FINTECH AND MONEY LAUNDERING IN NIGERIA

MODERATING EFFECT OF FINANCIAL REGULATIONS
AND
FINANCIAL LITERACY

BY

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DEDICATION

To My Family

To My Country (Nigeria) for a greater prosperity, financial stability and economic growth.

DECLARATION

This doctoral research project represents my original work and adheres strictly to academic, ethical and integrity standards. It has not been replicated, in part or in full, from any other source except where properly cited. I affirm that every segment of this research is a product of my individual effort, and where the contributions of others have been utilized, they have been explicitly recognized in accordance with scholarly standards.

Throughout this dissertation, I have drawn upon a diverse array of published materials including books, peer-reviewed journal articles, magazine features, online resources, and interview transcripts. Each instance where these sources have informed my work is duly acknowledged within the text and reference comprehensively in the bibliography section.

In cases where direct quotes or specific ideas from external sources have been integrated, they are clearly marked and attributed to their original authors in the main body of the report. Furthermore, all paraphrased content and conceptual influences are cited appropriately to provide transparent academic acknowledgment of the intellectual property of others.

My commitment to upholding the principles of academic honesty is reflected in the careful documentation of all external sources used. This ensures that the origins of every piece of information, whether obtained from traditional or digital media, are traceable and verifiable.

By following these documentation standards, I ensure that my PhD research meets the highest standards of scholarly excellence and ethical integrity.

LIST OF ABBREVIATIONS AND THEIR FULL MEANINGS

The table provides a comprehensive list of abbreviations used in the research report alongside their full meanings, serving as a quick reference for understanding the terms and acronyms relevant to the study.

S/N	ABBREVIATIONS	FULL MEANING
1	ADF	Augmented Dickey-Fuller
2	AFI	Alliance for Financial Inclusion
3	AFS	ATM-based financial services
4	AIC	Akaike Information Criterion
5	AML	Anti-Money Laundering
6	AML/CFT	Anti-Money Laundering and Countering the Financing of Terrorism
7	APIs	Application Programming Interface
8	AR	Autoregressive
9	ARA	Asset Recovery Agency
10	ARCH	Autoregressive Conditional Heteroscedasticity
11	ARDL	Autoregressive Distributed Lag
12	ATM	Automated Teller Machine
13	AVE	Average Variance Extracted
14	BG	Breusch-Godfrey
15	BIC	Bayesian Information Criterion
16	BIS	Bank for International Settlements
17	BKD	Bank Development
18	BOFIA	Bank and Other Financial Institutions Act
19	CBDC	Central Bank Digital Currency
20	CBN	Central Bank of Nigeria
21	CCAF	Cambridge Centre for Alternative Finance
22	CFT	Combating the Financing of Terrorism
23	CISLAC	Civil Society Legislative Advocacy Centre

24	COVID-19	Coronavirus Disease 2019
25	CPF	Countering Proliferation Financing
26	DL	Distributed Lag
27	DIFoR	Data Innovation and Financial Regulation
28	e-CNY	Electronic Chinese Yuan
29	ECOWAS	Economic Community of West African States
30	ECT	Error Correction Term
31	EFCC	Economic and Financial Crimes Commission
32	EFInA	Enhancing Financial Innovation & Access
33	EFT	Electronic Transaction
34	FATF	Financial Action Task Force
35	FCA	Financial Conduct Authority
36	FCT	Federal Capital Territory
37	FDIs	Foreign Direct Investment
38	FGD	Focus Group Discussion
39	FinTech	Financial Technology
40	FLT	Financial Literacy Rate
41	FPE	Final Prediction Error
42	FPIs	Foreign portfolio investment
43	GDP	Gross Domestic Product
44	GIABA	Group against Money Laundering in West Africa
45	H1	Hypothesis 1
46	H2	Hypothesis 2
47	H3	Hypothesis 3
48	HND	Higher National Diploma
49	HQ	Hannan-Quinn information criteria

50	HTMT	Heterotrait-Monotrait Ratio of Correlations
51	ICPC	Independent Corrupts Practices Commission
52	ICT	Information and Communication Technology
53	ICSD	International Conference on Sustainable Development
54	IFI	Infrastructure Investment
55	IFIC22	International Financial Inclusion Conference 2022
56	IMF	International Monetary Fund
57	IPOB	Indigenous People of Biafra
58	ISIS	Islamic State of Iraq and Syria
59	ISWAP	Islamic State West Africa Province
60	KII	Key informants' interviews
61	KYC	Know Your Customer
62	LM	Lagrange Multiplier
63	LML	Logarithm Monetary Value Laundered
64	LR	Sequential modified LR test statistic
65	M2	Broad Money
66	MFS	Mobile-based Financial Services
67	ML	Money Laundering.
68	ML/TF	Money Laundering and Terrorist Financing
69	MLACMA	Mutual Legal Assistance in Criminal Matters Act
70	MLPA	Money Laundering Prohibition Act
71	MMA	Mobile-Based Transaction
72	MMA	Mobile Money Adoption
73	MMO	Mobile Money Operators

74	MNO	Mobile Network Operators
75	NAICOM	National Insurance Commission
76	NCC	Nigerian Communication Commission
77	NCE	National Certificate of Education
78	NDIC	Nigerian Deposit Insurance Corporation
79	NDLEA	National Drugs Law Enforcement Agency
80	NFCA	Nigeria Financial Conduct Authority
81	NEFT	National Electronic Funds Transfer
82	NFIU	Nigeria Financial Intelligence Unit
83	NIBSS	Nigerian Interbank Settlement System Instant Payments
84	NIP	Nigerian Interbank Payment
85	OFIs	Other Financial Institutions
86	OLS	Ordinary Least Squares
87	PENCOM	Pension Commission
88	PFS	POS-Based Financial Service
89	PLS-SEM	Partial Least Square Structural Equation Modeling
90	POS	Point of Sale
91	PP	Philip-Perron
92	PSB	Payment Service Banks
93	PSSP	Payment System Service Providers
94	RegTech	Regulatory Technology
95	RMSE	Root-Mean-Square Error
96	RQT	Regulatory quality

97	SCUML	Special Control Unit Against Money Laundering
98	SEC	Security and Exchange Commission
99	SME	Small to Medium-Sized Enterprises
100	SPARC	Salford Postgraduate Annual Research Conference
101	SPSS	Statistical Package for the Social Sciences
102	TPA	Terrorism Prevention Act
103	UNICEF	United Nations International Children's Emergency Fund
104	UNODC	United Nations Office on Drugs and Crime
105	VIF	Variance Inflation Factor
106	WBT	Web-Based Transaction
107	WDI	World Development Indicators
108	WFS	Web-Based Financial Services

ABSTRACT

As FinTech (Financial Technology) continues to revolutionize the financial landscape, it also poses significant challenges in combating illicit financial flows, particularly in the context of money laundering. This study investigates the dynamics between FinTech and money laundering in Nigeria, offering valuable insights into the regulatory and policy measures necessary to effectively combat these illegal activities. While previous research has predominantly focused on the benefits of FinTech, this study shifts the focus to its potential role in facilitating money laundering—an area where existing understanding is largely anecdotal. Employing a mixed-methods approach, the study explores how financial regulation, and financial literacy may moderate the relationship between FinTech and money laundering. Data were gathered through surveys of 248 FinTech users and financial regulators in Nigeria, supplemented by structured interviews with regulators. The quantitative data were analyzed using Partial Least Square Structural Equation Modeling (PLS-SEM).

The findings reveal a significant positive correlation between the use of FinTech and money laundering activities in Nigeria, with financial regulation acting as a moderating factor. The study underscores the challenges faced by developing nations in aligning technology-based financial practices with Anti-Money Laundering (AML) laws and international standards, such as those established by the Basel Committee. Through thematic analysis and longitudinal data analysis, the study uncovers the complex interactions between FinTech and money laundering, highlighting the critical role of regulatory quality and financial literacy as moderating factors. These findings offer valuable guidelines for policymakers and practitioners on enhancing regulatory frameworks, safeguarding electronic fund transactions, and promoting digital financial literacy to stabilize the financial system. To validate the empirical findings, a robustness test was conducted using secondary data, including monetary proxies for FinTech, regulatory quality, corruption, trade openness, and other economic indicators. This data, covering 2008 to 2022, was sourced from the Ministry of Justice, the Central Bank of Nigeria, and the World Development Indicators. The analysis was conducted using the Autoregressive Distributed Lag (ARDL) model.

In response to these challenges, the study proposes a framework that emphasizes the necessity of a closely monitored and regulated interaction between FinTech companies and central banks to ensure secure, efficient, and compliant integration of FinTech into the broader financial

system. A key recommendation is the establishment of dedicated units within central banks to oversee Financial Innovation such as FinTech and Central Bank Digital Currencies (CBDCs). These units are crucial for promoting robust digital currency regulations that safeguard financial stability and integrity. The framework advocates for a sustainable regulatory environment where continuous interaction and feedback between regulators and FinTech companies result in adaptive and effective regulations, fostering innovation while mitigating risks such as money laundering and financial fraud. Additionally, the framework highlights the importance of a dual approach to addressing FinTech misuse by integrating AML practices with advanced Regulatory Technology (RegTech) solutions. It is recommended that Nigeria establish a Nigeria Financial Conduct Authority (NFCA) through an Act of legislation, creating an independent agency specifically tasked with the regulation, oversight, and enforcement of laws governing FinTech services and emerging financial technologies. The NFCA would be responsible for ensuring consumer protection, maintaining market integrity, and fostering sustainable economic stability. By standardizing regulations across the sector and enforcing ethical conduct, the NFCA would help create a secure and transparent financial environment that can effectively address the challenges posed by new and disruptive financial technologies.

The study also makes significant theoretical contributions by applying Technological Determinism Theory to the field of FinTech, particularly in the context of money laundering. It suggests that future research could utilize this theory to explore similar relationships in both developing and developed countries. Furthermore, the study indicates that Technological Determinism Theory can be extended to various forms of FinTech, such as Blockchain and Biometric Authentication Technologies, and applied to examine connections between FinTech and terrorism financing, thus broadening the theory's application. Methodologically, the study employs a mixed-method approach, providing a blueprint for future research by demonstrating the value of using both primary and secondary data, as well as various analytical techniques, to ensure robust and reliable results. Despite its contributions, the study acknowledges limitations in theory, methodology, scope, and context, offering opportunities for future research, including cross-country analysis and examining the dual effects of FinTech on money laundering and terrorism financing.

Keywords: FinTech, money laundering, financial regulation, financial literacy, Nigeria

1.0 INTRODUCTION

1.1 Background

This chapter presents the background of the study by thoroughly reviewing the relationship between Financial Technology (FinTech) and money laundering in Nigeria. It begins by providing a detailed review of the country's Anti-Money Laundering (AML) and Combating the Financing of Terrorism (CFT) efforts, highlighting the regulatory responses and the persistent challenges posed by these illicit activities. The chapter then articulates the research questions and objectives, exploring the theoretical connections between FinTech and money laundering. It also explains the rationale behind the focus on Nigeria, considering the country's dynamic FinTech landscape, the implications of financial literacy, and the role of financial regulation. A research correlation structure is introduced to visualize the relationships between these key constructs. Furthermore, the chapter outlines the anticipated contributions of the study, defines its scope, and provides operational definitions for the core concepts, setting a comprehensive stage for the subsequent analysis and discussion.

1.2 Research Background

Globally, it is estimated that approximately $1.6 trillion to $4 trillion is laundered annually, representing 2% to 5% of the world's GDP (IMF, 2018; UNODC, 2020). This substantial figure highlights the extensive nature of money laundering and its significant impact on the global financial system. This context underscores the relevance and urgency of examining how financial technology (FinTech) platforms, such as those implicated in recent high-profile cases like Binance's $2 billion money laundering operations that facilitated the movement of illicit funds in Nigeria (Reuters, 2022).

The issue of money laundering has become a global concern for the past two decades. At the global level, the International Monetary Fund (IMF) has taken money laundering as an issue of paramount concern in the global financial system because of its adverse implications on financial system stability, the integrity of cross-border capital mobility, and the need to make the world a safer place for all. Money laundering promotes tax evasion, illicit financial flows, criminal activities, and the shadow economy (Hendriyetty and Grewal, 2017). It discourages hard work, legitimacy, and merit but promotes drug abuse, illegitimacy, and ultimately corrupts the financial and legal systems (Jensen and Iosifidis, 2023; Alexandre and da Silva, 2023; Çemberci et al. 2022; Tertychnyi, 2022; Hendriyetty and Grewal, 2017).

One of such initiative is the domestication of the recommendations of the Financial Action Task Force (FATF) to promote a global fight against money laundering and terrorism financing (IMF, 2021). The global effort was, however, intensified after the tragic events of September 11, 2001, by extending it to cover combating financial terrorism (CFT). In 2009, the IMF launched a trust fund for donor-support

with the objective of financing capacity development in AML/CFT among its member countries. Eventually, by 2018, the executive board of the IMF reviewed the IMF's AML/CFT strategy which is part of its five-year review cycle of its policies, thereby giving a strategic direction for its works relating to AML/CFT in the next coming years (IMF, 2021).

At the regional level, group against Money Laundering in West Africa (GIABA) is saddled with the responsibility of monitoring the compliance of Economic Community of West African States (ECOWAS) compliance to international money laundering laws. Countries and regional institutions were mandated to conduct peer review assessment on the adequacy of member countries' legal regime (majorly banking laws and regulations) in combating money laundering and terrorism financing. In 2000 for instance, ECOWAS established GIABA with its headquarters in Dakar, Senegal. The GIABA consists of 16 member states. In its effort to actualize its objectives relating to the issue of money laundering, GIABA launched a Mutual Monitoring Review through Financial Action Task Force (FATF) in 2007, the essence is to evaluate money laundering activities among member countries (CBN, 2018). One of the key contributions of this group to its member countries including Nigeria was its recommendation for the review of its member countries' AML/CFT sanctions to be proportionate and dissuasive (CBN, 2018).

At the individual country level, Nigeria's first legislation to combat money laundering was the Money Laundering (Prohibition) Act, 2004. This Act was short-lived due to several deficiencies, including the lack of widespread consultation and the failure to incorporate some of the global recommendations on national money laundering legislation. Subsequently, the 2004 Act was repealed by the Money Laundering (Prohibition) Act, 2011, which provided a more robust framework for addressing money laundering activities in Nigeria. In the same year, the Terrorism (Prevention) Act, 2011 was enacted to combat the financing of terrorism. This legislation was further strengthened by the Terrorism (Prevention) (Amendment) Act, 2013, which extended the application of the law to include extra-territorial jurisdiction, thereby broadening Nigeria's capacity to combat terrorism financing globally.

In response to evolving threats and the need for enhanced regulatory frameworks, Nigeria introduced the Money Laundering (Prevention and Prohibition) Act, 2022. This recent legislation replaced the 2011 Act and aims to align Nigeria's legal framework with international best practices, particularly those set by the Financial Action Task Force (FATF). The 2022 Act emphasizes stronger enforcement mechanisms, stiffer penalties, and enhanced provisions for monitoring and reporting suspicious transactions.

Despite these efforts and improvements in the regulatory regime, the Nigerian financial system remains vulnerable to money laundering and terrorism financing. Notable examples include the

activities of terrorist groups such as Boko Haram in Northeast Nigeria, banditry in the Northeast and Northwest, the Indigenous People of Biafra (IPOB), Niger Delta militancy, and the emergence of several separatist groups. These groups are heavily funded by both local and foreign interests, as evidenced by their access to sophisticated arms and ammunition.

Furthermore, during periods of conflict, individuals often resort to informal savings channels for precautionary purposes instead of using conventional banks (Posso, 2023). These informal savings practices inadvertently create opportunities for money laundering and terrorism financing, further complicating the challenges faced by Nigeria's financial system. This development has likely influenced Nigeria's ranking on the Basel Anti-Money Laundering Index, where the country was rated as the 14th most vulnerable to money laundering risk in 2019 with a risk score of 6.88/10, compared to 6.86 in 2018 (AML/CFT, 2019). This underscores the need for researchers and policymakers to expand their understanding of the key factors driving this phenomenon. Interestingly, the increase in money laundering and terrorism financing in Nigeria coincides with the era of growing financial innovation through FinTech.

The existing literature suggests a potential link between money laundering and the increasing application of FinTech; however, the evidence remains mixed and inconclusive. Some studies highlight the possibility of FinTech fuelling money laundering (Odu, 2020), while others argue that it is incorrect to suggest that FinTech promotes money laundering (Phillips and McDermid, 2020). Despite disagreements among scholars on the relationship between FinTech and money laundering, empirical studies predominantly focus on the benefits of FinTech without adequately analysing its challenges within the financial system. The benefits of FinTech extend beyond improving business processes and payment systems to increasing access to finance. Globally, countries have prioritized FinTech as an essential element in protecting their financial systems, particularly as a sustainable coping strategy during natural disasters such as earthquakes, hurricanes, tsunamis, and pandemics. Currently, FinTech has evolved into a critical tool for promoting inclusion and trade during pandemics (Shofawati, 2020).

During the outbreak of the COVID-19 pandemic, FinTech was considered a critical strategy to drive the global economy and ensure business continuity in the financial industry. Ujunwa et al. (2021) argue that the global health crisis amplified difficulties surrounding food security, worsened the burden of debt, and led to a decrease in revenue due to the volatility of commodity prices. Moreover, the labour market was significantly impacted, particularly due to the prevalence of low-skilled and informally employed individuals who lacked the opportunity to work remotely. Ujunwa et al. (2021) further emphasized that enhancing FinTech is a vital strategy for mitigating the adverse effects of pandemic

outbreaks on the global economy. Conversely, Denis (2020) contends that the emergence of digital finance has increased money laundering, noting that FinTech platforms are recognized as channels for such illicit activities (Nurr, 2019; John, 2020). To the best of the researcher's knowledge, there is a paucity of empirical studies examining the relationship between FinTech and money laundering.

This study contributes to the existing literature by investigating the effect of FinTech on money laundering using Nigerian data. Additionally, the study introduces moderating variables, including regulation (regulatory quality) and financial literacy (level of financial literacy), to explore their influence on the relationship between FinTech and money laundering. This approach aligns with the suggestions of previous studies (Baron and Kenny, 1986; Jose, 2015). Moderating variables are expected to either strengthen or weaken the relationship. Regulation, in particular, is considered one of the most effective tools for combating money laundering. However, the effectiveness of regulation as a moderating variable depends heavily on a country's ethical climate.

Nigeria represents a country with a poor ethical climate due to challenges such as corruption, crony capitalism, political interference, and weak enforcement of laws. This raises the question: How effective can regulation be in moderating the effect of FinTech on money laundering in such a context? Similarly, Nigeria has one of the highest rates of out-of-school children in the world. According to UNICEF (2020), *"one in every five of the world's out-of-school children is in Nigeria. Even though primary education is officially free and compulsory, about 10.5 million of the country's children aged 5-14 years are not in school. In the Northern part of the country, the picture is even bleaker, with a net attendance rate of 53 percent"* (p.1). This situation is attributed to factors such as increasing insurgency, high poverty rates, rising unemployment, and poor hygiene, ultimately resulting in high levels of illiteracy.

There is a consensus in the literature that societies with high literacy rates also tend to have high levels of financial literacy (Jayasekara, 2020; Savona and Riccardi, 2017). Literacy levels can also influence money laundering and terrorism financing. Ardizzi et al. (2018) demonstrated that ethical climate, levels of corruption, cash-based transactions, and financial literacy are major predictors of money laundering and terrorism financing. Understanding the moderating effect of financial literacy on the relationship between FinTech and money laundering is crucial for effective policy formulation.

While theories have established the effect of regulation and financial literacy on money laundering, studies that clarifies the understanding of the moderating effect of the twosome on financial technology and money laundering relationship from developing country perspective is still lacking. To fill this important knowledge gap, this study introduces regulatory quality and level of financial literacy as moderating variables in examining the relationship between FinTech and money laundering in Nigeria.

Previous studies that examined the relationship between FinTech and money laundering from the regulatory perspectives, show that there are pertinent issues that require insights from the regulators that would enable charting of new courses of action for not only tackling money laundering but also establishing the positive and negative effects of FinTech on money laundering. For instance, there is the need to understand from the perspective of regulators the existence of other channels money launderers use to conceal illicit proceeds aside from financial technologies (Akartuna, Johnson, & Thornton, 2022). Currently, the most common digital finance products are ATM (Automated Teller Machine), internet banking, POS (Point of Sale), mobile banking, etc. It is also important to establish whether emergence of crypto currency amplify the effect of FinTech -induced money laundering, the challenges associated with the use of technology in countering money laundering in Nigeria, the adequacy of current laws in curtailing financial technology induced money laundering. Other contentious issues that require clarification from regulators are (1) existence of a specific laws that focus on technology-based money laundering; (2) existence of partnership with internal and external stakeholders in addressing technology-induced money laundering, and (3) how effective are those partnerships (if any). There is also the need to understand from the perspective of the regulators whether strengthening bilateral and multilateral partnership with internal and external stakeholders can offer some prevention of technology-induced money laundering. These insights could be relevant in formulation of policies in the future within the financial sector of the Nigerian economy.

1.3 Definition of Terms

1.3.1 Financial Technology (FinTech)

A broad range of technological innovations that enhance, streamline, and automate the delivery and use of financial services. It includes any technology that facilitates online banking, mobile payments, personal finance management, lending, investment, and crypto currencies. FinTech transforms traditional financial services by making them more accessible, efficient, and secure through digital platforms and advanced technologies (Dorfleitner, Hornuf, Schmitt, and Weber, 2017).

According to World Bank (2023) FinTech is a digital platform for payment and settlement as against the traditional cash use. The retail digital platforms include mobile-based, web-based, ATM-based, and POS systems (World Bank, 2023).

1.3.2 Regulatory Technology (RegTech)

RegTech refers to the application of technology to manage regulatory processes within the financial sector. RegTech primarily involves the use of innovative technologies to help businesses comply with regulations efficiently and effectively, thereby improving regulatory monitoring, reporting, and compliance. According to Arner et al. (2017) RegTech is *"the use of technology, particularly information technology, in the context of regulatory monitoring, reporting, and compliance"* and emphasizes how it facilitates efficient regulatory compliance and the potential transformation towards a nearly real-time regulatory regime.

RegTech solutions often leverage data analytics, machine learning, block chain, and artificial intelligence to automate and enhance compliance functions, reduce regulatory risks, and streamline the reporting process. This technology is particularly beneficial in managing large volumes of data and ensuring adherence to increasingly complex regulatory requirements.

RegTech is the use of innovative technology to manage regulatory processes within the financial sector, with a focus on regulatory monitoring, reporting, and compliance (Deloitte, 2022).

1.3.3 Money Laundering

Money laundering is the practice of making money generated by an illegal activity, such as drug trafficking, fraud, and terrorist funding, appear to have come from a legitimate source (Financial Action Task Force, 2021).

1.3.4 Financial Literacy

Financial literacy is the confident understanding of financial concepts including saving, insurance, money transfer services, and loans that leads to an overall sense of financial well-being and self-trust (Lusardi and Mitchell, 2014).

