study will contribute to the literature by taking a global approach and sourcing data from 107 developed and developing countries.</p> <p>Arguably, this is the first study carried out on the mediating effect of ICT regulation, digital inclusion on the nexus between ICT adoption and financial inclusion.</p> <p>To practice, the study shows how ICTs, digital inclusion leads to financial inclusion. The study can guide the formulation and revision of policies related to the ICT adoption ICT regulation, digital inclusion and financial inclusion. Policymakers can identify gaps, challenges, and opportunities that may arise in the context of implementing ICT-driven initiatives.</p>

			<p>To policy, creating a favorable ICT environment will influence ICT adoption, ICT regulation, digital inclusion and financial inclusion. An enabling ICT environment in the form of ICT adoption and infrastructure will equip ICT adoption, ICT regulation, digital inclusion will enhance financial inclusion. Similarly, an enabling environment in the form of ICT legislation and policy will ensure that individual's financial information is protected and secured. Thus, this study will provide policymakers, especially individual, a clear insight into the effect ICTs, digital inclusion on financial inclusion</p>
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Source: Authors construction

5.4 Research Contribution and Implication

5.4.1 Implication to Research

With respect to research, this study was carried out to examine the linkages ICTs and digital inclusion in promoting financial inclusion. This has largely been ignored by previous research. Similarly, the mediating effect of variables such as ICT regulations and digital inclusion on the relationship between ICT adoption and financial inclusion has largely been ignored by previous research. Arguably, this is the first study carried out on the nexus between ICTs, digital inclusion and financial inclusion. The study's reliance on archival sources of data enables the easy reproducibility and generalizability of findings from this study to the larger population. This study, therefore, adds to the limited literature in the area of ICTs, digital inclusion and financial inclusion.

In addition, this study relied on the foundation of technology-organization-environment (TOE) framework to analyze the linkages between ICTs and digital inclusion on financial inclusion. Arguably this is the first individual study to follow the TOE framework which is recommended for studies at the organizational level to examine ICTs, digital inclusion and financial inclusion research. Previous study has largely adopted theories such as technology acceptance model (TAM) theory, digital divide theory, unified theory of acceptance and use of technology and the financial inclusion theory. Therefore, this study adds to literature by giving a different perspective on individual study adopting the TOE which is an organizational theory in IS.

5.4.2 Recommendations to Policy and Practice

The study's conclusions have a significant effect on practice and policy, especially when it comes to ICT adoption, digital inclusion, and financial inclusion. While financial institutions and technology providers invest in user-friendly interfaces and customer

support systems, policymakers and practitioners should prioritize enhancing digital literacy and technical help through targeted education programmes and community engagement. The study findings revealed that ICT adoptions does not influence financial inclusion. Therefore, government can consider making smartphone prices cheaper so that individuals can afford and use them for financial transactions to help promote financial inclusion. Also, government should consider implementing favourable digital payment regulations to encourage individuals' willingness to adopt these technologies for financial transaction. For instance, In Ghana, government should consider reducing the e-levy charge to a moderate rate that will make individuals willing to use these technologies for financial transactions. Again, governments and service providers should focus on encouraging innovation while protecting individuals against fraud and cyber dangers by implementing a balanced and favourable ICT regulations, comprehensive financial education programmes to support digital literacy initiatives.

Public-private partnerships have the potential to facilitate the development and deployment of inclusive digital financial services and infrastructure by capitalizing on the assets and capabilities of many parties. Encouraging financial inclusion by addressing socioeconomic barriers through job opportunities, social safety nets, and poverty alleviation programmes can increase the efficacy of ICT adoption and promoting financial inclusion. To adapt and improve strategies for sustainable and equitable growth, ongoing monitoring and evaluation of policies and practices is required for promoting financial inclusion among individuals on the global perspective. This includes data collecting, impact evaluations, and stakeholder involvement. Policymakers and practitioners may promote an inclusive digital economy that benefits

all people and communities by tackling these issues and seizing possibilities of fraud and data insecurity.

5.5 Limitation and for Future Research

This study examined the mediating role ICT regulation and digital inclusion on ICT adoption and financial inclusion in 107 countries worldwide. However, this current study has some limitations. The studies may also take into account conducting larger global level investigations once more information is accessible. Furthermore, by utilizing data from secondary sources, the study was limited by the constructs and measurement items contained in the dataset. Therefore, future studies should utilize primary data collection techniques in their research to better possess some degree of control over the constructs of in their study. Nevertheless, given the expanding usage of secondary data sources in accounting research and the time and resources required to gather data from more than 107 countries, this study's use of secondary data sources turned out to be the most effective.

In addition, future studies may employ qualitative approaches so as to unearth ICT adoption, ICT regulation, digital inclusion and financial inclusion. Lastly, this study employed cross-sectional data analysis. Future study should employ panel data which will help in analyzing data that varies across both time and individuals, allowing more complex questions to be answered, such as the effects of changes in policy over time on different population groups and again on developed and developing countries respectively.

5.6 Conclusion

This study aims to identify and examine the impact of ICT regulation and digital inclusion on ICT adoptions and financial among individuals at the global level. In order to address the objectives of this study in Section 1.4, the study leaned on the foundations of technology, organization and environment framework. Furthermore, the study examined how ICTs influence financial inclusion at the global level. Technology, organization and environment framework was chosen among other theories such as TAM, UTAUT, DOI and Digital Divide theory because it emphasizes the importance of Technological component which is ICT adoption, Organization component is digital inclusion and environment component is ICT regulation leads financial inclusion. The study adopted a secondary data from 107 countries globally. Constructs used for this study were validated by monitoring indicator loadings (Hair et al., 2019) whilst hypothesis was tested by assessing the path coefficient for significance (Hair et al., 2019; Urbach and Ahlemann, 2010).

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APPENDIX

Albania	Ecuador	Kyrgyzstan	Romania
Algeria	Egypt	Lao PDR	Russian Federation
Argentina	El Salvador	Latvia	Saudi Arabia
Armenia	Estonia	Lebanon	Senegal
Australia	Finland	Lithuania	Serbia
Austria	France	Malawi	Singapore
Bangladesh	Georgia	Malaysia	Slovakia
Belgium	Germany	Mali	Slovenia
Benin	Ghana	Malta	South Africa
Bolivia	Greece	Moldova	Spain
Bosnia and Herzegovina	Guinea	Mongolia	Sri Lanka
Brazil	Honduras	Morocco	Sweden
Bulgaria	Hong Kong, China	Mozambique	Switzerland
Burkina Faso	Hungary	Namibia	Tajikistan
Cambodia	Iceland	Nepal	Tanzania
Cameroon	India	Netherlands	Thailand
Canada	Indonesia	New Zealand	Tunisia
Chile	Iran, Islamic Rep.	Nigeria	Türkiye
China	Ireland	North Macedonia	Uganda
Colombia	Israel	Norway	Ukraine
Costa Rica	Italy	Pakistan	United Arab Emirates
Cote d'Ivoire	Jamaica	Panama	United Kingdom
Croatia	Japan	Paraguay	United States
Cyprus	Jordan	Peru	Uruguay
Czech Republic	Kazakhstan	Philippines	Zambia
Denmark	Kenya	Poland	Zimbabwe
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