1.3.5 Financial Regulation

Financial regulation is a form of regulation or supervision that subjects financial institutions to certain requirements, restrictions, and guidelines that aims to maintain the stability and integrity of the financial system (Federal Reserve, 2020)

1.4 Research Motivation

Previous studies on FinTech and money laundering reveal serious methodological issues (Smith and Doe, 2020). Among the issues identified include excessive reliance on case study research that suffers

from the shortcomings of external validity and consistency, limited formulation and testing of research hypothesis, absence of robust statistical procedures in testing of hypotheses, and the issues degree of freedom and small sample size used (Ali, 2019 and Isaac, 2018). There is also paucity of evidence from the perspective of the regulators on issues surrounding money laundering and FinTech as well as the impact of specific laws and bilateral partnership in curtailing technology-induced money laundering. The motivation of this study is first to examine the effect of FinTech on money laundering using data from Nigeria, a country that is generally neglected by previous scholars (Financial Stability Board 2022; Alam, 2022), and more importantly, to examine the moderating effect of Nigeria's specificities such as regulatory quality and financial literacy, given the peculiarities of the country in terms of high rate of out of school and poor ethical climate. The study was also motivated by the need for evidence from the perspective of regulators with a view to having a balanced analysis on the subject (Ehrentraud et al. 2020) The findings of this study will form a springboard for designing suitable policies for combating money laundering in this era of increasing innovation in financial technology. FinTech empirical studies in this area would not only provide more empirical evidence on the issues of the FinTech, money laundering, financial regulation, and financial literacy in Nigeria, but would be of great benefit to promoting financial system stability, economic growth, and social development.

1.5 Research Question

Based on the above gap identified in past studies, the study asked the following research questions:

1. Is there a relationship between FinTech and money laundering in Nigeria as postulated by Technological Determinism Theory?
2. To what extent does financial regulations moderate the relationship between FinTech and money laundering in Nigeria as highlighted by Technological Determinism Theory?
3. To what extent does financial literacy moderate the relationship between FinTech and money laundering in Nigeria as highlighted by Technological Determinism Theory?

1.6 Research Aims and Objectives

This study aims to examine the relationship between FinTech, money laundering, and the moderating effect of financial regulation and financial literacy on financial technology and money laundering nexus, as well as explore the perspective of regulators on the issues of FinTech and money laundering in Nigeria. This has become extremely important given the changing landscape of the global payment system due to financial technology, and remote work policy due to the outbreak of the COVID-19 pandemic. For instance, it has been observed that the adoption of remote work policy to reduce the transmission rate of the COVID-19 virus amplified the disruption of business activities with malware

and ransom ware infections. The rising frequency of cyber-attacks and the associated risks to business continuity and data security have become more alarming. Attackers are now resorting to a new tactic of threatening to publicly release stolen data when victims refuse to pay the ransom. In some cases, the attackers are even more sophisticated by hijacking the network over long time as they search for any online backups to obstruct recovery or striving to encrypt the most-high value data. While pre-COVID-19 pandemic attacks focus on financial institutions usually referred to as cyber-attacks, the scope tends to widen during the COVID-19 pandemic, as the attacks include education sector, government institutions and hospitals in the United Kingdom, Europe, and United States.

Despite this growing evidence in literature on the effect of information technology on ransom ware and cyber security risks, little attention has been paid in extant literature on the effect of financial technology on money laundering. Financial technology could create incentives for money laundering, especially in countries with poor ethical climate and low levels of financial literacy. Digital platforms could create easy access for criminals to wash dirty money clean, and the seamless cross border transactions via digital platforms means that criminals can comfortably move proceeds of crime from one jurisdiction to another. The ever-increasing gap in regulatory quality and financial literacy, therefore, increases the vulnerability of poor income countries to money laundering in the era of financial technology. This study strives to reconcile theory with practical reality using Nigeria as a case study. Following are the major objectives of this study:

1. To examine the effect of FinTech on money laundering in Nigeria with the support of Technological Determinism Theory.
2. To investigate the moderating effect of financial regulations on relationship between FinTech and money laundering in Nigeria with the support of Technological Determinism Theory.
3. To establish the moderating effect of financial literacy on the relationship between FinTech and money laundering with the support of Technological Determinism Theory.

1.7 Scope of the Research

To overcome the limitation identified in previous studies, this study limited it theoretical framework to the understanding the relationship between FinTech and money laundering in Nigeria as well as the perspectives of regulators on the issues of FinTech and money laundering in the country. In specific, the study limits its scope to conceptualize only important variables relevant to the direct and indirect factors affecting the money laundering among FinTech users in Nigeria. The study limits its research variables to one independent variables - FinTech with four dimensions - mobile based, Web based, ATM based, and POS based financial services, then money laundering as dependent variable, and

financial literacy financial regulation as moderating variables. Moreover, the research was cross-sectional in nature, questionnaires were distributed to the FinTech users and interviews were conducted with regulators to understand their perspective on this issue. Thus, the data of the study was collected at one point in time. In terms of respondents, the study focuses on the users of FinTech in Nigeria which is estimated to be 32,363,047(CBN, 2019) as well as FinTech and money laundering regulators of the Nigerian banking system including Central Bank of Nigeria (CBN), Nigeria Financial Intelligence Unit (NFIU), Economic and Financial Crimes Commission (EFCC), Independent Corrupts Practices Commission (ICPC) National Drugs Law Enforcement Agency (NDLEA) and the Ministry of Justice.

1.8 Rationale for Research

The rationale behind the motivation and justification for conducting the research is broken down into five factors related to the research topic. These factors are partly informed by the researcher's professional background and working experience as a data analyst with one of the financial regulatory agencies in Nigeria.

1.8.1 Rationale for selecting FinTech.

The world has witnessed unprecedented digital transformation in every facet of human endeavor. Studies on FinTech transformation focus largely on the positive changes (Ujunwa et al. 2022; Onah et al. 2021; Ujunwa et al. 2021; Azarenkova et al. 2018; Chishti & Barberis, 2016). It is important for regulators to develop suits of policies or regulatory toolkits to keep up with the pace of technological innovation. The design of such regulatory toolkits should be influenced by empirics. The rationale for choosing FinTech is to provide empirics that counterbalance the argument. That is, undertaking studies that examine some of the negative changes of financial technology. This study contributes to this line of study by focusing on the effect of FinTech on money laundering. The FinTech money laundering nexus is an area with scant empirical literature and this study fills this important gap. Counterbalancing the theoretical and empirical argument by examining the effect of financial technology on money laundering would assist regulators design robust framework to mitigate the adverse effect of financial technology on the ecosystem.

1.8.2 Rationale for selecting Money Laundering

Money laundering is a serious phenomenon and studies that beam the search light on money laundering essentially promotes the stability of the financial system. The rational for focusing on money laundering are three folds. First, Nigerian Deposit Insurance Corporation Annual Report and Statement

of Account 2020 revealed an upsurge in fraud cases in the banking sector by 177.10% to 146,183 in 2020 from 52,754 in 2019. The instruments and channels of perpetrating the forgeries and fraud have evolved from traditional channels to FinTech channels such as ATM, internet banking and mobile banking (NDIC, 2020, p.197). This indicates a link between money laundering and FinTech in Nigeria. Therefore, studies examining this link are important in promoting the stability of the financial system. Second, the Basel AML Index 2022 ranked Nigeria 17th among 168 countries in terms of money laundering and terrorism financing. The report scored Nigeria 6.77 out of 10 while noting that Nigeria is "not doing enough to tackle money laundering and terrorist financing". The report further highlighted total disregard to extant laws, feeble institutions, selective interdictions reigns, weak and farcical enforcement as factors responsible for increasing money laundering in Nigeria. The poor ranking of Nigeria calls for more empirical studies to understand the drivers of money laundering and policy measure to address the phenomenon. This study contributes to the debate by focusing on FinTech as a major driver.

1.8.3 Rationale for Selecting Financial Literacy

Panos & Wilson (2020), Engel et al. (2020), and Wei et al. (2021) provide a functional perspective on the dynamics of financial literacy and fraud in the financial system. The studies emphasized the role of financial literacy in reducing fraud and the need for regulators of financial systems to consciously promote financial literacy as fraud prevention strategy. Engel et al. (2020) established a positive correlation between financially knowledgeable individuals and higher propensity to detect fraud. Wei et al. (2021) demonstrated that improvement in financial literacy increases fraud detection ability. Panos & Wilson (2020) further established a positive relationship between financial literacy and fraud detection, and financial literacy and financial innovation. Given the overwhelming evidence on the positive relationship between financial literacy and fraud prevention, we introduced financial literacy as a moderating variable to extend the analytical framework on examining the moderating effect of financial literacy on the relationship between financial innovation and money laundering.

1.8.4 Rationale for Selecting Financial Regulation

Effective regulation is extremely crucial in the development of financial innovation and for mitigating the adverse effects of FinTech on the financial system (Merton, 1995). Regulation could amplify the negative effect of financial innovation in terms of financial innovation promoting money laundering. Especially, the disparity in the structure and development of financial systems creates incentives for money laundering and regulatory arbitrage. This could worsen economies that are not optimizing the unprecedented opportunities financial innovation has provided in proactively reforming regulation.

Financial innovation has created new business processes and opportunities, and regulation must be designed to amplify the positives of FinTech and while mitigating or moderating the negative effects on the financial system. For instance, Zetzsche et al. (2017) argued that regulation should go beyond regulatory sandbox to smart regulation to promote the future of innovation and protect the financial system. Treleaven (2015) identified examples of unprecedented opportunities in reforming regulation such as using big data regulatory online reporting and analytics to streamline reporting; and stimulating a new generation of "RegTech" companies to provide the regulatory/compliance software". Regulation, therefore, moderates the effect of financial innovation on money laundering.

1.8.5 Rationale for selecting Nigeria.

The worth of FinTech companies in Africa as of 2020 is US$150 billion and is projected to grow to US$230 by 2025. The drivers of the revenue growth are SME lending, retail, and insurance (McKinsey & Company, 2022). The rationale for selecting Nigeria as the case study is in two folds. First, Nigeria FinTech growth rate is projected at 12% making the country one of the 11 key FinTech markets in Africa ((McKinsey & Company, 2022). Second, Nigeria currently ranks among the top 20 countries in the world with higher incidence of money laundering (Odu, 2020). Nigeria's ranking in the Basel Anti-Money Laundering Index has been deteriorating. The country was ranked 16th most vulnerable country (Basel Institute of Governance, 2012) but by 2019 it became 14th most vulnerable country (Basel Institute of Governance, 2019). This signifies that increasing penetration of FinTech could be associated with an increase in money laundering. It was asserted that digital finance has empowered financial service providers in establishing a market which is considered largely unregulated but attractive due to flourishing illicit activities. This underground economic activity is not only making illegitimate transactions easier but also opening new avenues for illicit transactions (Odu, 2020). Based on the above, it is important to examine the effect of FinTech on money laundering using Nigeria as a case study.

1.9 Research Correlation.

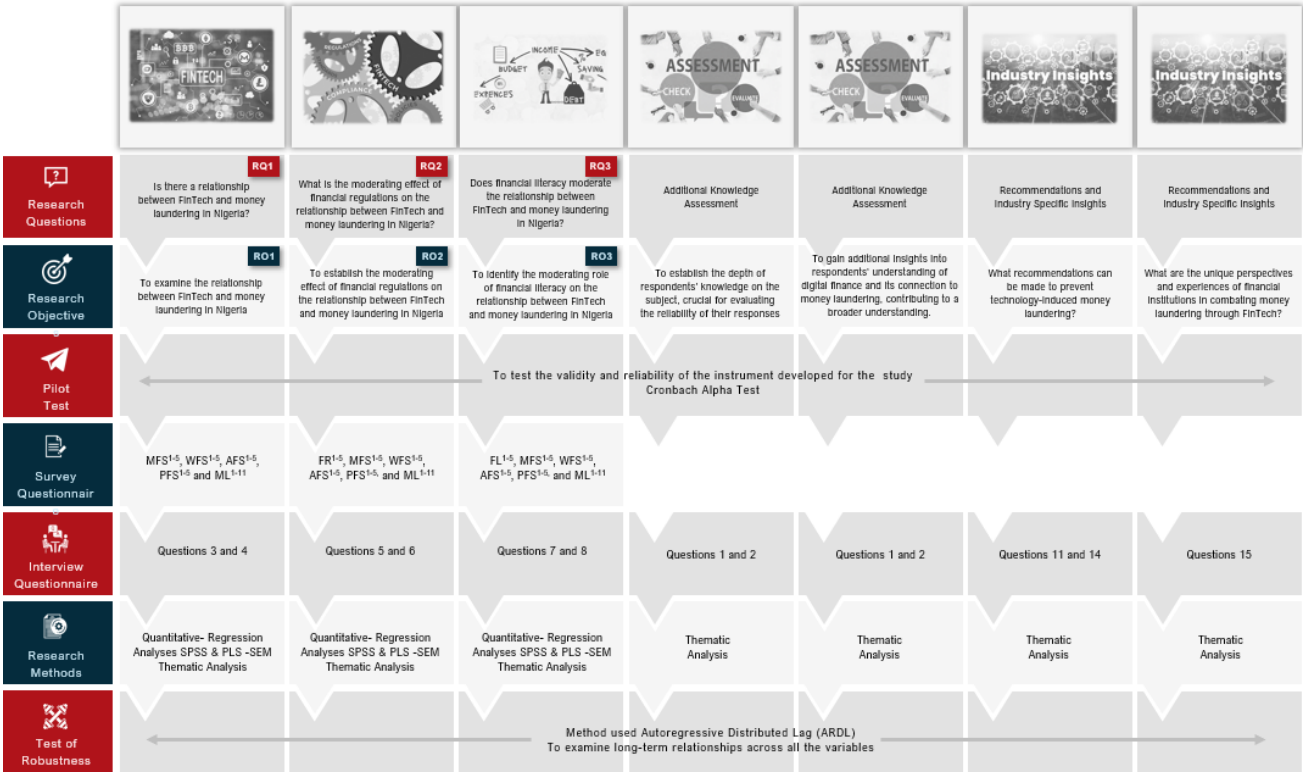
The structure of this research provides a comprehensive overview that encapsulates the various components and their interrelationships within the study. This correlation structure not only highlights how different aspects of the research connect and interact but also serves as a foundational guide that informs and directs the entire research process from start to finish. The structure offers a clear snapshot of the research framework, demonstrating how the various elements such as the research objectives, questions, and methodologies are interlinked. By illustrating these connections, it ensures that each component of the study is aligned and contributes coherently to the overarching goals of the research.

The correlation structure acts as an underpinning guide, ensuring consistency and alignment throughout the research journey. It helps in maintaining a focused approach, where each phase of the research, from data collection to analysis, is interconnected and supports the study's aims. It also aids in identifying and understanding the relationships between different variables and components, thereby enhancing the depth and clarity of the analysis. In the introductory chapter, the research objectives and questions are meticulously detailed, providing a clear roadmap for the study.

These objectives and questions form the core around which the entire research is structured, guiding the selection of methodologies, the development of hypotheses, and the interpretation of findings.

For a comprehensive understanding of the research tools used, Appendix C contains the full details of the survey and interview questionnaires. These instruments are crucial for data collection and are designed to capture the necessary information to address the research questions and objectives effectively. By including these details in the appendix, the research maintains transparency and provides readers with the tools to evaluate the validity and reliability of the data collected.

Figure 1.1: Research Alignment Grid (Source: Authors creation)



The correlation structure shows the relationships between the core research questions, objectives, and methods of this study, focusing on the interactions between FinTech, money laundering, financial regulations, and financial literacy in Nigeria. It also incorporates the perspectives of financial regulators on these issues which serves as a verification and validation of the first analysis conducted.

The questionnaire items are categorized and labeled as follows: Mobile-based financial services usage is coded as MFS 1 to 5, web-based financial services usage as WFS 1 to 5, ATM-based financial services usage as AFS 1 to 5, POS-based financial services usage as PFS 1 to 5, exposure to money laundering as ML 1 to 11, and financial regulation as FR 1 to 5.

Research Question 1:

Objective: To examine the relationship between FinTech and money laundering in Nigeria with the support of Technological Determinism Theory.

Questionnaire Items: MFS1-5, WFS1-5, AFS1-5, PFS1-5, ML1-11

Methods: Quantitative - Regression Analyses (SPSS & PLS-SEM)

Research Question 2:

Objective: To establish the moderating effect of financial regulations on the relationship between

FinTech and money laundering in Nigeria with the support of Technological Determinism Theory.
Questionnaire Items: FR1-5, MFS1-5, WFS1-5, AFS1-5, PFS1-5, ML1-11
Methods: Quantitative - Regression Analyses (SPSS & PLS-SEM)

Research Question 3:
Objective: To identify the moderating role of financial literacy on the relationship between FinTech and money laundering in Nigeria with the support of Technological Determinism Theory.
Questionnaire Items: FL1-5, MFS1-5, WFS1-5, AFS1-5, PFS1-5, ML1-11
Methods: Quantitative - Regression Analyses (SPSS & PLS-SEM)

Pilot Test: The pilot test was conducted to test the validity and reliability of the instrument developed for the study, measured using Cronbach's Alpha Test.

Thematic Analysis: The analysis was applied to interpret regulatory perspectives on the study, systematically uncovering insights such as prevalent crimes, the role of financial innovation, and recommendations for effective partnerships. This method was carried out as a form of verification and validation of the survey findings, further enhancing the reliability of the variables examined.

Test of Robustness: The Auto-Regressive Distributed Lag (ARDL) method was employed to test the robustness of the findings. The method was used to verify the stability and consistency of the relationships across the variables, ensuring that the observed effects are not due to spurious correlations or model specifications but are reliable and valid over different conditions and timeframes.

1.10 Research Structure

Research structure presents a snapshot of the entire research process and briefly discusses the objectives of the chapters of the thesis. This thesis is categorized into eight chapters.

CHAPTER 1 (BACKGROUND OF THE STUDY): This chapter sets the stage of the thesis by first discussing the background of the study, identifying the problem statement, and narrowing the scope of the study to Nigeria. Chapter one also provided a contextual definition of financial technology, money laundering, financial regulation, and financial literacy. This chapter also mainstreams the definitions of point-of-sales, automated teller machine, mobile banking, and internet banking as the financial innovation products that the study would examine. Chapter one further detailed the rationale for using Nigeria as a case study, for focusing on financial technology, financial regulation, money laundering, and financial literacy.

CHAPTER 2 (RESEARCH CONTEXT): This chapter provides an in-depth analysis of the research context, by exploring Nigeria profile within the context of financial technology, financial regulation, money laundering, and digital regulation. The chapter also discussed the structural rigidities with financial system and financial technology regulation in Nigeria, mandates of financial crime fighting agencies, and particularly the functions of Federal Ministry of Justice, Nigerian Financial Intelligence, Economic and Financial Crime Commission, National Drug Law Enforcement Agency, and Independent Corrupt Practices and Other Related Offences Commission.

CHAPTER 3 (LITERATURE REVIEW): This chapter reviews the extant literature on financial technology, point-of-base financial service, automated teller machine based financial services, mobile-based financial services, and web-based financial service. The chapter also laid a strong foundation for the theoretical foundation for the work from a practical perspective. The chapter emphasis the role of the Central Bank of Nigeria in designing policies to protect users of financial products, and the financial system.

CHAPTER 4 (THEORETICAL FRAMEWORK): This chapter lays the foundation for the theoretical framework, which is technology determinism theory. The theoretical framework guides the formulation of the 3 research objectives and questions and guides the researcher in narrowing down the scope of the research within various theoretical arguments in understanding the theoretical and empirical link between financial technology and money laundering.

CHAPTER 5 (METHODOLOGY): This chapter discusses the research techniques and design, which employs a mixed-method approach consisting of both qualitative and quantitative strategies.

For the quantitative approach, the chapter covers the sample and sampling techniques, operational definitions, and measurements of financial technology, money laundering, financial regulation, and financial literacy. It also addresses the design of the questionnaire, the data collection methods, and the statistical tools used for analysis, specifically justifying the use of partial least squares structural equation modeling (PLS-SEM).

For the qualitative approach, the chapter details the interview respondents, the interview questions, and the thematic analysis of the interviews. It also addresses ethical research issues, including ethical considerations, research integrity, and the researcher's background.

Additionally, this chapter introduces the pilot study conducted, along with justifications for its necessity. It discusses observations from the pilot study and lists all stakeholders interviewed for both

the pilot and main studies. Specifically, the chapter presents the criteria for conducting the Cronbach Alpha Test and its results concerning reliability constructs, as well as discriminant and convergent validity constructs.

CHAPTER 6 (QUANTITATIVE DATA ANALYSIS): This chapter discusses the results obtained from quantitative analysis. Specifically, it discusses the basis for selecting the respondents, the analysis response rate, the missing values, demographic profile of the respondents and the outliers. The chapter also discusses the descriptive statistics of the variables and pre-estimation tests such as independent sample t-test for non-response bias, non-response bias test, normality test, and multi-collinearity. The chapter also discusses the Partial Least Square Structural Equation estimation procedure and the results. For the qualitative analysis, it presents the study's respondents among the regulatory agencies and the interviews' thematic analysis.

CHAPTER 7 (QUALITATIVE DATA ANALYSIS)

This chapter discusses the result obtained from the qualitative analysis of data obtained from interview key informants' interviews (KII) were experts from six FinTech and money laundering related regulatory agencies including CBN, NFIU, EFCC, ICPC, NDLEA and the Ministry of Justice. The qualitative data analysis was conducted using thematic analysis using the five steps identified in the literature including familiarization with the data by the researcher through reading and re-reading, transcribing the data and jotting down the initial ideas, then initial code generation which is achieved through writing down small phrase or keywords, which was followed by theme generation and review and lastly supporting the themes with selected vivid and compelling extracts of examples.

CHAPTER 8 (TEST OF ROBUSTNESS): This robustness chapter conducts alternative analysis to establish whether the result obtained using survey questionnaire which was cross-sectional in nature can still hold using time series data. In this, Autoregressive Distributed Lag (ARDL) analysis was conducted through the relevant steps of analysis including the use of OLS estimator to estimate the co-integration relationship and the identification the lag order of the model. The ARDL model deployed also allowed different variables to be assigned differently with lag-lengths as it appears in the model. Then, the long-run and short-run parameters of the models were concurrently assessed, and the F-statistic computed is then compared with the arranged critical value and all the variables were expressed of order zero for values of the lower bound, and order one for the upper bound. The result from ARDL confirmed the survey results that FinTech is related to money laundering.

CHAPTER 9 (CONCLUSION AND RECOMMENDATIONS): This chapter recapitulates the research background and recaps its objectives to confirm whether the study's findings achieved the research objectives. It discusses the findings of the study in line with the research objectives. The chapter also discusses the theoretical implications of the study and its practical and policy implications. It also highlighted the limitations of the study as well as the recommendations to both policymakers and future researchers within the field of FinTech especially when link is being established with money laundering, financial regulation, and financial literacy.

1.11 Research Contribution

The findings of the study provide a foundation for understanding the relationship between financial technology and money laundering. Clarification is offered regarding the moderating roles of financial literacy and regulation, which are important dimensions for developing countries. The study includes an empirical assessment of regulatory quality in combating money laundering amidst the rapid growth of financial technology. The introduction of financial literacy, a variable largely neglected in money laundering literature, enhances the robustness of the findings, given the disparity in the development of financial systems and financial literacy levels between developed and developing economies. These findings hold significant value for regulators in the design of policies and regulations to combat money laundering, including the integration of financial literacy not only as an instrument of financial inclusion but also as a tool for combating money laundering. Specific benefits of the study include theoretical, methodological, and practical contributions as outlined below:

1.11.1 Designing Policies to Promote the Stability of the Financial System

In most developing economies, research objectives and policy intervention focus largely on leveraging financial technology for development. This advocacy has become extremely strong due to the disruptive effect of COVID-19 on global labor market, and more particularly, in Africa, due to large the informal sector (predominant low-skilled workforce that do not have the option of working remotely in the face of new variants), and educational system that is not powered by the state-of-the information technology Ujunwa et al. (2021). This development created a serious digital divide and brought to the fore, the imperativeness of African countries playing catching with the rest of the world. While the argument is germane and FinTech remains the best strategy to promoting inclusion, it is also important to examine the adverse effect of FinTech on the economy. Such balancing is extremely important in assisting policy makers harvest the opportunities of digital innovations and design policies to mitigate the associated risks.

This study represents one of the noble efforts in terms of balancing the argument by examining the effect of FinTech on money laundering in Nigeria.

1.11.2 Multi-lateral Cooperation and Partnerships

Strengthening bilateral and multilateral partnerships with both internal and external stakeholders is essential for Nigeria to effectively prevent technology-induced money laundering. It allows for improved information sharing, harmonized legal frameworks, enhanced capacity, international cooperation, and access to technical expertise, all of which are crucial for combating global financial crime, and money laundering.

1.11.3 Contribution to Practice

Regulatory quality and level of financial literacy are important moderating variables largely neglected by previous studies. In countries where the ethical climate is poor, with increasing cases of terrorism and banditry, the mere implementation of the FATF recommendation or domestication of the recommendations may not deter money laundering because of poor enforcement of law and order (La-Porta et a, 1996). Similarly, the effectiveness of regulation also depends on the level of financial literacy. In countries where the users of financial technology are not knowledgeable about the products, cannot exercise their rights, and do not understand the techniques of avoiding suspicious financial transactions, such country is expected to be a breeding ground for money laundering. Nigeria represents a good case for studying the moderating effects of regulation and financial literacy. Findings from this study make important contributions to practices because of the increasing presence of the predictors of money laundering and terrorism financing. The findings of the study would be useful in developing and providing guidelines and strategies to government institutions and agencies, mainly those responsible for designing and formulating policies to combat money laundering and terrorism financing. The findings of the study would also be useful for data policies, academic knowledge, consulting, and training services related to money laundering in Nigeria. Additionally, the finding of the study could provide empirical information on the impact or influence of FinTech in fueling money laundering in Nigeria and how financial regulation and literacy moderates the direction of this relationship in Nigeria. In view to that, it is expected that this study will provide government agency with better understanding of these relationships and help develop a clear strategic policy direction on how to achieve a greater financial inclusion without compromising the safety and integrity of the financial system.

1.11.4 Contribution to knowledge and Theory

The study first, reaffirms and emphasizes the significant importance of technological determinism theory in understanding the relationship between FinTech and money laundering in Nigeria. Second, the results of this study contribute to knowledge and theory with respect to FinTech. Specifically, it provides empirical evidence on FinTech from a new context of Nigeria with the support of Technological Determinism Theory. Third, the study contributes to the theoretical and empirical development on the relationships between FinTech, money laundering, and financial regulations. In doing this, the study demonstrates the relative importance of variables such as financial regulation to the money laundering control in Nigeria. Also, the study is useful in offering theoretical propositions to promote, encourage and facilitate future research in FinTech.

1.11.5 Methodological Contribution

The study contributes to methodology as the existing methodology in the field of FinTech and money laundering are either conceptual (Nurr, 2019; John, 2020) or case studies (Faccia, Moşteanu, Cavaliere, & Mataruna-Dos-Santos, 2020). Only a few methodologies are empirical in nature (Davis, 2018; and Denis, 2020). This study deploys the use of Partial Least square (PLS) and Structural Equation Modeling (SEM) as a methodological tool for which the survey data collected are analyzed. The justification for using PLS-SEM as a method of data analysis is justified and supported by the relative complexity of the research model which includes direct and moderating effects. The PLS-SEM use is consistent with Hair et al. (2014)'s suggestion that the analytical tool be used in a complex research setting. The fact is that methodological data analysis using other forms of tools such as Statistical Package for Social Science (SPSS) may require separate analysis of both direct and moderating hypothesis, which the PLS-SEM runs concurrently. In addition, the study also deployed mixed-mode methods in terms of both data and analytical procedures. For the data, the study used both primary and secondary data. For the primary data, both qualitative and quantitative data were used while quantitative time series data was used for the secondary data part to ensure robustness of findings. In terms of methods of analysis, thematic analysis was used for the qualitative primary data while the quantitative primary data was analyzed using PLS-SEM. Furthermore, the secondary time series data was analyzed using Autoregressive Distributed Lag (ARDL). The mixed-mode methodological approach deployed provide some uniqueness in two ways. Firstly, it ensures robustness of findings and seconding it serves as guide to future research on how different data and analytical approaches can be deployed in FinTech research. To the best of the researcher's knowledge no existing research has demonstrated the level of methodological robustness achieved in this study.

1.12 Conclusion

The chapter presented the background of the study which gives important insights on the historical perspective of the money laundering from around the world, within Africa and Nigeria which supports the formulation of the statement of the research problem. Thus, consistent with the gaps identified through the literature summarized in the problem statement, the research questions and objectives were formulated with clear target of addressing them. The chapter also addressed the study's motivations from different perspectives including the motivations for selecting the variables including money laundering exposure, FinTech usage, financial regulation, and financial literacy. The motivation for selecting Nigeria as a context of the current study was also addressed in this chapter. The chapter also offered brief descriptions of all the chapters of the study intended to guide the users of the thesis to have complete grabs of its content. Lastly, the contributions of the study to different stakeholder groups including policymakers, practitioners, regulators, researchers and multi-lateral cooperation and partnerships were also addressed in the chapter. Conclusively, a comprehensive introduction of the study was given in this chapter.

2.0 RESEARCH CONTEXT

2.1 Overview

This chapter introduces the research context discussing the relationship between Financial Technology (FinTech) and money laundering within the context of Nigeria. It begins with a brief overview of Nigeria, emphasizing critical aspects of its economic and financial landscape. This contextual foundation is essential for comprehending the intricate dynamics at play. Subsequently, the chapter discuss the evolution and current state of FinTech in Nigeria. It investigates how technological advancements have transformed financial services and evaluates the regulatory frameworks established to oversee this burgeoning sector. The discussion centered on the dual objectives of these regulations: promoting innovation within the FinTech space while simultaneously safeguarding the financial system against misuse for illicit activities, such as money laundering.

The chapter further examines the regulatory landscape in Nigeria, analyzing the measures implemented to ensure that the growth of FinTech does not compromise the integrity of the financial system. This examination is crucial for understanding how Nigerian authorities strive to balance the encouragement of technological advancements with the imperative to prevent financial crimes. The chapter offers a comprehensive introduction to the Nigerian context regarding FinTech and money laundering. It sets the stage for a more detailed analysis of the interactions between these domains, providing a foundational understanding of the regulatory and policy challenges that must be addressed to mitigate the risks associated with FinTech innovations.

2.2 Country Profile

Nigeria is in the Gulf of Guinea, with wildlife reserves and natural landmarks. The country is multi-ethnic, multi-lingual, multi-religious, and multi-cultural. Nigeria is endowed with natural resource in commercial quantity, with crude oil accounting for 85% of the export earnings. Nigeria is a former British colony and comprise of Western, Eastern, and Northern Protectorates. The country attained independence from British rule on October 1, 1960, and had had a turbulent political history from civilian to military rule. However, since 1999, there has been political stability due to a successful political transition between political parties and opposition political parties.

Nigeria has the largest economy in Africa with approximate GDP of 362.81 billion US$ in 2023 (Trading Economics, 2023). Nigeria's population of 223.8 million in 2023 is the largest in Africa, with average annual GDP growth rate of 2.72% (Trading Economics, 2023). Nigeria is one of the 16 Member countries of the Economic Community of West African States and account for 85% of the Community's GDP. Nigeria practices the Federal system of government, and it currently comprise 36 autonomous states plus

the Federal Capital Territory and 774 Local Government Areas. The Ministries, Agencies and Department responsible for combating money laundering are federal institutions. This arrangement has somewhat limited the effectiveness of the agencies in combating financial crimes. Specifically, there are cases where the state governments drag the law enforcement agencies to court on jurisdictional issues – challenging the power of a federal agency to investigate and prosecute money laundering cases committed in a state.

2.3 Financial Technology (FinTech) in Nigeria

Financial technology is the use of modern and digital technology in financial service delivery. Firms adopt digital products or technologies such as cloud computing, big data analytics, Internet of Things, 5G network, artificial intelligence, and industrial version algorithm to improve their production processes and other activities (Yang et al. 2023; Truant et al. 2021). In the financial service industry, it involves assisting customers, institution, and businesses to promote access to financial product, easing the processes of cash withdrawal and transfer, simplifying loan application and assessment procedure, account opening procedure, reducing documentation associated sundry banking activities, promoting remote access to helpline, and checking accounting balances, and facilitating cross-border payment and settlements. Financial technology companies are, therefore, defined as organizations that are using internet-based and non-internet-based technology solutions to improve local and cross-border payments and settlement, as well as banking services and products. This development is also changing the structure of bank revenue, which is currently titling towards fee-based financial services.

FinTech implies services provided through personal computers, mobile devices and cards that are linked for efficient digital payment systems facilitated by the Internet (Ozili, 2018). Multiple stakeholders are involved, such as banks, mobile network operators, financial technology providers, regulatory bodies, agents, retailers, and customers alike. (Michelle, 2016). FinTech enables a range of financial services, such as agency banking, internet banking, and mobile banking. Countries are consciously making effort to optimize the benefits of FinTech, while mitigating the potential risks.

The Bank for International Settlements (BIS) is an international financial institution that serves as a Bank for Central Banks and a forum for international monetary and financial cooperation. Established in 1930, the BIS aims to foster international monetary and financial stability through its various functions, including facilitating cooperation among central banks, conducting research on economic and financial issues, and providing banking services to central banks and international organizations.

One of its key contributions in recent years has been through its Financial Stability Institute (FSI), which plays a crucial role in addressing financial stability and regulatory challenges associated with

financial innovation. The FSI has introduced several frameworks to better understand and manage emerging risks in the financial sector.

A notable framework developed by the BIS is the FinTech Tree, which provides a comprehensive structure for categorizing the FinTech landscape. This model divides the FinTech ecosystem into three core components: FinTech activities, facilitating policies, and enabling technologies. This structured approach helps stakeholders—including policymakers, regulators, and industry participants—navigate the complex and rapidly evolving world of financial technology. By offering insights into the relationships between these components, FinTech offers a structured categorization of the pertinent domain as illustrated in Figure 2.1

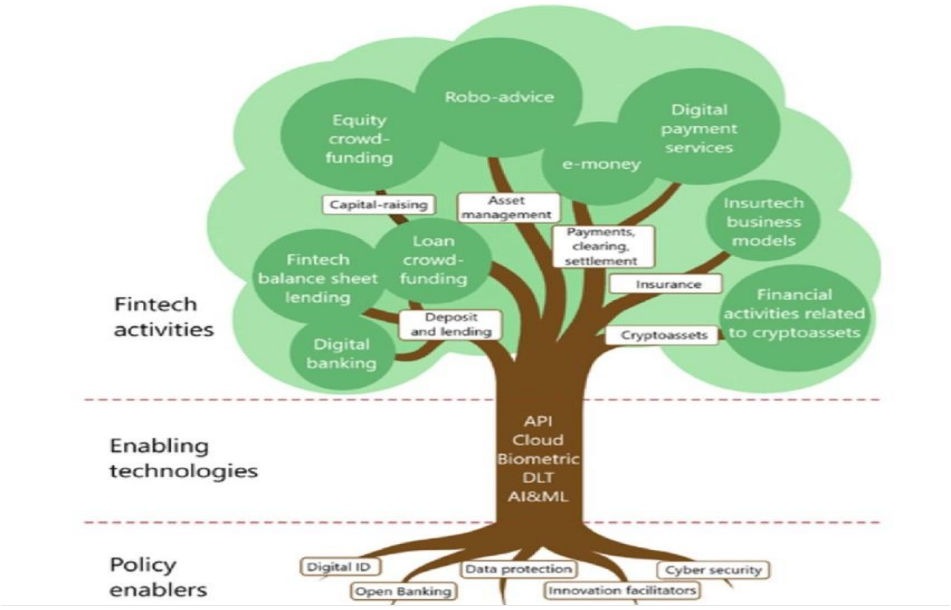


Figure 2.1: FinTech tree a taxonomy of the FinTech components

(Source: BIS, 2020)

In Nigeria, the trajectory on the adoption of FinTech is upward sticky. Digital finance sustained uptick from January 2009 when the Central Bank of Nigeria through moral suasion encouraged deposit money banks to deploy payment system infrastructure to reduce cash handing and cash-based transactions. Due to the moral suasion and deployment of FinTech regulations in Nigeria, transaction through digital platforms increased astronomically within the period. For instance, ATM transactions increased by 1,412% to Naira 638.07 billion in December 2018 from Naira 42.20 in January 2009. Similarly, mobile banking, internet banking, and Point-of Sales (POS) increased astronomically within the period (Ujunwa

et al. 2022). Figure 2.2 presents the trend of digital finance in Nigeria from January 2009 to December 2018).

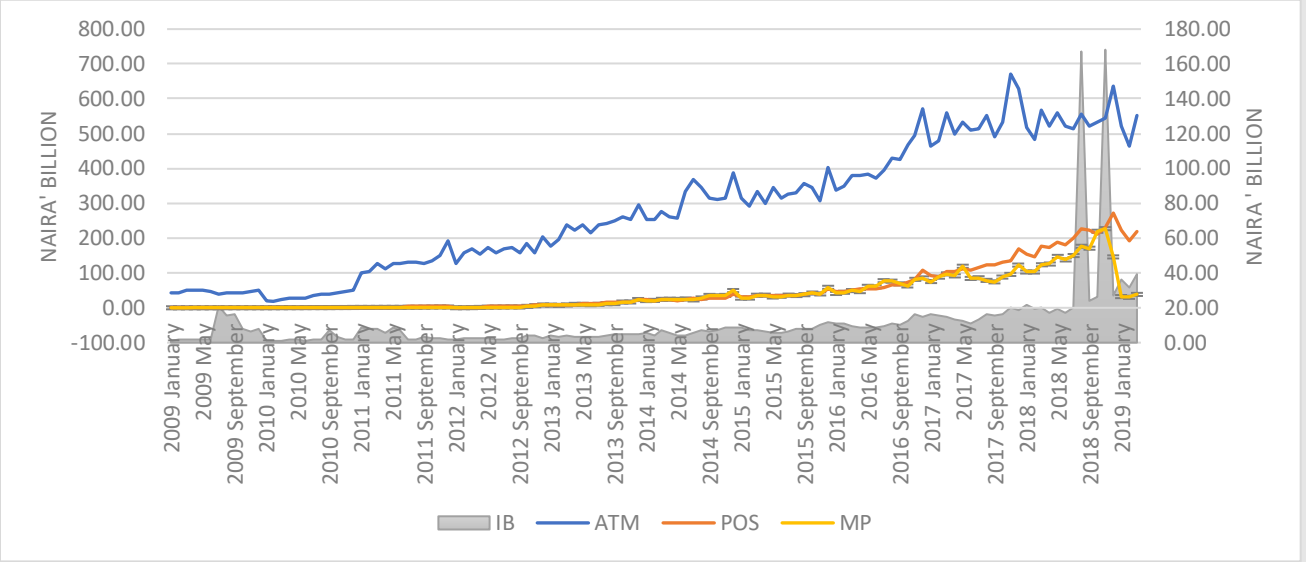


Figure 2.2: Monetary Value of Digital Platform Transactions in Nigeria

Source: Culled from Ujunwa et al. (2022)

The massive adoption of FinTech solutions in Nigeria is attributable to functional efficiency such as security, flexibility, convenience, and adaptability. FinTech is essential to both businesses and their customers in managing cash flows and fast-tracking payment and settlement. This is in line with the study of Adebayo (2021), who argues that FinTech is the use of technology to simplify and automate the utilization and delivery of financial services. This evolved system has changed the financial landscape of Nigeria and has formed an integral part of the Nigeria financial sector.

Nigeria is arguably regarded as the giant of Africa with over 200 million population, the under 30 population constitute 60% of the population due to high fertility rate in the country, while the older population aged between 65 years, and above who are less FinTech savvy population constitutes less than 3% (Statista, 2024). This implies that the country has existing and future potential for FinTech in line with (Swacha-Lech & Solarz,2021) who asserted that millennial population are more likely than other generations to use the services offered by FinTech. However, the conventional and commercial banks could not meet up with their expectation in providing adequate financial services to the population. The unavailability of bank branches in most urban centers and rural areas made access to financial services extremely difficult. In 1977/1989, the Central Bank of Nigeria adopted the Rural

Banking Scheme to reduce the drift of rural – urban migration, encourage the development of agriculture and agro-allied industry, the creation of credit for small scale industries, improve credit mobilization in rural areas, and help the cultivation of banking habit among rural dwellers (Uche, 1999). The major setback of the rural banking scheme is the dearth of infrastructure in the rural area. The prohibitive cost of running the rural branches, consumer bad experience with banks, lack of customer support, and outrageous charges were the feasible features of rural banking at the time. These challenges made it extremely difficult for banks to establish branches across the rural areas in Nigeria. At some point, the banks were agitating for the Central Banks of Nigeria, to allow them to close some of the rural branches because they operated merely as cost centers.

The agitation for rural banking network in Nigeria is quietening due to the emergence of FinTech as highlighted by Technological Determinism Theory which postulates that emergence of technology has the potential to transform human culture (McLuhan (1962). Early operators of FinTech in Nigeria include the systemspecs, Paga, Etranzact, Mkudi, and Teasypay. These FinTech companies mainly engage in the customer-to-customer money transfer system. This system enables bank customers to transfer and receive money without the interference of a third party. This system of customer-to-customer dealings is also referred to as Mobile Money. Mobile money services were created with the concept of a virtual mobile wallet owned by the customer, which could be topped up at an agent location. The money stored in the wallet can then be transferred to another user or utilized for paying utility bills (Adebayo 2021). The mobile wallet is owned by each participatory customer and is funded by the mobile agents. The mobile agents are those licensed and trained to carry out money transfer in a wallet or coins system which can be purchased by a customer at a price. Unlike the barter system, the wallet is used for business transactions. Adebayo (2010) also claims that mobile agents assist customers in funding their wallets and receiving a commission for the transaction.

Before the Nigerian payment system was rejigged by the Central Bank, which is the country's apex bank to encourage innovation, the Structural Adjustment Programme (SAP) introduced in the 1980s was designed to promote a virile banking system. Within three years of the adoption of the structural adjustment programme, the number of banks increased from 16 to 89, and the armchair banking model was abandoned in favor of an aggressive marketing regime. FinTech started in Nigeria when the traditional banks began to incorporate and use technology in their business operations, after the Central Bank of Nigeria, in 2012 reengineered the Nigerian financial system to promote cashless policy. SystemSpecs was the first FinTech Company in Nigeria birthed by John Obaro in 1991. Mitchel Elegbe followed by establishing Interswitch in 2003. These were the two prominent FinTech Companies, even though, there are many other companies existing at that time. Today, there are

indigenous FinTech companies such as Flutterwave, Paystack, Remitta, Piggyvest operating under the purview of the payment system regulation. The emergence of FinTech products such as crypto currencies, central bank digital currency, and artificial intelligence are revolutionizing the financial system.

2.3.1 FinTech and Vertical/horizontal Disintegration of Conventional Banks

Generally, financial technology is rapidly transforming the operations, services, and products of conventional banks. One area that has witnessed this massive transformation is the role of banks as horizontally and vertically integrated intermediaries. Bank services that promote loan-granting and deposit-taking, such as communication and information like established communication channels with retail lenders that enhances crossing-selling, efficient loan monitoring due to the existence of payment information are classified as horizontal integration. Vertical integration takes the forms of direct interaction with customers during account opening, making loans and raising deposit, as well as using their balance sheet to transform maturities of customers (Boot et al., 2021; Parlour et al., 2019; Drucker $ Puri, 2005). However, financial technology companies, as competitors, are seriously driving vertical and horizontal disintegration of financial intermediaries. First, the vertical integration of banks is threatened by the entrant of financial technology companies that are providing financial services that do not require balance sheet access. FinTech companies are also challenging the horizontal integration of banks through direct access with bank customers and imposing serious risk on bank products. Bank products at risk are:

Asset Management: Traditionally, conventional banks serve as gate keepers (first point of call), and this enables them to collect fees for acting as brokers and agents. Since these services do not require a deep balance sheet FinTech companies are providing these services with rich databases.

Deposit collecting and granting of loans: Financial technology companies have developed products that promote deposit taking and the granting of loans. Specifically, because the process is technology-based, it is seamless, fast, convenient, and cheap.

Payment and Settlement: Traditional banks serve as agents for internal and cross-border payments and settlements. They also use correspondence banks and complex networks to facilitate payment and settlement. FinTech companies are gradually dominating this space, especially in retail payment and settlement. Coincidentally, low regulatory compliance cost is promoting this horizontal disintegration relative to banks that require full banking license with strict regulatory requirements.

Direct Access to Customers: FinTech companies have drastically transformed the distribution of goods and service using digital platforms. The inclusion of financial services has transformed the financial service industry into a digital ecosystem. This transformation poses serious threats to banks as the interjection of online platforms between themselves creates a layer of intermediation which makes them middlemen. FinTech companies serving as middlemen between the banks and financial institutions enhances their capacity for the collection of market data and existing rents. This would lead to banks losing direct access to their customers.

Market Power: FinTech companies are increasingly able to leverage their extensive customer databases to gain market power previously held by traditional banks. Historically, customer loyalty to specific banks was driven by limited transparency regarding loan pricing. However, FinTech firms have revolutionized this landscape by developing online platforms that enable customers to compare financial product prices easily (Arner et al. 2016). This shift is moving customer loyalty away from individual banks and toward the financial products themselves. Consequently, there is an emerging consensus on the need for product-based regulations rather than institution-based regulations. This change is prompted by concerns that traditional banks may face challenges due to both vertical and horizontal disintegration as argued by industry experts (Gomber et al. 2018; Philippon, 2016).

2.3.2 Alternative Ledger System: Block chain Technology

Block chain serves as a digital ledger designed to monitor transactions conducted among multiple parties within a network. It is a peer-to-peer, internet-based distributed ledger that encompasses all transactions in a series of events. Deloitte (2016) highlighted that blockchain captures a shared node or database for all participants, connected to the blockchain, with each node maintaining an identical copy of the entire ledger in a transaction series. According to Gietzmann & Grossetti (2019), each entry in a blockchain ledger represents a transaction involving the exchange of value between participants. These values often consist of digital assets or records symbolizing rights, completed tasks, or ownership. Kokina et al. (2017) argued that various types of blockchains are currently being developed and tested. Nevertheless, most blockchains adhere to a universal framework and approach. Discussion on how to time stamp a digital record led to the emergence of a technological solution for time stamping. This solution, which prevents tampering with digital assets, traces the origins of digital asset records and any attempts to modify them. To clarify the nature of this digital solution, Moll & Yigitbasioglu (2019) explained that it employs a computationally intelligent method for digitally time stamping easily modifiable documents, utilizing a cryptographically secure chain of blocks that

eliminates the possibility of backdating or forward dating a document. The concept of a cryptographically secure chain of blocks, known as the time stamp digital solution, is considered the basis of block chain technology. However, the widespread recognition of blockchain technology began in 2008 when the anonymous "Satoshi Nakamoto" used it to describe the functioning of the public transaction ledger used for Bitcoin, the first digital cryptocurrency. Despite being initially met with skepticism, little is known about the full potential of blockchain technology. The advantages of blockchain technology include:

Distribution: The participants involved in the blockchain are interconnected through a network, where each participant operates a complete node and possesses a complete copy of the transaction records of the organization. Unlike the existing digital tools, the blockchain's distributed nature ensures that stakeholders are promptly informed about new transactions. The consensus algorithm governs the operation of each computing device (nodes) utilized by individual participants. Particularly, a remarkable aspect is that a blockchain participant can assess the ledger, while the ledgers themselves cannot be erased as they are replicated across the nodes of other stakeholders.

Encryption: This pertains to advanced technologies, including public and private keys that are utilized to securely and privately store data or documents on the network, enabling participants to manage the shared records in a transaction (Kwilinski, 2019). Consequently, each participant has the ability to input commands into the blockchain to facilitate transactions. However, every transaction initiated is simultaneously recorded in the nodes of all unique participants.

Immutability: The transactions are signed using cryptography, stamped with a timestamp, and then sequentially appended to the ledger. Once recorded, transactions ledgers cannot be deleted on the blockchain by a single participant. By integrating the immutability aspect of blockchain technology, manipulation of transactions by a single individual cannot be done.

Tokenization: Tokenization enables the conversion of intangible or tangible values into digital tokens. Tokenization in blockchain would enable individuals and businesses to convert their assets into token forms, thereby opening new business opportunities.

Decentralization: The ledger cannot be centralized due to the nature of technology. Data in the blockchain network is stored across multiple nodes, preventing any single participant from having complete control over the ledgers. Transactions are validated through a consensus mechanism that operates on each node, eliminating the need for a central authority to ensure trust and transparency in accounting. This system acts as a safeguard against fraudulent accounting practices such as earnings manipulation, window dressing, and aggressive accounting. Integrating blockchain technology into

accounting processes has the potential to revolutionize the field. Several studies have highlighted the drawbacks of blockchain technology, which include:

Difficulty of Data Modification: Modifying data within a technology often involves rewriting or updating code, especially if the modification affects the structure, format, or processing logic of the data. This process can indeed be expensive and time-consuming due to several reasons like code complexity, Testing and Validation, resource allocation, Risk of Disruption and Backward compatibility.

Expensive to Implement: When compared to traditional databases, the adoption of blockchain technology comes with a higher price tag. Transitioning businesses onto blockchain platforms requires meticulous planning and integration efforts, adding to the complexity and expense of the process.

Speed: Generally, blockchain technology undertakes a complex transaction that makes the processing speed relative to traditional database. For instance, there is low transactions of the consensus mechanism, signing transactions electronically, and signature verification, decentralization that requires verification and storage of transactions slows down the speed or could promote redundancy.

2.3.2.1 Argument on Crypto-Currency Replacing Fiat Money and Implications on Money Laundering

Money flower is a concept generally used to explain the evolution of money from the past to the present and into the future (BIS, 2017). Money has evolved from its traditional paper-based form to electronic, digital, and now it is in becoming virtual formats (Cohen, Shy, & Stavins, 2022). Therefore, it is crucial for regulators to understand the process of embracing the future of Money with Central Bank Digital Currency (CBDC), serving as a catalyst for revolutionizing FinTech through secure, efficient, and regulated digital payment system to shape a seamless Digital Economy that fosters inclusive Economic Growth. Figure 2.3 presents the money flower where privately issued cryptocurrencies like bitcoin are circled blue. The wholesale and retail CBDCs are circled green. The circled green represents crypto currencies issued by the central banks. For instance, the Fedcoin was a proposal for the Federal Reserve System to issue its own cryptocurrency. During the World Economic Forum 2023, it was reported that 44 central banks globally are experimenting with blockchain technology.

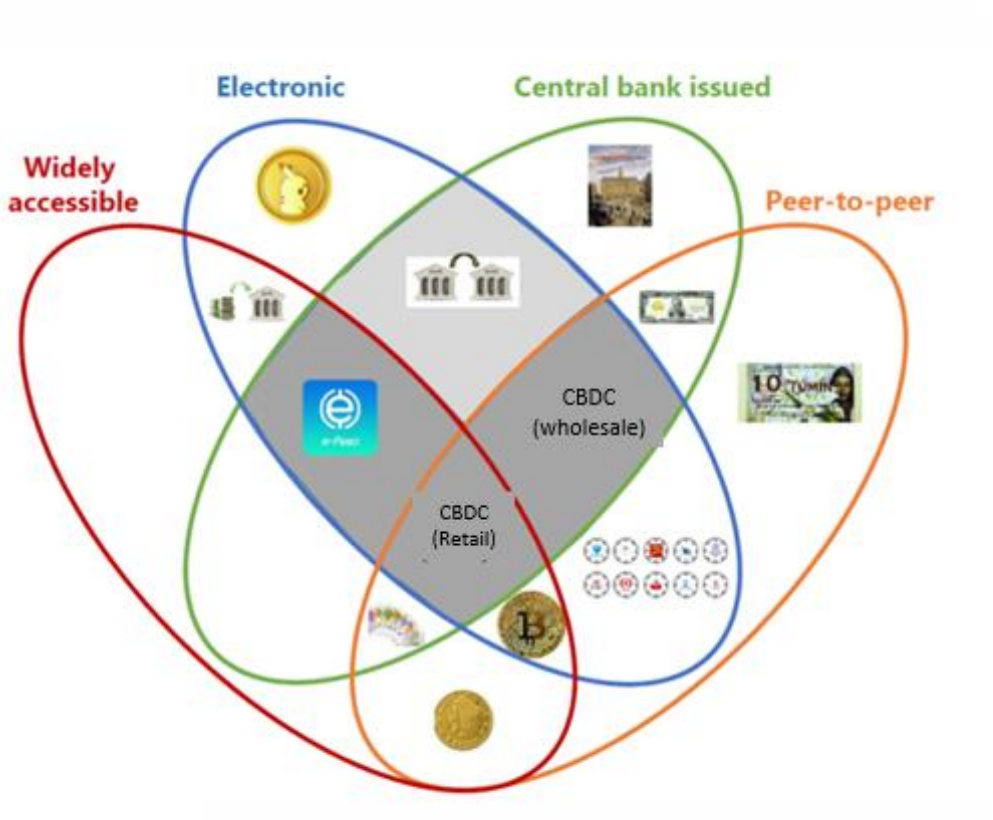


Figure 2.3: Money Flower

Source: BIS (2017)

For a cryptocurrency to replace fiat money, the following factors must be present:

1. Issuer: The Central Bank must be willing to act as the issuer. The Central Bank must be the issuer and consciously withdraw fiat money from the system for this to happen.
2. Form: Cryptocurrency is a digital money and could replace fiat money in the digital form. So many central banks are issuing e-currency which is also a fiat money.
3. Accessibility: Accessibility is an important feature of money, and the cryptocurrency must be made accessible to all. This could take the form blockchain automated teller machine, availability of payment points, and interoperability with existing payment technology.
4. Technology: The technology behind the money must be token based as against accounting based.

One important debate that has not been resolved in extant literature is the vulnerability of fiat versus virtual currencies to money laundering. Some scholars opine that fiat money is more susceptible to laundering because of the underground nature of cash transactions, ease of carrying cash, and most

importantly, cash transactions do not leave any audit trail (Ujunwa et al. 2021). In the same vein, dealers in illegal activities such as drug peddlers, terrorism financiers and bribery prefer cash-based transactions because of the ease of concealing the origin of the fund. They further argue that this contrasts sharply with virtual currency transactions with decentralized blockchain technology. In their view, since all transactions records are public, and the identity of all the parties are verified, money laundering on the ledger would be extremely difficult.

Choo (2015) and Tsuchiya & Hiramoto (2021) provided evidence to counteract the above postulation. In their view, virtual currency is more prone to money laundering relative cash. The major source of vulnerability is online anonymizing technology, especially when paired with another technology that makes it difficult to determine the location of the user. Online anonymizing technology has created the potential for the creation of illicit crypto markets or online marketplaces. They further argued that the predominate good traded in the illicit crypto markets is illicit drugs and stolen virtual currencies. Unfortunately, activities in the market evade law enforcement agencies because of concealed location. This explains the evinced interest in crypto markets by scholars, regulators, law enforcement agencies, government, and the media.

Another important dimension in the money laundering of virtual currency versus fiat currency debate is the associated legal issues or the complexities involved in prosecuting money laundering cases. Globally, legal practice has developed expertise and enacted elaborate laws to prohibit fiat money laundering. However, virtual currency which use cryptographic techniques to secure financial transactions operates independently of the traditional banking system, pose unique challenge to legal issues because of the anonymity and pseudonymous nature of the transactions. Specifically, virtual money launderers use obscure channels and techniques such as mixers or tumblers to blend criminal proceeds with multiple sources. Similarly, launders leverage privacy coins to enhance anonymity, obscure the origin of the fund and make it harder for law enforcement agencies to track in situations where criminals are identified, prosecuting these cases becomes complicated because of the borderless and virtual nature of the transactions. Money laundering through cryptocurrency transactions can result in serious criminal charges due to the intricate and effortless way individuals can transfer funds globally, while ensuring secrecy. However, prosecuting the individuals involved in such activities is an extremely complex process that demands substantial resources. The implications of this are that even when the legal profession strives to develop expertise in prosecuting virtual money laundering related cases, the prohibitive cost of prosecuting such cases could constitute a serious drag on the willingness to build expertise in the area. This development is likely to adversely affect the fight against financial innovation linked to money laundering.

On the empirical front, Choo (2015) examined the influence of emerging virtual currency on money laundering and terrorism financing. The author reviewed the 75 FATF and FATF-style regional bodies' mutual evaluation reports and identified compliance issues in areas that might afford exploitative opportunities for bribery and corruption. Based on the review the author concluded that virtual currency presents higher potential for money laundering relative to cash regime and proposed a conceptual intelligence-led AML/CTF strategy for addressing the risks. Tsuchiya & Hiramoto (2021) used the January 26, 2018, 58-billion-yen ($530 million) cryptocurrency, NEM that was fraudulently accessed stolen from the Coin check Exchange, headquartered in Japan, to demonstrate ease of laundering virtual currency relative to cash. Specifically, the authors argued that *"three years later, the Metropolitan Police Department, Japan, announced that more than 30 people had been charged for allegedly exchanging NEM cryptocurrency, accounting for one third of the stolen value, for other cryptocurrencies…the hackers have not yet been arrested, and how the stolen NEM was money laundered has not yet been investigated"*. The implication of this finding is that while the patterns and layers for laundering and concealing fiat money have been established, that of virtual currency is not yet known. The authors further argued that *"there was no pattern in the hour of the day of the sales transactions whereas more sales occurred on Sundays and Mondays … he suggests that the laundering was international and that the stolen virtual was purchased by individuals."*

2.3.2.2 Application of FinTech to Capital Market

The application of FinTech solution would promote a liquid, deep, and resilient capital markets accelerate growth through effective corporate governance, risk sharing, and profit incentive for investors. The application of FinTech solutions ensures that the system is powered by state-of-the-art technology in all aspects of its operations. It is emerging as a critical market infrastructure for production distribution, elimination of intermediaries, custody, accessibility, clearing and settlement. It promotes large value transfers, cross-border payments, efficiency, transparency, cross-border listing, and creating new opportunities. It is also used to reduce regulatory bottlenecks, time to market, costs, errors, and duplications. FinTech promotes good market governance - market surveillance and examination, ensuring market transparency and effective price discovery mechanism, and supervisory support. It enhances product and market innovation through restructuring of the market for efficiency, reliable trading and settlement infrastructure, protection of client's assets, and setting of valuation and benchmarks through price discovery mechanism such as the online price discovery portal.

Capital market are easy targets for FinTech disruptions because of the following:

1. **Market Demand**: Capital market regulators and operator are desperately striving for efficiency and flexibility. FinTech companies are providing technologies that improves the entire value chain of capital market process that addresses the challenges of speed, efficiency, transparency, and flexibility.
2. **Core Market Infrastructure:** FinTech companies are designing core market infrastructure such as intelligent and efficient trading and platforms, transparent and safer platforms to access liquidity, functionality that improves access to new products and assets classes.
3. **Post-Trade Digitization:** FinTech solutions have digitalised reporting processes, risk attribution, stress testing, clearing and settlement, securities lending, dematerialisation of trading instruments, collateral management, among others.
4. **Artificial & Analytics**: FinTech companies have also developed solutions that use machine learning and in-memory computing to analyse that makes prediction, forecast and investment decision by analysing structured and unstructured data. They have developed tools and software that accelerate decision making.
5. **Alternative Funding Platforms:** Platforms that enable different approaches to raising capital throughout the capital structure of both major corporations and small to medium-sized enterprises (SMEs).

Regulators and operators need to take a long-term view of digital innovation. Innovation has come to stay, and regulators must use FinTech as a risk mitigating tool. Regulators should deploy software and innovative technology to enhance compliance processes, periodic returns, and intelligent monitoring. Regulators should use technology to enhance real-time access to regulatory information, design of predictive tools for analyzing market abuse, regulatory news flows, and short trading. RegTech provides the opportunity for regulators to reduce systemic risks and improve operational efficiency. Regulators must importantly:

a. Design regulation to address the risk it poses such as financial integrity, consumer protection, cyber securities, money laundering, and data governance.
b. Adopt flexible stance that promotes enabling supervisory, regulatory, and legal environment for innovation to thrive.
c. Enhance cooperation with other regulators in developed economies to learn from each other.
d. Design policies that will increase accountability, transparency, security, and regulation of digital products

2.4 FinTech Regulation in Nigeria

The world over, financial regulations are guidelines which help to prevent unnecessary economic crises and untold economic distress. With the rapid growth of FinTech, regulations are necessary to guide the mode of operations, exit, and entrant. The FinTech companies has witness tremendous regulation such as ATM regulation, regulatory Sandbox, POS regulation, FinTech strategy, and regulatory framework for open banking in Nigeria. These regulations will be discussed in no consequential order.

2.4.1 Regulation of Automated Teller Machine in Nigeria

The ATM is an electronic equipment that aids customers to send and withdraw cash, make payments, and online transactions using a smart card called ATM card. Mohammed & Mayowa (2014) cited in Odewale (2008) defined Automated Teller Machine as an electronic appliance that gives out or receives cash deposits from account holders. A smart card is utilized to commence and finalize a transaction with the machine. The CBN over time in discharging it supervisory and regulatory role is implementing policies that will guide the payment system in Nigeria among which is ATM regulation. For better service delivery, the CBN revised the guidelines for failed transaction in Nigeria. To regulate the ATM, where there is a failed transaction, the bank is expected to make an immediate reversal in an instant; and where there are network glitches, reversal should not exceed 24-hours. This regulation is contained in the CBN guidelines on failed transaction in 2016 as revised in 2020. (CBN Guidelines on electronic payment channel 2016).

2.4.2 Regulatory Sandbox

The sandbox framework established by the Central Bank of Nigeria is a policy aimed at boosting the potential for creative business models that promote financial inclusion. The CBN, in its efforts to engage innovators in more adaptable ways to improve the payment system, introduced the concept of involving digital lenders, app developers, and FinTech providers in creating a smooth transition for the Nigerian digital payment system. The main goal of the regulation is to recognize and support innovative solutions that will improve the design and delivery of payment and financial services to Nigerians, enhance customer satisfaction, and promote financial inclusion. According to Banwo & Ighodalo (2020), the sandbox serves as a controlled testing environment for safely experimenting with web or software products, allowing the CBN to keep up with the latest advancements in payment solutions and emerging technologies in financial services, all while ensuring adequate consumer protection. The sandbox approach is a strategy utilized by nations to oversee FinTech companies.

2.4.3 Regulation of Point of Sale (POS) in Nigeria

The point of sale, a widely used payment system in Nigeria, is recognized for its instability. It is a single-use debit machine that functions with debit cards. A POS signifies the completion of a retail transaction, usually taking place when a customer uses their debit/credit card to pay for goods and services rather than cash (Mafimisebi et al. 2019). It can be used to access many financial services without necessarily interfacing with the bank agent. This service includes sending money, checking account balance, purchase of recharge card and bill payment. Unlike like the ATM, the POS requires the service of an agent that will interface between the banks the customer. The POS is equally regulated through the payment system regulation in Nigeria. The Central Bank of Nigeria has updated its regulations regarding POS transactions. According to the 2020 Guidelines, any disputed or failed POS or web transactions must now be resolved within forty-eight (48) hours, a significant improvement from the previous timeline of five (5) days outlined in the 2016 Guidelines.

2.4.4 Central Bank of Nigeria FinTech Strategy

The Central Bank of Nigeria FinTech strategy seeks to position the Nigerian financial ecosystem as a global leader that contributes to inclusive growth and development. The strategy adopts rules, and initiatives targeted to catalyze the FinTech ecosystem in Nigeria. This strategy encompasses all digital service platforms in Nigeria. (CBN National FinTech Strategy, 2022). Regulating payment systems, especially when financial technology is involved, might be critical in consideration of FinTech start up. An example is the sandbox regulation developed to manage the landscape of new businesses. This is in tandem with the study of Oyetoyan & Ajiboye (2021), who argues that Excessive regulation may not be favorable as it has the potential to be detrimental to FinTech start-ups. Recognizing this delicate balance, regulatory bodies in certain nations are implementing regulatory sandboxes to effectively navigate the shift towards a new business environment Hence, financial system regulators of various countries are coming up with efficient strategies to regulate FinTech companies. For policy and recommendation, the sandboxes will allow FinTech companies to interface with customer directly with low and minimal supervision for a specific period while regulators try to understand the level of risk involve in these services before permitting the company to launch the product to the wider market. The RegTech strategy also help financial system regulators to monitor and regulate the FinTech space, in terms of identifying the inherent risks, addressing compliance, this system is used to address compliance and regulate digital financial services.

2.4.5 Regulatory Framework of Open Banking in Nigeria

The word open banking is not new in the financial system regulatory space. It is a common term which enables the access of customer information by financial institutions. Udoma & Osagie (2021) suggests Open banking is founded on the concept of financial institutions providing third parties with access to their customers' data. In another study by Elias (2021), open banking is a system which permits and enables the sharing of financial information of customers by a bank or other financial institutions with third party players through Application Programming Interface (APIs).

The regulatory framework for open banking in Nigeria was an effort birthed by the CBN via a public concern in other to regulate the digital financial service space. This concern was initiated by players and stakeholders in the digital financial service arena. Elias (2021) is of the view that the issuance of the Open Banking Framework by the CBN was the culmination of a long and dogged effort by FinTech, and other players in the financial services space, who consistently lobbied the CBN for an innovative regulatory framework setting the ground rules for open banking operations in Nigeria. The CBN, in acting in accordance with its mandates as regulators of financial institution issued the regulatory framework in Nigeria in February 2021.

This regulatory framework now forms an offshoot of the guidelines that regulate the relationship between conventional banks and FinTech in the sharing of third-party data.

The framework is designed to oversee the utilization and distribution of clients' personal information and safeguarding such data among users of digital financial service providers. According to Elias (2021), the framework is intended to establish fundamental requirements and benchmarks for the sharing of data and services among stakeholders in the financial services industry. It delineates the conditions under which banks and other financial institutions must reveal consumer data and the array of financial and non-financial services to be offered, while addressing the risks associated with personal data privacy and cybersecurity. The framework also outlines the procedures and steps for registration and application. This aligns with the research of Udoma & Osagie (2021), who contend that the Framework provides comprehensive guidelines on the process for participants to apply for registration within their respective tiers, on the open banking registry maintained by the CBN.

In line with the guidelines, the framework also set out the principles and procedures to be strictly adhered to by software developers. This is to ensure seamless operation and flow of information within the system. All software developed must also be of similar specifications as outlined in the CBN regulation. While ensuring that the standard and agreement at which consumer information should be shared is strictly followed. With the emergence of open banking regulation, coupled with vile policies

to guide and protect consumer rights, more players will be witness in the financial technology space thereby increasing the Nigeria investment base.

2.4.6 Money Laundering in Nigeria

Money laundering is a widespread issue that affects all economies globally. It involves the illegal transfer of funds through legitimate businesses or financial institutions to disguise the illicit source of the money. Ogbodo & Miseseigha (2013) as cited in Enofe et al. (2018) define money laundering as the concealment of illegally obtained money or property, such as from embezzlement, drug trafficking, corruption, and other criminal activities. Essentially, money laundering is the process of turning illicit funds into legitimate ones if successfully laundered. This practice plays a significant role in funding crimes, drug trafficking, terrorism, and ultimately disrupts societal peace. The complexity of money laundering requires the involvement of structured financial institutions. Ribadu (2004) argues that money laundering necessitates a financial framework, which in Nigeria includes exchange houses, brokerage firms, trading organizations, car dealerships, and casinos. These institutions possess the means to disguise revenues derived from illegal activities. In response to this issue, the Nigerian government and relevant authorities are implementing policies and frameworks to combat money laundering and fraud effectively. These initiatives include the FATF Reports, the GIABA Review, and the revision of existing regulations on money laundering.

2.4.7 Financial Action Task Force (FATF) Report

The Financial Action Task Force on Money Laundering captured in French as groupe d'action financiere (GAFI) established in France, is an organization formed by different government of the world in 1989. This initiative developed by the G7 summit is to maintain certain interest and combat money laundering. On incorporation, the FAFT was known only to combat fraud, however, in 2001; the scope was widened to fighting terrorism, terrorism financing and other related crime. The major objective of the FATF is to maintain, implement and set out procedure for the legal, regulatory, and operational measures for combating and reducing the effect of money laundering, terrorism, terrorist financing and other related offences which distorts and threatens the international financial system. The FATF is a regulatory body known for developing and implementing policies such as counter terrorism and terrorist financing, that can compromise the integrity of the global financial system. Policies developed are reviewed by each member nation which makes it a mutual evaluation process. This system makes the policies and regulations highly effective since expatriates are involved in its peer review process.

The mutual evaluation process helps to access the rate of compliance with the recommendations and strengthen the AML/CFT process. In furtherance to this, ratings are given to countries on technical compliance based on recommendations. The FATF report in the Nigerian financial space has not been so palatable, Abiola (2013) remarked that Nigeria keeps featuring on the grey list of the Financial Action Task Force. This translates to absence of full commitment in complying with the methodologies outlined by the FATF. This development would have led to the flourishing of terrorism activities in Nigeria such Boko-Haram, ISWAP group, and the IPOB case. The FATF reports reveal that Nigeria has little or no understanding of the causes and linkages of the menace. In 2021, the mutual evaluation reports relating to the implementation of anti-money laundering and counter terrorist financing standard was carried out in Nigeria, among other things, it was found that Nigeria was only compliant in 14 out of the 40 FATF core benchmark. This suggests the low compliance and implementation of the FATF methodologies.

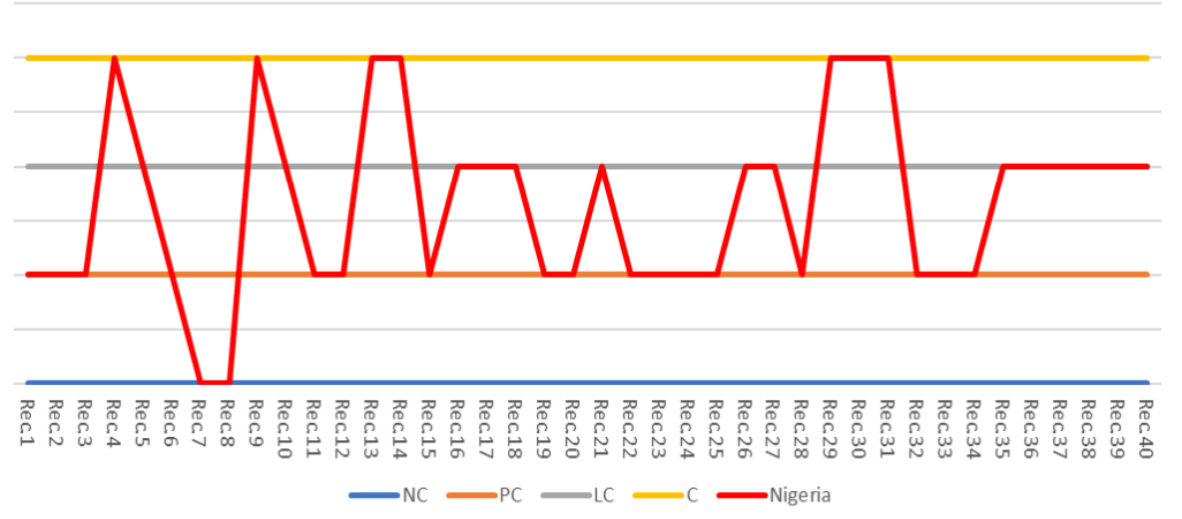


Figure 2.4: Nigeria's Technical Compliance with FATF Recommendation

source: NFIU 2021

C (Compliant): No shortcomings
LC (Largely Compliant): Minor shortcomings
PC (Partially Compliant): Moderate shortcomings
NC (Non-Compliant): Major shortcomings

2.4.8 Inter Government Action Group Against Money Laundering in Africa (GIABA Report)

Just like the FAFT, The GIABA is a regional inter-governmental group in West Africa. GIABA is an Economic Community of West African States (ECOWAS) institution saddled with the responsibility

of reviewing from time to time the methodologies and processes that will help to counter terrorism and money laundering activities in West Africa. GIABA is also a member of FAFT. The GIABA report reveals that, most ML/TF (Money Laundering and Terrorist Financing) risk in Nigeria is predicative. They submit that the most prevalent money laundry case in Nigeria is corruption, advanced fee fraud, human trafficking, maritime offences, kidnapping, and drug trafficking. Corruption is endemic in the Nigerian economy and carried on domestically with majority of it proceed laundered abroad. On terrorist financing, Nigeria faces the deadliest group called Boko Haram, which have strong ties with world renowned Islamic State of Iraq and Syria (ISIS).

This group poses a serious threat to the growth and development of Nigeria. They operate majorly in the northeast of Nigeria by engaging in nefarious activities such as kidnapping, robbery and taxation raiding in other to finance their activities. Since the conduct of the first evaluation carried out by GIABA in 2008, the Nigerian financial space has witnessed a tremendous turnaround in terms of Anti-Money Laundering and Countering the Financing of Terrorism (AML/CFT) framework which is in line with best standard (FAFT). To tackle this problem of AML/CFT, the Nigerian government has enacted some regulations which include the Money laundering prevention and prohibition Act (2022) which repealed the money laundering prohibition Act, 2011 (MLPA), Nigerian Financial Intelligence Units Act, 2018 (NFIU), the Mutual Legal Assistance in Criminal Matters Act, 2019 (MLACMA) and the Terrorism Prevention Act (TPA).

Despite the foregoing, Nigeria still experiences some deficiency in that it has not conducted in detail, a critical examination of ML risk related to fraud and corruption considering its role in the contribution of illicit financial flows. GIABA reports highlighted that Nigeria lacks clear strategies to address the ML risks. Also, Nigeria has not fully assessed the vulnerability and danger posed to persons with disability and how they can be used for AML/CFT purpose. The reports also suggest that supervisory bodies have a clear understanding of the ML risk in their sectors, however, efforts to educate entities under their watch have not been effective. They recommend that, Nigeria should as a matter of priority undertake a comprehensive assessment of the ML risk relating to corruption, fraud, legal persons, and PEPs. Furthermore, entities should explicitly report any suspicious transaction relating to ML and associated predicated offences.

2.4.9 Extant Regulation on Money Laundering in Nigeria

The Money Laundering Prevention and Prohibition Act (2022) has been the primary regulation on money laundering since its inception and implementation, replacing the Money Laundering Prohibition Act, 2011 (MLPA). It served as the major legal framework for preventing, detecting,

prosecuting, and punishing money laundering and related offenses in Nigeria. The Act also established the Nigerian financial intelligence units Act. According to the Act, financial institutions are required to report any cash deposits exceeding the specified limit. Individuals are not allowed to deposit more than five million naira or its equivalent, while corporate bodies have a limit of ten million naira. Additionally, the Act created a department within the EFCC called the Special Control Unit Against Money Laundering (SCUML).

The SCUML is tasked with overseeing specific non-financial businesses and professionals to ensure they comply with the requirements of the Act. Its responsibilities include registration, monitoring, enforcement, inspection, and maintaining a comprehensive database for non-financial businesses and professions. Recently, the SCUML was transitioned from a department under the EFCC to an independent agency in order to operate autonomously and effectively carry out its duties. Part five of the Act addresses money laundering offenses and penalties in Nigeria, such as concealing or disguising the origin of funds, covert transfers, removing funds from the jurisdiction, and taking control of assets known to be from illegal sources. These provisions serve as the foundation for the AML/CFT guidelines in Nigeria.

2.5 Summary

This chapter through extensive discussions provides contextual insights on the country and area of this this study through adequate discussion and description of the country profile – Nigeria. The contextual area of the study which is FinTech was also extensively discussed around the world with clear focus on Nigeria. The chapter also achieved an extensive contextual discussion on the FinTech and vertical and horizontal disintegration of Conventional Banks. Importantly, the emergence of Alternative Ledger System also known as Blockchain Technology which has significant contributions in FinTech, and money laundering was also addressed in this chapter. Other important areas of interest which is the application of FinTech to Capital Market FinTech Regulation in Nigeria, regulation Automated Teller Machine in Nigeria, Regulatory Sandbox and Regulation of POS in Nigeria were also discussed. The contribution of Central Bank of Nigeria in designing FinTech Strategy was also discussed including the regulatory Framework of Open Banking in Nigeria. Having addressed important areas of FinTech, the chapter in an elaborative form achieved an extensive discussion on Money Laundering in Nigeria FATF Report, GIABA Report as well as extant regulation on Money Laundering in Nigeria.

3.0 THEORETICAL FRAMEWORK AND HYPOTHESES DEVELOPMENT

3.1 Overview

This chapter discussed the theoretical framework of the study built in line with the Technology Determinism Theory that served as the underpinning theory of the study. Therefore, the theoretical framework is built using three main variables – dependent variable, independent variables and moderating variables. In specifics, money laundering is the dependent variables of the study while financial technology (serves as independent variable and financial regulation and financial literacy serve as moderating variables.

3.2 Evolution of the Technological Determinism Theory

The theory of technological determinism traces its roots back to Marshall McLuhan's seminal work, "The Guttenberg Galaxy: The Making of Typographic Man," published in 1962. McLuhan further expounded on this theory in a subsequent article in 1964. In both publications, McLuhan (1962; 1964) argued that communication-induced changes shape human thinking, behavior, and movement towards the technological era's future. The underlying premise of this theory posits that the emergence of communication technology has the potential to transform human culture (Hariyono & Tjahjadi, 2021; McLuhan, 1962). McLuhan (1962) went on to assert that the very existence of humanity can be influenced by changes in modes of communication, including the advent of communication technology.

The fact is that the development of communication technology has brought increasing advancement in how everything works fast and instantaneously (Hariyono & Tjahjadi, 2021). This happens given that technology serves as a mechanism that helps facilitate human work, which creates new culture over time, in which lives become easier and people move from persistence and hard work to a softer adventure. Adversely, technology also causes weakness in the social spirit given that people start to think about themselves as they do not need help from others because technology is enough as a solution. Therefore, to make the best out of the technology, Hariyono & Tjahjadi, (2021) stressed that the new culture brought by this technological era is for people to remain positive by developing mental and spiritual knowledge. Thus, any information obtained through technology can be processed by a conscious and clear mind to create new humanist cultures (Hariyono & Tjahjadi, 2021). The theory has been summarized by as the belief in technology as a key governing force in society (Ganiu & Alawode, 2014).

3.3 Application of the Technological Determinism Theory

The technological determinism theory has been proposed to be applied in many disciplines such the social media, numbers, games theory, financial management, financial economics, and monetary finance (McLuhan, 1964). In the area of social media, Hauer (2017) applied technological determinism theory. Hauer (2017) stressed that people today can confidently state that the internet and the nature of new media has brought fundamental change to the structure of society. This is based on the understanding that the expansion of networks, the internet and computers has fundamentally changed various aspects of human life, which include human communication, social interaction, approaches to life, disposition to nature, and the entire spectrum society's life. In fact, rising popularity of new media changed the way society and people act in many areas including shopping, pay taxes, library usage, preferences, decision making among others (Hauer, 2017). More recently, Azam et al. (2020) applied the theory with respect to social media as an important aspect brought by new technology. In this, Azam et al. (2020) argued that as McLuhan (1964) stressed that money has power of facilitating access to many things as it empowers people to travel globally which enables transmission of information, culture and knowledge, information technology according to McLuhan do the same as it turns the world into a global village. In specific, the social networking through different media also play the same role.

The technological determinism theory also has it application in criminal law, in this, Raharjo, Saefudin, & Fidiyani (2018) argued that technology-based criminal penalties, and in general criminal law often arises consequent to technology utilization in committing criminal acts including those relating to acts of decency, defamation, humiliation, and crime dimension technology. Although, Raharjo, (2018) did not mention financial crimes, however, citing other dimension of technological crime implied that the theory can also be applied in the study of financial crime such as money laundering which is commonly perpetuated through financial technology. In relation to this, the key proponent of technological determinism theory (McLuhan, 1964) also includes monetary finance as part of the theory's domain. Thus, it is arguable that the theory can be applied in the study of FinTech giving the technological and monetary aspects of the theory.

3.4 Argument against the Technological Determinism Theory

Although proponents of technological determinism argued that technological development shaped and influenced society (Hauer, 2017) However, technology has its negative consequences relating to the poor use by the people (Hauer, 2017). Thus, this brings about two different branches of technological determinism consisting of radical and moderate (hard, soft) technological determinism. The radical

version of technological determinism argued that technologies represent a key aspect that changes the society, however, moderate version of technological determinism only regards technology as a factor that may or may not mean a change (Hauer, 2017).

Therefore, consistent with this divergence, many scholars placed argument against the theory, for instance, Ganiu & Alawode (2014) argued that McLuhan (1964) failed to address the technological innovation processes, which is expected to provide explanation on how various technologies come to play within the scope of the theory. The argument of Ganiu & Alawode (2014) in this regard is that media technologies are created, invented, and utilized by humans, thus, humans can be a control factor to a certain degree in determining the use and their potential effect of such technologies. This argument is consistent with that of Ruth (1988) who states that "Who uses it, who controls it" indicating that it is the users that control the technology not the technology that control the users, which contradict the basis of the theory as postulated by McLuhan (1964). Another more polemical stand against technological determinism was that of Freen (2002) who dismissed technological determinism as key myths of technology, stressing that the argument placed by McLuhan (1964) is an old day of looking at things. Thus, Freen (2002) stressed that society is responsible for the development and deployment of technologies.

Despite these arguments, the theory remains relevant in the application in the areas of social media, criminal justice, and financial technology. In fact, more recent study such as Azam et al. (2020) applied the theory with respect to the social media as an important aspect brought by new technology, while Raharjo, (2018) applied the theory in the area of technology-based criminal penalties, whereas Hariyono & Tjahjadi, (2021) in the area of intellectual capital in the development of financial technology. In fact, the more recent scholars after Freen (2002) stressed that the theory still summarized the belief that technology is a key governing force in society (Ganiu & Alawode, 2014).

3.5 Link between the Technological Determinism Theory and Financial Technology

In the case of the relationship between FinTech and money laundering, the theory postulates that mediated technologies such as FinTech ensure culture diffusion in a society which in turn facilitates changes in human behavior. McLuhan (1964) states, "We shape our tools, and they in turn shape us." This means that humans create digital financial technologies to simplify transactions and easily facilitate businesses, however, such technologies could also have the potential to shape humans in either positive or negative ways. For instance, FinTech can be applied in checkmating money laundering by government (Phillips & McDermid, 2020). In this, the technology support government is changing human illicit behaviors. In another hand, digital financial technologies also can change

human behaviors towards illicit activities such as money laundering especially when they are seen as havens for terrorists and criminals.

It was also asserted that technological determinism is a reductionist theory which intends to provide a causative relationship between technology and the nature of society (McLuhan, 1964). It explains that technology could have the power to control human affairs by explaining the magnitude to which technological factors influence human thoughts or action. This happens given the fact that changes in technology often brings with it an unintended or unexpected result and effects on human life, a situation refers to as 'technological drift,' in which people drift deeper into a sea of uncertain and unpredictable consequences. The implication of this assertion is that technology is considered not as a slave of human beings, rather humans are seen as technology slaves as they are forced towards the adaptation of changes within their technological environment. Consequently, technology is considered as a fundamental influence of the ways in which individuals survive in their society, and it changes leads to changes in society. The implication of this is that financial technology has resulted in changes in society in either positive or negative ways. From the positive perspective, it can result in reduction in financial crimes, whereas from the negative perspective it can result to people taking advantage of loopholes in financial technologies to perpetuate criminal activities.

3.6. Review of Empirical Evidence on Technological Determinism Theory in FinTech

Although Technological Determinism Theory of McLuhan (1964) highlights the link between FinTech and money laundering, only recently empirical evidence on the application of this study in the area of financial technology emerged. This cannot be surprising considering financial technology is an emerging area of research. The recent study that deployed Technological Determinism Theory in the study of financial technology is that of Hariyono and Tjahjadi, (2021) who deployed Technological Determinism Theory to study the role of intellectual capital in the development of financial technology in the new normal period in Indonesia and found that intellectual capital (human skills) proven not to have a significant positive role on the development of financial technology in the current new normal in Indonesia. Therefore, this study offers insights on the application of technological determinism theory in financial technologies.

In general, literature disclosed a mixed result on the relationship between FinTech and money laundering which highlights the need for the integration of a moderating variable (Baron & Kenny, 1986). Interestingly, Technological Determinism Theory also highlights that the impact of technology on human behavior can be indirectly affected by numbers, games, and monetary issues (Jan, et al. 2020). Thus, indicating some indirect factors that can affect the impact of technology on human

behavior. Thus, in line with these theoretical highlights, this study proposed the potential moderating effect of financial regulation on the relationship between FinTech and money laundering.

3.6.1 Technological Determinism Theory, FinTech and Traditional Banks

FinTech is fundamentally transforming the global financial system by fostering the development of innovative business models and changing the methods and processes associated with financial products and services. The intermediation theory is commonly utilized to illustrate the dynamic interaction between FinTech and traditional banking institutions. FinTech covers a broad range of banking functions, including insurance services, investment management, digital currencies, payment systems, clearing and settlement operations, brokerage services, and capital-raising activities like issuing deposits and credits (Murinde et al. 2022). Numerous scholars have highlighted the advantages that FinTech offers to traditional banks, such as enhanced efficiency and expanded service offerings (Daud et al., 2022; Lee et al., 2022; Thakor, 2020). Conversely, other researchers have emphasized the potential risks posed by FinTech to the traditional banking sector, including increased competition and operational challenges (Murinde et al. 2022; Bhutto et al. 2023; Tambunlertchai et al. 2021).

FinTech has effectively reduced verification costs, facilitated more affordable and secure transmission of information, leveraged economies of scale in data collection and utilization, and decreased the search costs associated with matching transacting parties within the banking system. According to (Daud et al. 2022), FinTech promotes financial stability through the integration of data technology, cloud computing, internet technologies, and artificial intelligence. They also noted that the consolidation of banks enhances these positive effects on financial stability. (Lee et al. 2021) observed that FinTech improves cost efficiency and accelerates the adoption of advanced technologies in the Chinese banking sector. Furthermore, (Lee et al. 2021) argued that FinTech supports the expansion of cross-border banking services, aids in the development of credit systems by banks, boosts the efficiency of resource allocation, enhances banks' ability to share risks, and increases the variety of banking services available. On the contrary, the innovation fragility hypothesis highlights the potential risks FinTech poses to the banking system. For example, FinTech can precipitate banking crises by enabling excessive credit expansion through financial innovation, and it also introduces challenges such as data protection issues, cybersecurity threats, regulatory pressures, and the volatility of digital currencies.

In terms of risk and opportunities, it would be argued that the opportunities are higher than the risks. More importantly, FinTech's cannot replace traditional banks. Bank should, therefore, treat FinTech's as complementors and not competitors. FinTech's would coexist with banks. Banks should also

innovate to remain relevant. Regulators need to take a long-term view to digital innovation, design regulation to address the risk it poses such as financial integrity, consumer protection, cyber securities, money laundering, and data governance adopt flexible stance that promotes enabling supervisory, regulatory, and legal environment for innovation to thrive; enhance cooperation with other regulators in developed economies to learn from each other; and design policies that will increase accountability, transparency, security and regulation of digital products. The banks and FinTechs also need to collaborate in the fight against money laundering and terrorism financing.

3.6.2 Technological Determinism Theory, FinTech, and Traditional Banks: Issues with Collaboration

The collaboration between FinTech companies and traditional banks has been progressing slowly worldwide due to factors such as regulatory burdens, resistance to change, competition, and the regulatory environment (He et al. 2023; Dinçkol et al. 2023).

Competition: Open banking facilitates the exchange of data between traditional banks and FinTechs with consumer consent. Traditional banks may view this as a competitive threat, as it allows FinTechs to enter markets traditionally dominated by banks. He et al. (2023) argues that open banking fosters competition by aiming the playing field for all lenders in the applicant screening process. However, it also provides FinTechs with a strategic advantage, enabling them to capture a significant share of the loanable credit market. This competitive tension can hinder collaborations between traditional banks and FinTech firms.

The collaboration between FinTech companies and traditional banks has been progressing slowly worldwide due to factors such as regulatory burdens, resistance to change, competition, and the regulatory environment (He et al. 2023; Dinçkol et al. 2023).

Regulatory Obligation: Promoting industry-wide interoperability under the open banking model may not be best achieved through a singular, regulatory-enforced standard, given the diverse implementation approaches among stakeholders (Dinçkol et al. 2023). Standardization can impose substantial regulatory and compliance burdens on traditional banks, potentially leading to oversight from multiple industry regulators, including those outside the banking sector, who may be involved in data-sharing interoperability and standardization. To prevent future bottlenecks, the industry architecture for open banking should adopt a multi-stakeholder approach, recognizing that

standardization is an ongoing process. Traditional banks that are hesitant to face the regulatory demands of multi-regulatory oversight may be discouraged from collaborating with FinTechs.

Resistance to Change: The efficiency, sustainability, liquidity, inclusivity, and transparency of financial and real assets are anticipated to be enhanced by the tokenization of these assets through digital technologies such as codes, QR, smart contracts, and blockchain (Thompson & Rust, 2023). Nevertheless, these innovations may encounter opposition because of institutional factors. Thompson and Rust (2023) discovered that the digitization and automation of the seafood supply chain were at risk due to the oligopoly of wholesalers, who possess the power and networks necessary to regulate the supply chain. The role of social, cultural, and institutional factors in impeding innovation has been disclosed through the application of the theory of planned behavior, principal-agent theory, and innovation resistance theory in a variety of studies. Despite the prospective advantages of collaborating with FinTechs, this theory of change may have an impact on banks.

Technological Obsolescence: Schumpeter's paradoxical concept of "creative destruction" in economic development has become exceedingly pertinent in elucidating the rapidity of innovation and the obsolescence of technology, demonstrating how innovation propels technological evolution and industry dynamics in modern economies (McCraw, 2007). Despite the innovative nature of FinTechs' business models, their capacity to withstand competition and rapid innovation presents significant challenges to both their sustainability and other stakeholders, including banks. It is essential to assess whether the business model can remain viable in a competitive environment, even when it becomes outdated, or to evaluate the company's strategy for innovating in response to intense market pressures. It is crucial to determine the business model's capacity to endure in the face of competition, even when it is outdated, or to determine how the company intends to innovate in response to intense competition. Given the rapidity of technological obsolescence, banks may be hesitant to collaborate with FinTechs.

Unfavorable Regulatory Position: Regulators appear to be reluctant to adopt blockchain technology. Nigeria and China are examples of regulators that have either prohibited traditional banks from collaborating with FinTechs on blockchain initiatives or have banned blockchain. The collaboration between banks and FinTechs is adversely affected by such an unfavorable regulatory posture.

3.6.3 Key Governance Challenges in Technological Determinism Theory and FinTech

Firm survival necessitates corporate governance (Lai et al., 2023). Stewardship theory, stakeholder theory, agency theory, and resource dependency theory are typically implemented in the development of effective corporate governance mechanisms (Chen & Liu, 2013). Ultimately, the traditional assumptions of these theories are transformed by FinTech dynamics, resulting in significant governance challenges. For example, agency theory advocates for the separation of ownership from management in order to mitigate agency problems or the self-serving behavior of managers (Onjewu et al., 2023). In contrast, stewardship theory posits that managers are deserving of trust and endorses CEO-duality (Sama et al., 2022). The governance structure is being rapidly altered in favor of the stewardship model by FinTech, which has resulted in governance challenges such as the inability of audit firms to detect fraud, over-boarded directors, CEO-duality, and the absence of anti-misconduct policies (Sama et al., 2022). The agency theory paradigm of separating the CEO from the board chairperson was embraced by numerous corporate governance codes that were implemented in the wake of the corporate scandals of the 2000s. The CEO-duality model's adoption by FinTechs poses significant governance issues, such as the desirability of CEO-duality.

Other substantial challenges of FinTech, as identified by Onjewu et al. (2023), include regulatory lapses, a lack of transparency and veracity, and the subsequent societal concerns with inequities. Consilience Ventures is an excellent example of a business model that seamlessly integrates ownership and administration. The tokenization of financial and real assets by Consilience results in the establishment of a market network that is overseen by its members. As it eliminates the agency costs and conflicts associated with the separation of owners from managers, this business model is appealing and is expected to continue to generate a perpetual demand for Consilience's services. Principal-agent issues in corporate ownership and management, including information asymmetry, risk aversion, and conflicting objectives, are being significantly resolved by blockchain technology and artificial intelligence (Onjewu et al., 2023). The Consilience model employs the following assumptions to alleviate agency behavior in blockchain alliances: information availability, mean risk, smart contracts, information symmetry, unbounded rationality, common interests, and congruent objectives. This is achieved through the use of novel blockchain theory. This results in corporate governance compliance-related issues, which are summarized in figure 3.1.

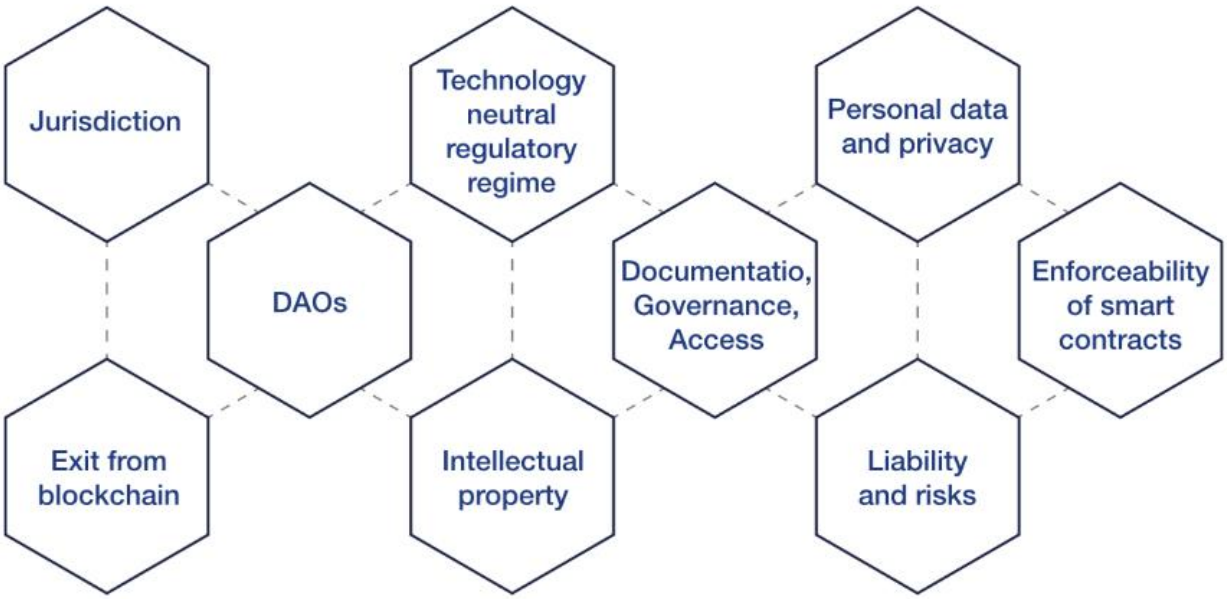


Figure 3.1: Regulatory Compliance Related Issues in Blockchain

Culled from World Economic Forum, 2021.

Specifically, Consilience's future projection of establishing distribution channels in the United States, European Union, and Gulf Cooperation Council involves the location of blockchain nodes across jurisdictional boundaries to enable FinTech companies to raise funds through crowdfunding and/or tokenization of financial and real assets in those jurisdictions. This poses several jurisdictional challenges in terms of compliance with local laws. Addressing anti-money laundering (AML), Know Your Customer (KYC), and sanctions compliance, such as the absence of surveillance and monitoring activities for the detection and prevention of inappropriate activities, the deployment of applications that transmit value without compliance or control programs, payments to politically exposed persons or countries on sanction lists, the anonymity of transactions, and non-compliance with applicable AML/CFT (Counter Financing of Terrorism)/KYC regimes, poses significant jurisdictional constraints

3.6.4 Technological Determinism Theory, FinTech and Business Death in the UK

Recently, studies have applied the technology determinism theory to the failure of start-ups in the UK. Small and medium sized enterprises (SMEs) are important to the UK economy. SMEs accounted for 52% of private sector turnover, 60% of private sector employment, and 99.9% of UK business in 2019 (Calabrese, 2023). Given the contribution of SMEs to the UK economy, business failures, especially startups, have attracted serious attention. In 2021 for instance, UK recorded 327,000 business death, which represent 11.1% death rate compared to 10.3% in 2020 (see Hutton, 2022). Prior studies documented the causative factors of business failure (Elsayed, 2022; Calabrese, 2023; Stewart and Gallagher, 1985).

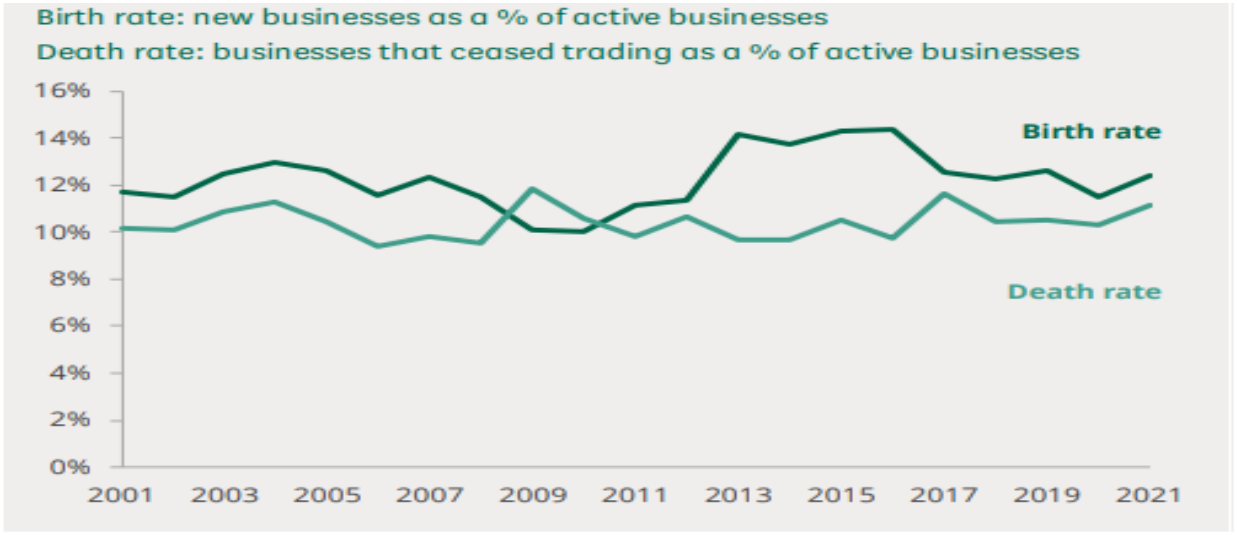


Figure 3.2: Business Birth and Death Rates in the UK

Source: Hutton (2022).

A practical insight on the role of financial technology in promoting the survival or sustainability of start-ups in the UK has received less research attention. Studies have documented the importance of FinTech in building entrepreneurial ecosystems relying on technology determinism theory. Iacobucci & Perugini (2021) argue that the concept of entrepreneurial ecosystem could create survival conditions for entrepreneurs. Hiatt & Sine (2014) opined that entrepreneurial ecosystems are effective in promoting recovery and resistance for entrepreneurs. Studies also document the crucial role financial technology in resolving high levels of entrepreneurial failure. Rawhouser et al. (2023) demonstrated the revolutionary impact of blockchain technology in creating peer-to-peer relationships, assisting the weakest and most vulnerable ecosystem, decentralizing power, and reforming institutions.

Studies also showed that financial technology product could assist start-ups mitigate the adverse effect of local policies, reduce the cost of improving property rights, promote intermediation and eases transportation, access to larger markets, compliance to global standards, improve transparency and price discovery, and ease payment and documentation. It also increases automation of transaction, data security, traceability, and data security, energy crises in vulnerable locations, promote knowledge transfer and business advice, enable disconnected firms increase customer base, adopt insurance products (e.g. climate risk insurance), create the option of digital-enablement financing (Initial Coin Offerings and World Food Program), promote credible credit reference database, foreign involvement in local businesses, and replacement of insurance adjuster with smart contracts that issue immediate pay-out (Rawhouser et al. 2023; Iacobucci & Perugini, 2021). Rawhouser et al. (2023) examined the impact of blockchain technology on vulnerable entrepreneurial ecosystems and demonstrate that blockchain technology mitigates the adverse effect of local policies, reduce the cost of improving property rights through blockchain base land records, and moderate's inflationary pressures and monetary and political dependence on rich countries.

One product that has received serious attention in literature is the process of firm digitalization. Firms adopt digital products or technologies such as cloud computing, big data analytics, Internet of Things, 5G network, artificial intelligence, and industrial version algorithm to improve their production processes and other activities (Yang et al. 2023; Truant et al. 2021). Firm digitalization improves market opportunities, corporate value chain, environmental response, and overall firm performance. Other positive externalities associated with the adoption of blockchain technology include promoting disintermediation, improving transportation, access to larger market for firms, compliance to global standards, payment and documentation, transparency and price discovery, automation of transaction, data security, traceability, data security, knowledge transfer, business advice, professional support, customer base, the creation novel skill sets, new occupational roles and organizational types, and eliminates currency convertibility hurdles. Empirics have used theories of social change, dynamic capability, information processing, and transaction costs economies to demonstrate the positive effect of digitalization on firm performance (Yang et al. 2023; Sui & Yao, 2023). Zhou et al. (2022) found that digital transformation reduces tax stickiness significantly and improves tax avoidance. Business intelligence applications are products that might be very useful for business survival (Arizmendi & Stapleton, 2019).

Studies that examine the drivers of start-ups failures and codify financial technology products to address the drivers of business failure are lacking. Undertaking a study that clarifies the understanding of the revolutionary impact of FinTech in addressing business failure in the UK is lacking. UK

represents a good case study on resolving business failure using financial technology for the following reasons: First, UK is the leading economy in terms of financial technology across the globe. Second, the death rate of start-ups in the UK is also high. So, mainstreaming financial technology to promote business survival is not only important for the UK economy, but as a springboard for resolving business failures in developing economies.

3.7 Technological Determinism Theory, FinTech, and Money Laundering

Technological Determinism Theory (McLuhan, 1964) underpinned the framework presented in Figure 4.3. The theory has its origin from media technology which is used to shape human behaviors. However, its application has been proposed in many disciplines such the new social media, numbers, games, and monetary finance. In the case of the relationship between FinTech and money laundering, the theory postulates that mediated technologies such as FinTech ensure culture diffusion in a society which in turn facilitates changes in human behavior. McLuhan (1964) states, "We shape our tools, and they in turn shape us." This means that humans create digital financial technologies to simplify transactions and easily facilitate businesses, however, such technologies could also have the potential to shape humans in either positive or negative ways. For instance, FinTech can be applied in checkmating money laundering by government (Phillips & McDermid, 2020). In this, the technology support government is changing human illicit behaviours. In another hand, digital financial technologies also can change human behaviours towards illicit activities such as money laundering especially when they are seen as havens for terrorists and criminals.

It was also asserted that technological determinism is a reductionist theory which intends to provide a causative relationship between technology and the nature of the society (McLuhan,1964). It explains that technology could have a power to control human affairs by explaining the magnitude to which technological factors influence human thoughts or action. This happens given the fact that changes in technology often brings with it an unintended or unexpected result and effects on human life, a situation refers to as ‘technological drift,’ in which people drift deeper into a sea of uncertain and unpredictable consequences. The implication of this assertion is that technology is considered not as a slave of human being, rather humans are seen as technology slaves as they are forced towards the adaption of changes within their technological environment. Consequently, technology is considered as a fundamental influencer of the ways in which individuals survive in their society, and it changes leads to changes in the society. The implication of this is that financial technology has result in changes in the society in either positive or negative ways. From the positive perspective, it can result in

reduction in financial crimes, whereas from the negative perspective in can results to people taking advantage of loopholes in financial technologies to perpetuate criminal activities.

Therefore, from the above it is evident that Technological Determinism Theory of McLuhan (1964) highlights the link between FinTech and money laundering, however, literature disclosed a mixed result which highlights the need for the integration of a moderating variable (Baron & Kenny, 1986). Interestingly, Technological Determinism Theory also highlights that the impact of technology on human behavior can be indirectly affected by numbers, games, and monetary issues (Jan, et al., 2020). Thus, indicating some indirect factors that can affect the impact of technology on human behavior. Thus, in line with these theoretical highlights, this study proposed the potential moderating effect of financial regulation on the relationship between FinTech and money laundering. In line with these, the following research framework is presented in Figure 3.3

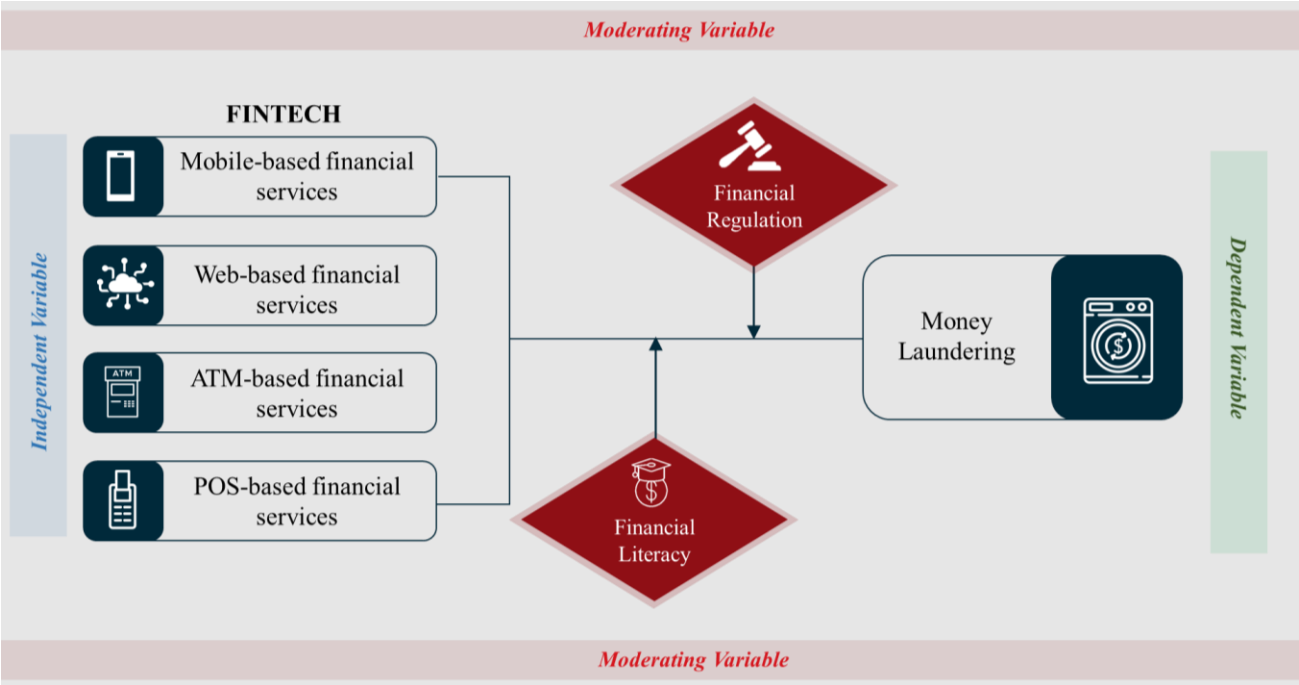


Figure 3.3: Framework for FinTech, Money Laundering, Financial Regulation, and Financial Literacy

(Source: Authors creation)

3.7.1 Dependent Variable – Money Laundering

A dependent variable is one being measured or tested in an experiment. It is the outcome or effect that is influenced by the independent variable(s) (Kerlinger & Lee, 2000). Researchers focus on the dependent variable to see if changes in the independent variable cause changes in the dependent variable (Field, 2018).

Money laundering is considered the dependent variable of this study, explained by the financial technology based on the postulations of Technology Determinism Theory of McLuhan (1964). The focus is on understanding the relationship between financial technology and money laundering within the framework of McLuhan's Technological Determinism Theory. This is because technology often have controlling power over human behaviours as it explains the degree to which technological factors have influence over human thoughts or action. This happens given the fact that changes in technology often brings with it an unintended or unexpected result and effects on human life. For instance, changes in technology can brings about increase in crime as unintended or unexpected consequences, instead of the intended consequences of bringing an ease and efficiencies to human actions. In relation to financial technologies, the expectation is that technology can be an anti-money laundering, however, its turnout that in many instances it accelerates money laundering. In a recent study of cases, Faccia, et al., (2020) titled electronic money laundering, the dark side of FinTech: an overview of the most recent cases established evidence which confirmed that FinTech lead to money laundering. Thus, in view of this, FinTech can be an independent variable that explain money laundering as dependent variable.

3.7.2 Independent Variable – FinTech

An independent variable is manipulated or categorized to examine its effect on the dependent variable. It is the presumed cause or predictor that researchers alter to observe how it influences changes in the outcome or effect (Field, 2018; Kerlinger & Lee, 2000).

However, digital finance brings with it its unique set of challenges and risks because of the different supply channels, services and products offered by the service providers (Odu, 2020). Some of these challenges and risks associated with FinTech include the possibility of using these channels to perpetuate crimes such as money laundering. In fact, consistent with the development of FinTech in Nigeria, the country's ranking in the Basel Anti-Money Laundering Index has been deteriorating. The country was ranked 16th most vulnerable country (Basel Institute of Governance, 2012) but by 2019 it became 14th most vulnerable country (Basel Institute of Governance, 2019). This signifies that increasing penetration of FinTech could be associated with an increase in money laundering. It was asserted that digital finance such as FinTech have empowered financial service providers in establishing a market which is considered unregulated but attractive due to illicit activities being undertaken in it. This underground economic activity is not only making legitimate transactions easier but also opening new avenues for illicit transactions (Odu, 2020).

Campbell-Verduyn (2018) conducted another study on Bitcoin, crypto-coins, and global anti-money laundering governance, which also emphasized the connection between FinTech and money laundering. The study aimed to evaluate the global anti-money laundering regime's effectiveness in addressing the challenges and opportunities posed by alternative cryptocurrencies. According to the study, the Financial Action Task Force (FATF) should strive to strike a balance between the existing risks and opportunities associated with crypto coins. Additionally, the study highlights the importance of ongoing monitoring and investigation into the broader ethical implications raised by crypto coins in the context of combating money laundering during a period of rapid technological advancements.

The focus on addressing cybercrime has been a top priority at national and international levels for a long time. Notably, Tropina T. (2014), Bjelajac, Z. (2011), and more recently Venkatesh K., Jamalian M., and Maharous M. (2020) have highlighted the connection between digital finance practices and money laundering in both developed and developing countries. Based on this, the following hypotheses were developed:

H1: Financial technology has significant positive effect on money laundering in Nigeria.

3.7.3 Moderating Variables

A moderating variable, in the context of research, is a variable that influences the strength or direction of the relationship between an independent variable (IV) and a dependent variable (DV) (Baron & Kenny, 1986). Essentially, it modifies how an independent variable affects a dependent variable. The presence of a moderating variable can explain variations in the relationship between the IV and DV across different contexts or subgroups (Frazier, Tix, & Barron, 2004).

3.7.3.1 Moderator- Financial Regulations

This highlights the need for the integration of a moderating variable in line with Baron and Kenny (1986) and a more recent study by Jose (2015) who suggested the use of moderating variable where relationship between variables have been inconsistent. Therefore, the study proposes the relationship to be integrated as link between FinTech and money laundering to be influenced by moderating variables financial regulation.

Specifically, there are growing incidences of money laundering, governments around the world, thus, authorities have continued to introduce more financial regulations. It was asserted that the issues of money laundering and financing terrorism remain key challenges that are repeatedly being acknowledged and addressed by authorities by bringing about changes in the regulations (Odu, 2020). For over a decade, the IMF have introduced AML/CFT (IMF, 2009), there after many countries

introduced these regulations including Nigeria (Odu, 2020). The essence is to reduce incidences of money laundering. Therefore, since the direct relationship between FinTech and money laundering has been proposed to be positive, the existence of stiffer financial regulation such as AML/CFT regulation can further reduce the money laundering, thus, making such initial direct relationship to be more negative. Based on this, the following hypotheses for the study are generated.

H2: Financial regulations moderate the relationship between financial technology and money laundering in Nigeria. Such that the relationship will be weaker (negative) with the intervention of financial regulation, thereby reducing the effect of financial technology on money laundering.

3.7.3.2 Moderator - Financial Literacy

There is increasing sophistication in digital financial products to reduce their vulnerability to identity theft. These sophistications include password policy (two or three-way authentication), safe keeping of password and digital products such as ATM, POS and token, detection of fraudulent websites, and user friendliness. Fujiki (2020) recently found that the owners of crypto currencies in Japan are *"tend to have higher financial literacy from two perspectives: a measure of objective financial literacy and the experience of financial education at school, and lower financial literacy from three perspectives: the experience of financial education about money management by parents at home, experience of financial troubles, and knowledge about credit cards, than average nonowners"*. He further argued that low financial literacy could lead to the misapplication of the instruments for fraudulent purposes. We extend the argument by proposing low financial literacy could amplify the vulnerability of users of digital products to fraud and money laundering, while high financial literacy could reduce such vulnerability. In Nigeria, for instance, 16,751 fraud cases were reported in Deposit Money Banks (DMBs) in 2016, representing an increase of 36.42 per cent when compared with 12,279 cases reported in 2015. In terms of the types of reported fraud and forgeries, information technology-based bank products recorded the highest frequency. Specifically, ATM/card related fraud occurred most between 2015 and 2016. The number of reported cases increased to 11,224 in 2016 from 8,039 in 2015, representing 39.87 increased in the number of reported cases. ATM/card related fraud also represented 67.12 per cent of fraud cases in 2016.

Web-based or internet banking recorded the second highest fraud in 2016 as it represents 22.02 per cent of the total fraud and forgeries. Web-based fraud and forgeries increased to 3,689 in 2016 from 1,396 in 2015, representing 164.26 per cent increase in the number of incidents (NDIC, 2017). The

Nigerian banking industry also recorded an uptick in the total number of fraud cases compared to the previous years - a total of 52,754 fraud cases were reported in 2019, against 37,817 and 26,182 in 2018 and 2017, respectively. In terms of actual loss, however, the value declined slightly from ₦15.15 billion in 2018 to ₦5.46 billion. The dominant channels remained ATM and web-based transactions. Unlike 2017, in 2019, ATM card-related fraud had the highest frequency of 49.78% of fraud cases followed by web-based fraud of 21.02%, while the value of losses was high in web-based transaction (NDIC, 2019). NIDIC (2019) further attributed the trend to increasing FinTech channels such as ATM, mobile transfers, internet banking, among others. This phenomenon presents a conundrum for policy makers. Could this trend be attributed to the vulnerability of the technologies or level of financial literacy of the users?

On the basis of this, hypothesis three was developed as follows:

H3: Financial literacy moderates the relationship between financial technology and money laundering in Nigeria. Such that the relationship will be stronger (positive) for people with low financial literacy, thereby increasing the effect of financial technology on money laundering.

3.8 Limitations of Technological Determinism Theory and its Applications in Financial Products and Innovations

Although Technological Determinism Theory offers a theoretical framework for understanding the impact of technology on financial innovations, it has notable limitations that warrant critical evaluation. These limitations influence its applicability to financial products and innovations, particularly in the context of developing economies (Smith & Marx, 1994; Wyatt, 2008).

Overemphasis on Technology as the Sole Driver of Change Technological Determinism Theory postulates that technology is the primary force shaping societal, economic, and organizational changes. However, this perspective often overlooks the complex interplay of social, cultural, political, and economic factors that co-determine technological adoption and impact (Bimber, 1994). In the context of financial products, such as blockchain-based innovations or mobile payment systems, non-technological factors like regulatory policies, market dynamics, and user literacy significantly shape outcomes (Avgerou, 2008). In addressing, these limitations, the current study proposed the regulation and financial literacy as moderators.

Limited Consideration of Human Agency - Another critical limitation of Technological Determinism Theory is its tendency to downplay human agency in the development, adoption, and utilization of technology. For instance, the success of FinTech platforms is not solely due to technological advancements but also other actions regulators, developers, and users (MacKenzie & Wajcman, 1999). Financial literacy and regulatory frameworks play crucial roles in determining whether technologies are used to enhance financial inclusion or facilitate illicit activities such as

money laundering (Arner, Barberis & Buckley, 2017). However, this has not been addressed by the theory, hence, this study extends the theory through the integration of financial regulation and financial literacy as moderators.

Inflexibility in Addressing Context-Specific Challenges - Technological Determinism Theory often assumes a universal pathway of technological impact, which may not align with the diverse contexts of financial innovation. In developing economies like Nigeria, the constraints of low financial literacy, weak enforcement of regulations, and socio-political instability significantly influence the adoption and effectiveness of financial technologies (Odu, 2020). The theory's deterministic approach struggles to account for these localized factors. Accordingly, the current study addresses these limitations through the integration of regulation and financial literacy as moderators.

Ethical and Social Implications - The deterministic perspective frequently neglects the ethical and social consequences of technological adoption. For example, while blockchain technology promises transparency and security, its misuse for illicit financial transactions poses significant risks (Tapscott & Tapscott, 2016). The theory does not adequately address how to balance technological advancement with ethical safeguards and social equity. This suggests the need for further studies to integrate ethical values into their frameworks when Technological Determinism Theory is deployed as underpinning theory.

3.9 Applications of Technological Determinism Theory in Financial Products and Innovations

Despite these limitations, Technological Determinism Theory has been instrumental in exploring the transformative potential of financial technologies. It has provided insights into how innovations like digital payment platforms, cryptocurrency, and RegTech solutions reshape financial services (Arner et al., 2017). By focusing on the inherent capabilities of technology, the theory highlights opportunities for improving efficiency, accessibility, and security in financial systems.

Alternative Theoretical Approaches

To address the limitations of Technological Determinism Theory, several alternative frameworks offer more nuanced perspectives:

1. **Social Construction of Technology (SCOT):** This approach emphasizes the role of human agency, societal values, and cultural factors in shaping technological development and adoption. SCOT provides a holistic view of how financial technologies are co-created and utilized within specific social contexts (Bijker, Hughes & Pinch, 1987).
2. **Actor-Network Theory (ANT):** ANT explores the dynamic relationships between technology, humans, and institutions. It highlights the interconnectedness of these elements in shaping technological outcomes, making it particularly useful for analysing the complex ecosystems of financial innovations (Latour, 2005).

3. **Adaptive Structuration Theory (AST):** AST focuses on the interaction between technology and organizational structures. It underscores how technologies are adapted and appropriated based on user needs and organizational goals, offering valuable insights for understanding the adoption of FinTech solutions in various regulatory and market environments (DeSanctis & Poole, 1994).
4. **Institutional Theory:** This framework examines the influence of institutional norms, policies, and practices on technological development and use. It is particularly relevant for analysing the role of regulatory bodies and international standards in shaping the implementation of financial technologies (Scott, 2001).

Therefore, while Technological Determinism Theory provides a starting point for understanding the role of technology in financial innovation, its limitations highlight the relevance of alternative theoretical approaches. These alternatives offer additional insights by considering the interplay of technological, human, and institutional factors, thereby enriching the analysis of financial products and innovations in diverse contexts.

3.10 Empirical Evidence Validating the Application of Technological Determinism Theory in Financial Products and Innovations

Technological Determinism Theory has been applied successfully in various empirical studies, particularly in the context of financial products and innovations. This theory posits that technological advancements play a pivotal role in shaping societal and economic changes, including the evolution of financial systems. The theory has been applied to in the context of mobile payments and financial inclusion, for instance, M-Pesa in Kenya, illustrate how technological determinism explains the transformative impact of mobile technology on financial inclusion. Jack and Suri (2011) argue that M-Pesa enabled previously unbanked populations to access essential financial services, thereby overcoming infrastructural and geographic barriers. This case exemplifies the deterministic view that technology itself drives societal and economic inclusion, particularly in underserved regions. Additional empirical evidence was obtained from the application of the theory within the context of Blockchain Technology in AML, studies highlight its potential to enhance transparency and reduce illicit activities. Blockchain's ability to create immutable, real-time transaction records addresses vulnerabilities in traditional systems, making it a powerful tool in AML processes (Casino, Dasaklis & Patsakis, 2019). This aligns with the deterministic perspective, which suggests that technological features inherently improve efficiency and security. There is also empirical evidence from the context of Cryptocurrency Adoption and Market Dynamics where it was found that the adoption of cryptocurrencies, such as Bitcoin, demonstrates a clear technological shift. Specifically, Nakamoto (2008) introduced Bitcoin as a decentralized currency, independent of central authority, reshaping value exchange and trust in financial systems. The widespread adoption of cryptocurrencies further underscores the deterministic view that technological innovations can disrupt traditional paradigms without significant reliance on social or regulatory drivers. More empirical findings were also made within the perspectives of Artificial Intelligence in Credit Scoring, it was found that AI-driven credit scoring systems exemplify how technological determinism manifests in financial markets. In this, Berg et al. (2020) found that machine learning algorithms significantly outperform traditional credit

assessment methods by reducing biases and improving predictive accuracy. These advancements underscore the theory's principle that technological features drive systemic changes.

3.10.1 General Research Questions Answered by the Technological Determinism Theory

Firstly, the theory answered questions regarding Efficiency and Accessibility of Technology. Studies that applied this theory validate those technological advancements, such as mobile banking and AI-driven platforms, enhance the efficiency and accessibility of financial services. These technologies reduce operational costs and extend financial services to previously underserved demographics (Jack & Suri, 2011). Secondly, it answered questions regarding Neutrality and Objectivity. Specifically, the deterministic perspective of the theory highlights the neutrality of technology, emphasizing its role as an independent force that drives systemic changes, regardless of social or political contexts (Casino, Dasaklis & Patsakis, 2019). Lastly, it also addressed question with respect to predictable pathways of technology. The empirical applications support the view that technology follows a predictable trajectory, shaping the pace and direction of financial innovations, as evidenced by blockchain adoption and digital payment systems (Nakamoto, 2008). While these examples affirm the utility of Technological Determinism Theory, there is still the need for alternative frameworks, such as the Social Construction of Technology (SCOT) and Actor-Network Theory (ANT), to address the contextual and human-centric factors that this theory often overlooks.

3.11 Major Alternative Theories to Technological Determinism Theory and Their Applicability

Technological Determinism Theory provides a foundational framework for understanding the relationship between technology and societal changes. However, alternative theories offer diverse perspectives that emphasize the socio-cultural, political, and institutional contexts of technological adoption and impact. These include the Social Construction of Technology (SCOT), Actor-Network Theory (ANT), Adaptive Structuration Theory (AST), and Institutional Theory. Firstly, SCOT emphasizes the role of human agency and social dynamics in shaping technological development and usage. According to Bijker (1995), technology evolves through negotiations among various stakeholders, such as developers, users, and regulators, making it a co-created entity rather than an autonomous force. While SCOT provides a holistic view, its emphasis on social influences renders it less applicable to this study, which prioritizes the inherent capabilities and impacts of technology on financial practices. Secondly, ANT examines the interconnected relationships between human and non-human actors (e.g., institutions, technologies) in shaping technological outcomes. As highlighted by Latour (2005), the theory provides a relational view of technology and its interactions. While valuable for exploring regulatory ecosystems in financial technologies, ANT's broad and abstract nature limits its practicality for analyzing technology-driven financial innovations and money laundering. Thirdly, AST highlights the interplay between technology and organizational structures, focusing on how users adapt, and appropriate technology based on organizational goals and practices

(DeSanctis & Poole, 1994). Although AST is helpful for understanding contextual adoption, its organizational focus makes it less relevant for the broader systemic analysis in this study. Lastly, Institutional Theory examines the influence of institutional norms, rules, and frameworks on technological development and use. Scott (2001) highlights how institutional factors shape organizational behaviors, including technological adoption. However, its focus on external institutional influences neglects the intrinsic transformative capabilities emphasized by Technological Determinism Theory.

Although alternative theories offer comprehensive frameworks for understanding the interplay between technology and society, their emphasis on external, human, or institutional factors makes them less appropriate for this research. Technological Determinism Theory remains the most fitting framework due to its ability to highlight the transformative power of technology in reshaping financial practices and addressing challenges such as money laundering. While these theories provide valuable insights into socio-cultural and institutional dimensions of technological adoption, they fall short in explaining technology as an autonomous driver of change. This study focuses on the direct impacts of financial technology on money laundering and the moderating roles of financial literacy and regulation. Technological Determinism Theory aligns more closely with the study's aim of exploring technology-driven changes in financial systems.

3.12 Summary

This chapter's aim is to discuss the theoretical framework of the study based on which to develop the hypotheses tested in the study. The underpinning theory of the study, which is economic determinism theory, was extensively discussed with focus of evolution, application, and argument against its deployment. The link between the Technological Determinism Theory and Financial Technology was also discussed. Literature was reviewed on the empirical evidence on Technological Determinism Theory in Financial Technology as well as Technological Determinism Theory, Financial Technology and Traditional Banks and issues in that respects that require collaboration. The theoretical framework of the study highlighted how Technological Determinism Theory supports the link between FinTech and money laundering and the moderating effect of financial regulation and financial literacy. The framework highlighted how the four dimensions FinTech – mobile-based financial services, web-based financial services, POS-based financial services, and ATM-based financial services collectively predicts money laundering as well as the potential moderating effects of financial regulation and financial literacy on such relationship. Based on this theoretical postulation and support from the literature, the three hypotheses of the study were developed as presented in the chapter.

4.0 LITERATURE REVIEW

4.1 Overview

This chapter reviews the extant literature on money laundering, which is considered the dependent variable of the study. It also examines the literature on the independent variable, FinTech. In this context, FinTech is categorized into four dimensions based on existing literature: mobile-based financial services, web-based financial services, POS-based financial services, and ATM-based financial services. Additionally, the chapter reviews literature related to the moderating variables financial regulation and financial literacy that influence the relationship between FinTech and money laundering.

4.2 Money Laundering

Money laundering is characterized as the criminal act of generating profits through illegal financial dealings and then concealing or using these illicit gains to further criminal endeavors (Odu, 2020). In contrast, terrorism financing involves the collection, storage, and transfer of funds, whether legally or illegally obtained, with the intention of executing terrorist acts or supporting the operational infrastructure of terrorist groups (Stringer, 2011). Common money laundering practices include activities such as corruption, market manipulation, tax evasion, drug trafficking, and fraud. The funds derived from these illicit activities divert resources that could otherwise be utilized for economic and social development and have detrimental effects on the overall stability and functioning of nations and their financial systems. Consequently, combating money laundering is crucial to prevent the undermining of the economy by corrupt entities. To combat these issues, the IMF has established Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT) measures, which are continually reviewed and updated to lessen the impact of money laundering activities (IMF, 2019).

Previous research, including that by Odu (2020), has established a connection between money laundering and the FinTech sector. According to Odu, FinTech has enabled financial service providers to create markets that are largely unregulated and appealing, inadvertently facilitating not only legitimate transactions but also offering new opportunities for illicit activities, specifically money laundering. While Odu (2020) points out the potential for FinTech to be exploited for money laundering, Phillips and McDermid (2020) counter this view by arguing that it is incorrect to label digital financial products and services as havens for criminal activity. Despite these differing opinions, both studies underscore a possible link between FinTech, money laundering, and terrorism financing.

The process of money laundering typically involves three primary stages: Placement, where illegally obtained funds are introduced into the financial system in smaller, less conspicuous amounts; Layering, which complicates the tracking of the money through intricate financial transactions, wire transfers, or the use of shell companies; and Integration, where the laundered money is reintegrated into the economy, often through investment in legitimate businesses or assets, making it appear lawful. Figure 4.1 illustrate the stages in money laundering showing how various methods are used in money laundering, including the establishment of shell companies, smurfing (breaking large sums into smaller, less suspicious amounts), trade-based laundering, and the use of cryptocurrencies (FCA, 2023).

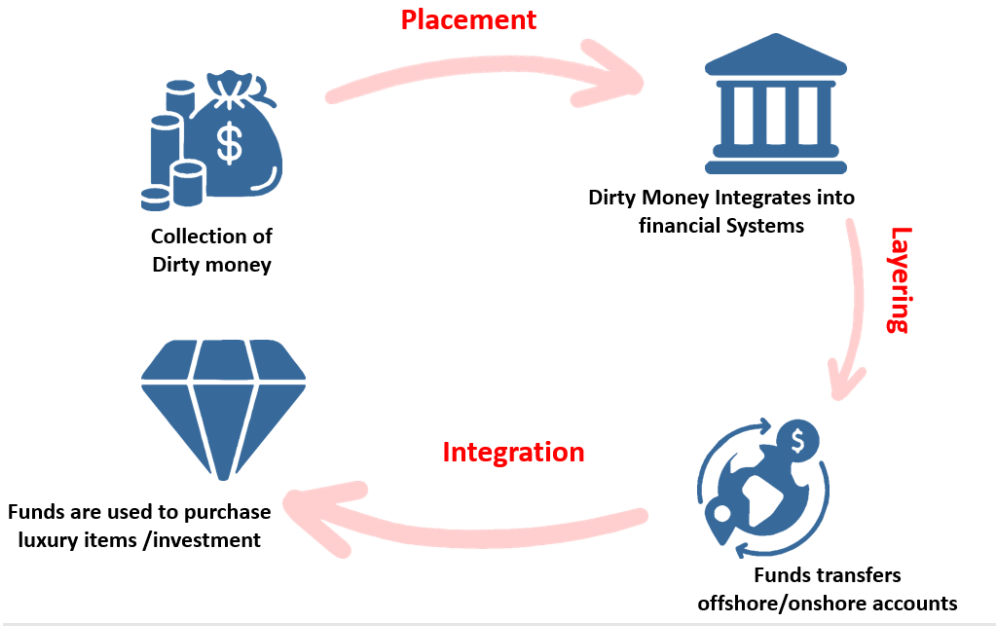


Figure 4.1: Money laundering stages flow.

(Source: Authors creation)

4.3 Argument on Fraud and its Connection to Money Laundering in Nigeria

To understand the relationship between fraud and money laundering in Nigeria, it is crucial to explore how these two phenomena intersect through conceptual analysis, empirical evidence, case studies, and discussions on regulatory frameworks addressing these issues within the Nigerian context. According to a study by Ajibolade et al. (2020), understanding these linkages is essential for effective regulatory and law enforcement strategies in combating financial crimes in Nigeria

4.3.1 Conceptual Linkages Between Fraud and Money Laundering

In the context of financial crimes in Nigeria, fraud and money laundering are deeply intertwined. Fraud typically involves deceit for financial gain, while money laundering is the process by which illicitly acquired funds are concealed and made to appear legitimate. This chapter explores how fraud frequently serves as a precursor to money laundering, particularly within Nigeria's financial ecosystem. The pervasive nature of these crimes poses significant challenges for Nigerian regulatory authorities and financial institutions. Nwankwo (2013) discusses how fraud is often the initial step that leads to money laundering, emphasizing the complex relationship between these crimes and the difficulties they pose for financial oversight in Nigeria.

Fraud generates illicit funds that necessitate laundering to enter the legitimate financial system. This relationship underscores the critical need for robust anti-fraud and anti-money laundering (AML) frameworks. The Nigerian financial sector, characterized by rapid technological adoption and evolving regulatory measures, provides a unique backdrop for examining these interdependencies.

Nature and Scope of Fraud in Nigeria

Fraud in Nigeria manifests in diverse forms, including identity theft, embezzlement, cyber fraud, and corporate fraud. The country's economic environment, marked by both rapid digitalization and regulatory evolution, has seen a surge in fraudulent activities. Wells (2017) categorizes fraud into three main types: asset misappropriation, corruption, and financial statement fraud. These forms of fraud present distinct challenges within the Nigerian context:

Asset Misappropriation: This involves the theft or misuse of resources within organizations. In Nigeria, common examples include fraudulent withdrawals and unauthorized use of company funds or assets, often exacerbated by insufficient internal controls (Wells, 2017).

Corruption: Corruption remains a pervasive issue in Nigeria, involving the misuse of power by public officials for private gain. This includes bribery, kickbacks, and conflicts of interest, which undermine public trust and economic stability (Button et al. 2020).

Financial Statement Fraud: This type involves the deliberate misrepresentation of financial information to mislead stakeholders. In Nigeria, such fraud is often linked to efforts to inflate company performance or hide financial distress, posing significant risks to investors and creditors (Dorminey et al. 2012).

The integration of advanced technology into Nigeria's financial system has expanded opportunities for fraud, making detection and prevention more complex. Cyber fraud, particularly involving online banking and electronic payment systems, is a growing concern in Nigeria's financial landscape.

4.3.2 Fraud as a Precursor to Money Laundering in Nigeria

In Nigeria, fraudulent activities often generate substantial illicit profits, which perpetrators seek to integrate into the legitimate financial system. The typical money laundering process involves three stages: placement, layering, and integration. These stages are critical in understanding how fraud proceeds are cleansed and absorbed into the economy:

Placement: The initial stage where illicit funds are introduced into the financial system. In Nigeria, this could involve depositing cash into local banks, purchasing real estate, or investing in high-value assets such as vehicles or jewelry (Levi, 2021).

Layering: This stage involves complex financial transactions designed to obscure the origins of illicit funds. Techniques used in Nigeria include transferring money across multiple accounts, engaging in foreign exchange transactions, or investing in legitimate businesses to disguise the trail (Unger & Busuioc, 2007).

Integration: The final stage where laundered funds are reintroduced into the economy as legitimate. In Nigeria, this often involves using the funds for further investment in real estate, luxury goods, or legitimate businesses, effectively integrating them into the economic mainstream (Reuter & Truman, 2004).

The seamless integration of fraudulent proceeds through money laundering allows perpetrators to enjoy their illicit gains while undermining the integrity of Nigeria's financial system.

4.3.3 Empirical Evidence and Case Studies in Nigeria

Empirical studies and case analyses highlight the significant role of fraud in generating funds that are subsequently laundered. In Nigeria, several high-profile cases illustrate this connection:

Cyber Fraud and Laundering: The rise of cyber fraud, including phishing and unauthorized electronic transfers, has generated substantial illicit proceeds in Nigeria. These funds are often laundered through complex schemes involving local and international bank accounts, as well as investment in high-value assets (Button et al. 2020).

Corporate and Public Sector Corruption: Cases like the misappropriation of public funds by government officials or the fraudulent activities within corporations, such as the infamous Nigerian fuel subsidy scandal, demonstrate how large-scale fraud generates significant illicit funds that require laundering to be utilized without detection (Healy & Palepu, 2003).

These examples underscore the need for robust AML measures that address the sources of illicit funds—primarily fraud—at their inception.

4.3.4 Regulatory and Legal Perspectives in Nigeria

Nigerian regulatory bodies, recognizing the intertwined nature of fraud and money laundering, have developed integrated approaches to combat these crimes. The Central Bank of Nigeria (CBN), the Economic and Financial Crimes Commission (EFCC), and other regulatory agencies have established frameworks that encompass both anti-fraud and AML measures:

Central Bank of Nigeria (CBN) Guidelines: The CBN has issued comprehensive guidelines to ensure that financial institutions implement robust internal controls to detect and prevent both fraud and money laundering. These guidelines emphasize customer due diligence, transaction monitoring, and reporting of suspicious activities (CBN, 2020).

Economic and Financial Crimes Commission (EFCC): The EFCC actively prosecutes cases involving fraud and money laundering. Their enforcement actions often reveal the intricate schemes used to launder funds generated through fraudulent activities, highlighting the need for coordinated regulatory responses (EFCC, 2021).

Financial Action Task Force (FATF) Compliance: Nigeria's adherence to FATF recommendations has led to the development of national strategies that integrate AML and anti-fraud measures. These strategies are aimed at enhancing transparency, improving regulatory oversight, and fostering international cooperation (FATF, 2019).

The integration of these measures within Nigeria's financial and legal systems is crucial for effectively addressing the dual challenges of fraud and money laundering.

In the Nigerian context, fraud serves as a critical precursor to money laundering, generating the illicit funds that necessitate laundering processes. The intricate connection between these crimes underscores the importance of integrated regulatory frameworks that simultaneously target both fraud and money laundering. By addressing fraud at its source and enhancing AML measures, Nigeria can bolster the integrity and stability of its financial system, mitigating the risks posed by these pervasive financial crimes.

4.4 FinTech (Financial Technology)

FinTech, short for financial technology, encompasses a range of services delivered via digital platforms such as mobile phones, personal computers, and cards that are connected to secure digital payment systems enabled by the internet (Ozili, 2018). This sector operates within a complex ecosystem of

stakeholders, which includes banks and other financial institutions, mobile network operators, financial technology providers, regulatory bodies, agents, retail chains, and customers (Michelle, 2016). These entities collaborate to provide various financial services like agency banking, internet banking, and mobile banking. FinTech aims to enhance the efficiency of financial intermediation, promote financial stability, and contribute to sustainable development (Ozili, 2021).

In recent years, the integration of FinTech in the financial services sector has accelerated, driven by technological advancements and increasing consumer demand for convenient, accessible financial solutions (PWC, 2022). This evolution is transforming traditional financial systems and fostering innovation in financial products and services. The proliferation of FinTech has also raised concerns about its potential to be misused for illicit activities such as money laundering and terrorism financing, highlighting the need for robust regulatory frameworks to mitigate these risks (IMF, 2022).

4.4.1 FinTech and Financial Markets

The emergence of FinTech have resulted in the disruption of the global finance architecture, and studies suggest that the innovation could potentially increase tail movements or market crashes through co-movements, changes in correlations, and increased volatility among asset classes. Important features of FinTech such artificial intelligence, big data, distributed ledger technology, smart contract, robo-advisors, and cloud computing have enabled FinTech to penetrate all facets of the financial system. Figure 4.2 for example presents a breakdown of FinTech startups and the financial service in Latin America in 2018. FinTech disruptions occur largely in payments and remittances which account for 24.4% and lending which account for 17.8%.

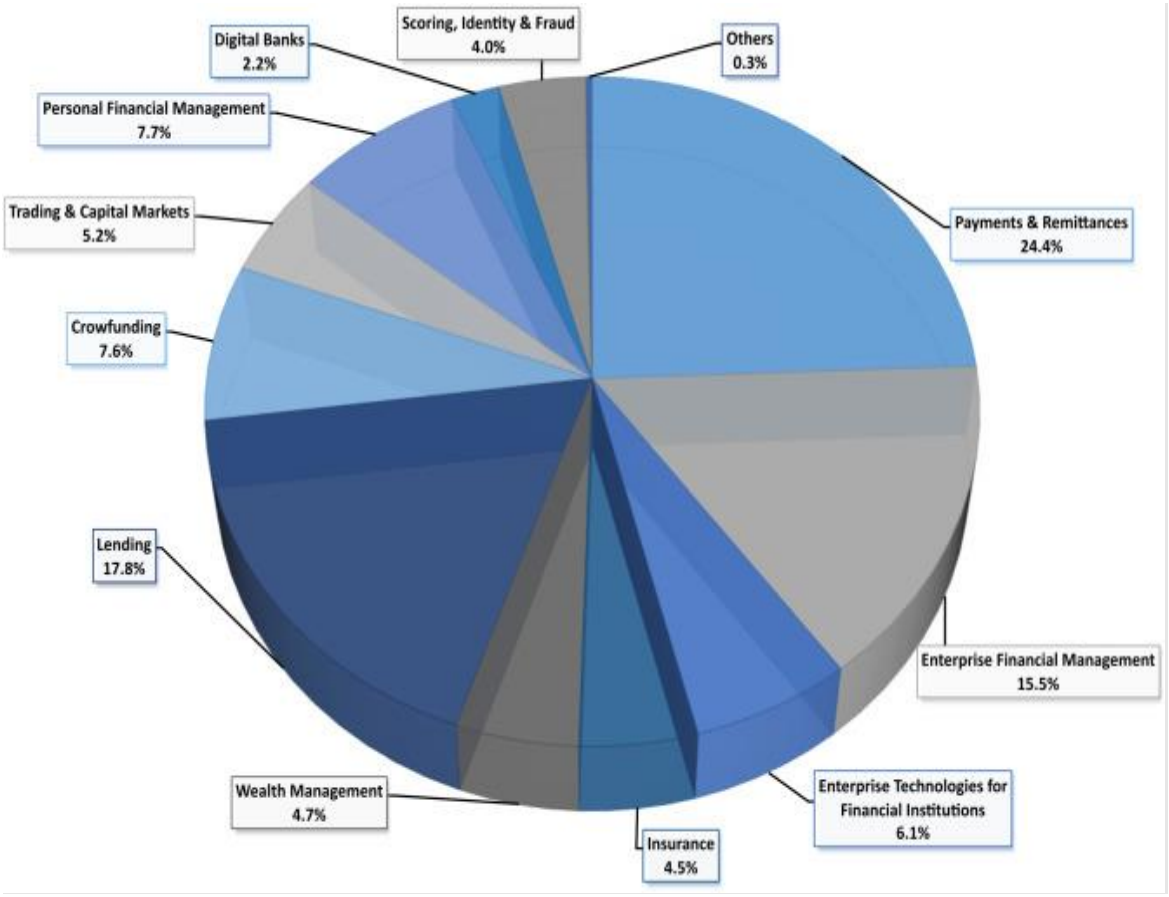


Figure 4.2. FinTech start-ups by financial service segments in Latin America in 2018.

Source: Murinde et al. (2022).

Though FinTech is venturing into the entire spectrum of the financial system, their traditional financial services FinTech operators have not established the perfect substitute in the financial system. Specifically, Murinde et al. (2022) identified Loan commitments (credit rationing insurance) and other off-balance-sheet puts and guarantees, funding liquidity creation, monitoring, screening, improved risk sharing and consumption insurance, and deposit insurance as areas that FinTech has not provided perfect substitute. In other areas of banking and financial markets, FinTech has made serious progress. The progress on lending does not consider the quality of legal institutions. Theoretically, there is a negative association between interest rates of business loans and the quality of legal institution. According to La Porta et al. (1997) finance is a set of contracts, and the quality of the legal institutions determine the cost and effectiveness of contracts. Similarly, the quality of legal institutions is an important determinant of the efficiency of recovery and collection of delinquent loans of the credit market. Importantly, better legal enforcement lowers the borrowing cost of credit vis-versa. Studies show that the practical reality of this theory for FinTech credit activity, especially peer-to-peer lending

is scant. Peng et al. (2023) filled this important gap and contributed to the role of the quality of legal institution on FinTech by investigating the effect of the quality of legal institution on FinTech lending using a sample of over five million FinTech loans from 24 countries. They found a passive effect of quality of legal institution on FinTech credit, a persistent effect when borrowers' jurisdictions have fewer information-sharing channels, the FinTech platforms have fewer risk-sharing tools, and the loans bear higher risk.

Gambarelli and Muzzioli (2023) explored the significant role of FinTech innovation within financial markets and its impact on regulators, financial institutions, and investors, focusing particularly on how European financial regulatory bodies are responding to these advancements. Their study highlighted gaps in the current European regulatory framework that need addressing to effectively manage the rise of FinTech. For instance, Cuadros-Solas et al. (2024) analyzed the influence of FinTech lending on the market power and stability of banks from 2013 to 2019, using a comprehensive international dataset of 6,225 banks. They discovered a negative correlation between FinTech lending and both the market power and stability of banks, attributing this to the varying institutional quality and legal frameworks across jurisdictions. Consequently, they suggested that to tackle the information imbalances and potential risks posed by FinTech activities, a more cautious and rigorous regulatory approach to FinTech operations is essential.

Furthermore, Figure 4.3 provides an overview of the FinTech landscape in the UK, which showcases a distinct development pattern compared to other regions. Unlike in many other countries where independent FinTech companies are at the forefront of disrupting traditional financial markets, in the UK, established banks such as Barclays and NatWest/RBS have led the way in FinTech investments. Murinde et al. (2022) reported that approximately 65% of the FinTech investments in the UK originate from six major banks. These investments are heavily concentrated in startups and scale-ups, with a significant focus on financial management solutions. Figure 4.3 illustrates the distribution of these investments across various FinTech sectors in the UK, noting that investments in mortgage and lending, as well as wealth management, are considerably lower compared to those in payments, banking, and financial solutions.

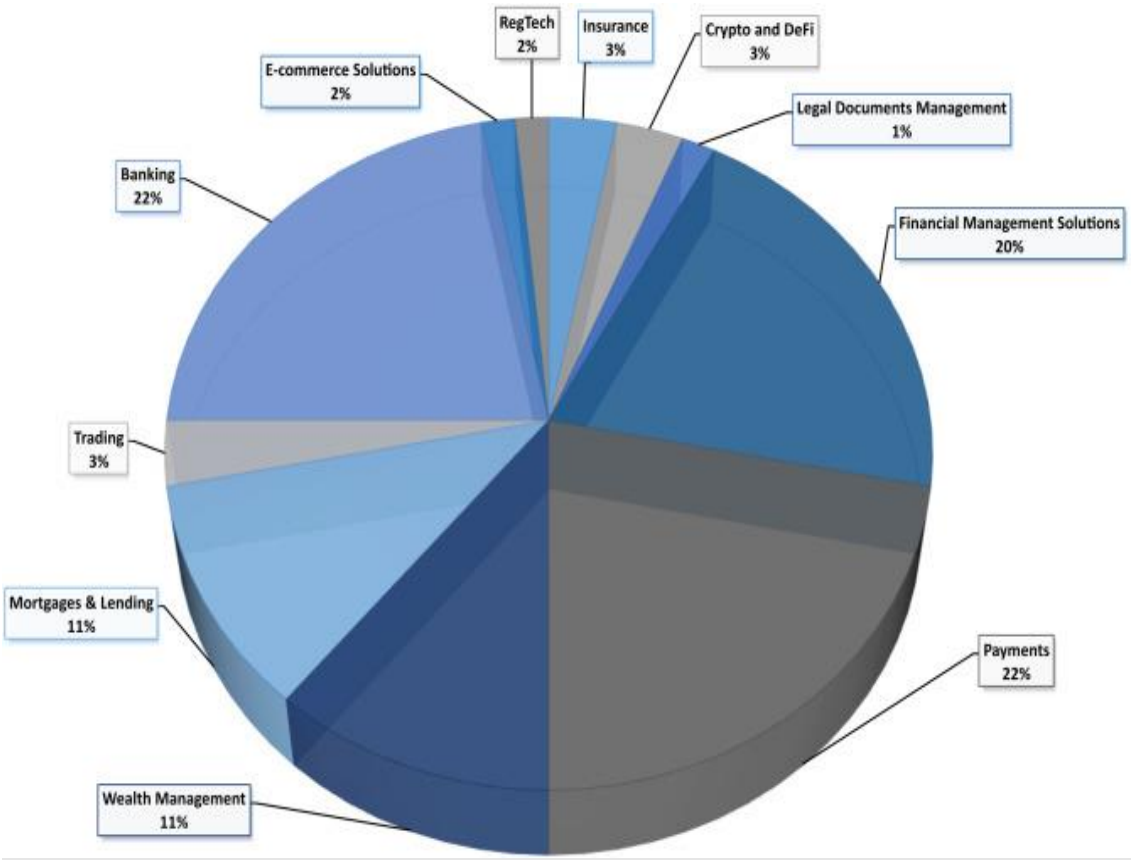


Figure 4.3: UK Banks' Investment in FinTech Spaces.

Source: Murinde et al. (2022).

Murinde et al. (2022) used high quality bank level data from 115 countries covering 16-year period to investigate the risks and opportunities of banks and found that FinTech will unlikely replace traditional banks because banks are working with FinTech startups to develop their own platforms. Their findings also highlight the effect geopolitical frictions, global infrastructures, regulation in shaping the future of FinTech. Tang et al. (2024) examined the effect of FinTech development on bank liquidity and diversification in China, using a robust text mining processes and implement factor analyses to construct a FinTech development index of 101 banks from 2011 to 2021. The authors found evidence that FinTech development increases bank diversification, while reducing liquidity creation. Their results were consistent across smaller banks and state-owned banks. They further found evidence of a weaker response to FinTech development for smaller banks and state-owned banks, and that COVID-19 outbreak inhibited bank diversification and liquidity creation.

4.4.2 FinTech Blockchain and Cybersecurity

It is generally argued that the rapid evolution of FinTech with the advancement is artificial intelligence and smart-everything movement poses serious and sophisticated threats to the cyber space and that traditional methods are grossly deficient in identifying threats. Javaheri et al. (2023) developed a novel and refined taxonomy of security threats in FinTech and conducts a comprehensive systematic review of defensive strategies. Using the PRISMA methodology most applied in similar studies, Javaheri et al. (2023) identified 11 central cyber threats and 9 corresponding defense strategies.

Blockchain technology and FinTech penetrated all spheres of the financial system and has reduced the opacity and frictions in payments and lending, disrupted traditional financial firms, improve financial inclusion, and digitized payment system and stock exchange processes across the globe. Blockchain technology is also designed to address the challenges of the traditional financial systems such as limited access, high costs, centralized control, limited access, and delay payments. Allen et al. (2022) reviewed recent literature on FinTech with the objective of identifying the benefits of central bank digital currencies (CBDCs), stablecoins, and cryptocurrencies in China focusing on their utility functions in delivering FinTech lending, digital banking, and payments. The authors also reviewed China's experience in FinTech and identify important considerations in designing effective cryptocurrency regulations. The study argued that the adoption of cryptocurrency regulations could promote growth of innovations through enhanced public confidence in this market, given that the wider adoption has remained the key success factor, while emphasizing that China could effectively offer potential solutions to inherent problems in the traditional financial system by mainstreaming e-CNY (the digital renminbi China's central bank digital currency).

There is an ongoing discussion regarding the impact of blockchain technology on the financial system. Some argue that features like smart contract auditors, decentralized governance, and trustless state-space may make the system more susceptible to cyberattacks and money laundering. In a study conducted by Kirimhan (2023), it was discovered that the supposed benefits of pseudonymity and financial inclusivity in permissionless blockchain systems actually increase the vulnerability to cyberattacks, as they do not comply with anti-money laundering (AML) regulations. This finding was based on a game theory model that integrated various crime theories. Additionally, Kirimhan found that AML-compliant permissioned centralized blockchains can effectively prevent cyber attackers. These results suggest that a cybersecurity policy can be designed for permissionless decentralized blockchains to prevent money laundering, while still maintaining their decentralized characteristics. Such finding is extremely important in the design of the roles of smart contract auditors and decentralized governance in creating a "trustless" state-space.

4.4.3 FinTech and Payment System Fraud

According to Hill (2018), FinTech provides financial services more inclusively, effectively, and efficiently than traditional financial institutions. It can also innovate products that harm borrowers and businesses, inefficiently allocate capital, misdirect savers and investors, and harm consumers. The easiest target of FinTech fraudsters is the payment system infrastructure. Nikkel (2020) investigates the abuse of FinTech for financial transaction related fraud, extortions, money laundering to finance criminal activities. The author established a positive link between FinTech disruption and criminal actives and advocates for the development of the digital forensics landscape to enhance FinTech technical activities linked investigation. From public interest perspective, FinTech regulation should prevent fraudsters from exploiting weaknesses in the FinTech ecosystem to the detriment of the public. To address this challenge, Mirza et al. (2024) suggested that machine-learning approaches are extremely effective in identifying potential irregularities, red flags in economic dataset. Mirza et al. (2024) used variety of techniques to multiple synthetic and real-world databases to examine anomaly detection using machine learning approach and found that machine learning is effective for fraud detection with varying degree of effectiveness.

4.4.4 Central Bank Digital Currency (CBDC) and Its Implications to Money Laundering

Recently, the Central bank digital currency (CBDC), a form digital of central bank money operating within the spectrum of FinTech has attracted global attention. Evidence, within the literature revealed that a recent survey by the Bank for International Settlements discovered more than 80% of central banks around the world are currently and actively researching on CBDC (Boar et al. 2020; Wang, 2023). CBDC have now undoubtedly appeared to be the future of currency among the small and larger economies given the wider research on this FinTech based money system. The world is now witnessing efforts from different economies aimed towards merging of monetary policy and instruments with computer-science-driven financial technology by revamping economic systems using new types of digital tokens designed by a single authority and for wider retail usage (Fanusie, 2020). Different from independent cryptocurrencies such as Bitcoin, CBDC may have higher chances of country-wide adoption given that it is issued by a nation's monetary authority with values backed by the government fiat and its utilization is encouraged by public policy within a country (Fanusie, 2020). In fact, it was asserted that the design of the CBDC should be in such a way to address the concern of money laundering in a country especially when such is an emerging threat to the economy of such country so that the CBDC will compete and potentially perform better than other forms of anonymous payment

instruments such as cash in addressing the money laundering challenge being experience by a country (Wang, 2023).

Broby (2022) outlines fourteen crucial policy responses that can help economies ensure the effective implementation of CBDC. The initial implication emphasizes the importance of clearly defining the role of CBDC within a country's legal framework and regulatory structure. For example, in Nigeria, the legalization of CBDC should be backed by the constitution. The second policy implication stresses the need to classify CBDC and other digital currencies based on their nature and characteristics, ensuring that the rights and obligations associated with ownership are clearly defined by law. This clarity is essential to avoid any ambiguity in the classification of digital currencies, including CBDC, so that users understand their rights and responsibilities. The third policy implication highlights the importance of distinguishing between retail and wholesale use of CBDC to prevent potential misuse and illicit activities such as money laundering. The fourth implication underscores the necessity of clearly differentiating CBDC from other digital currencies issued by decentralized entities in the enabling legislation, including regulating alternative payments between the two. The fifth policy implication suggests that privacy legislation should support retail CBDCs to enhance trust in their use, with checks and balances in place to foster this trust.

Lastly the sixth policy implication suggests that supporting wholesale CBDC innovation and testing by removing unnecessary regulatory burdens will facilitate ease of doing business and promote wider adoption of CBDC in the economy. The seventh policy implication emphasizes the need for a strong digital public infrastructure and disaster recovery plan when introducing a CBDC to mitigate potential risks of loss and damage. The eighth implication highlights the importance for central banks to determine whether the CBDC should be an interest-bearing asset, and how the interest rate should be set in relation to the reserve rate. The ninth policy implication underscores that any legislation recognizing a CBDC should address both its function as a medium of exchange and its exchange mechanism, using technology-neutral language. The tenth policy implication stresses that any legislation recognizing a CBDC should include provisions for ensuring financial stability, specifying whether the CBDC should be a local or universally accessible currency (Wronka, C.2023).

The eleventh policy implication is that any potential smart programmability of digital currencies that is anticipated to exist should have legal backing. The twelfth policy implication is that where CBDCs are anticipated to compete with cryptocurrencies, the status of such cryptocurrencies should be defined within the law to avoid any ambiguity. The thirteenth policy implication is that any anticipated cybersecurity challenge associated with CBDC need be addressed, such that there should be no trust threat, and a multi-layer protection strategy should be inbuilt into all infrastructures for CBDC. Lastly,

the privacy of users, especially retail users of CBDCs, and the extent of such privacy should be protected in law (Wronka, C.2023).

It is important to stress that despite this development, researchers and policymakers are yet to arrive on the common ground on how CBDC should be designed in such a way to avoid its illicit utilization for money laundering (Wang, 2023). For instance, Fanusie (2020) posited that any large economy that tends to develop and deploys a CBDC would be likely to come across the dimensions of new financial crime risks not entirely existing within its monetary systems before the advent of such CBDC. The fact is that in comparison with physical cash, the CBDCs in some respect would be easier for fighting money laundering by the regulators, this is on the premise that the key technical aspects of CBDCs would hinder traditional illicit financial techniques. Despite this potential, however, there could be likelihood for bad actors with the technology space of CBDCs to have a bad tempting target it both from within state and non-state actors who have an in-depth knowledge on methodologies of how the system operates (Fanusie, 2020). This tendency is due to the nature of wallet programmability and microtransactions giving more ability to the users to transact in volumes below a penny thereby enabling them to perpetuate intricate money laundering schemes (Fanusie, 2020).

Evidence from the work of Wang (2023) disclosed the implications of money laundering could lead to an optimal design of CBDC through general equilibrium framework such that the design will address money laundering by agents and income audits by a government. Specifically, the application of general equilibrium framework disclosed that in instances where CBDC offers less anonymity compared to cash, introduction of CBDC would have the tendency of decreasing money laundering. However, in situations where CBDC offers high level of anonymity compared to

physical cash and at same time CBDC provides a low interest rate, then there is tendency that introduction of CBDC will decrease the output within the monetary system not only from the part of the agents who launder money. This in essence signifies that the money laundering agency will device other means of money laundering instead of CBDC. Nevertheless, in situations CBDC offers high anonymity with high interest rate, there would be high tendency by agents to launder money. Adversely, where low anonymity is provided by CBDC and a high interest rate exist, in such case, introduction of CBDC can increase aggregate welfare without lowering output and gets wider acceptability among citizens. Conclusively, the introduction CBDC would need not increase the funding costs of banks or decrease bank lending (Wang, 2023).

Despite the likelihood of CBDC to expose countries in financial crimes in some instances, it was explained that these money laundering risks should not in any way dissuade such countries from exploring CBDCs, because of its substantial benefits to businesses and consumers (Fanusie, 2020).

The effort should be that anti-money laundering professionals and organizations should channel their initiatives towards fine-tuning transaction monitoring to cover the CBDC capabilities. Policymakers also need to understand the dynamics of how the users explore the application of CBDC towards illicit behaviors with view to set appropriate compliance standards that will guarantee and enhance the financial integrity of technology industry that will likely expand around CBDC applications. These initiatives will enable policymakers, regulators and professionals in projecting potential additional layers of financial crime, which can be tackled in collaboration with the private sector and deploy policy responses even ahead of emergence of such illicit efforts to mitigate them against CBDC platforms (Fanusie, 2020).

4.5 Review of Empirical Literature on FinTech and Money Laundering

The advancement in financial technology has resulted in positive and negative consequences. Most studies tend to focus on the advantages of financial innovation which include promoting financial inclusion, costs reduction, increased product offerings and transaction speed, and simplifying product offerings. This review focuses on what some scholars described as the dark side of FinTech advancement (Pejkovska, 2018; Pavlidis, 2023; Mogaji & Nguyen, 2022), with emphasis on money laundering. The review highlights the typologies of money laundering - emotional connections with money, information privacy, and security (see Mogaji & Nguyen, 2022). Pavlidis (2023) argued that the Financial Action Task Force (FATF) standards focus on targeting Non-Profit Organizations, financial exclusion, and issues of de-risking in combatting money laundering and terrorism financing. They further argued that FATF neglect of FinTech induced money laundering techniques could persistently exacerbate money laundering, and therefore, recommend a rejig of ownership, principle of proportionality, and risk-based approach in the design and implementation of FATF standards to address FinTech induced money laundering. (Pejkovska 2018) examined the potential negative consequences of FinTech in the global financial sector. The author found that FinTech has created a platform for the creation and utilization of illegal financial services, infringement of data privacy, cybersecurity, and corruption in the United States, European Union and India.

Another strand of literature argues that FinTech -induced money laundering related cases is in part, caused by the failure of cooperation between public institutions and private institutions. This model advocates for a combination of public interest theory of regulation and capture interest theory of regulation. According to Chi-Cheng et al. (2022), the analytic skill sets in public-private partnership determine the success of preventing FinTech induced money laundering transactions. Chi-Cheng et al. (2022) proposed a practical Plan-Do-Check-Act (PDCA) management cycle model that assigns

specific activities to all stakeholders. A combination of public and private sector regulation has become a common practice across the globe because of the practicability of the methodology in reducing the complexity of money laundering. Industries are encouraged to set their standards. Industries are also assigned some responsibilities to detect and prevent money laundering. Law enforcement communities and financial system regulators are also assigned distinct roles. For instance, banks can negotiate with the police to investigate money laundering cases. The work of Çemberci et al. (2022) that analyzed the impact of corporate governance (CG) principles on perceptions of anti-money-laundering effectiveness that the implementation of the corporate governance principles at the corporate level promotes the effectiveness of combating money laundering.

The consensus in empirical literature is that FinTech has its downside risks, which takes the form of criminals or opportunistic individuals using the technology to launder money or defraud unsuspecting consumers. The downside risks could take the forms of choice of cloud services which could lead to comprising sensitive financial information due to inadequate security measures; digital identity and data integrity due to insecurity of digital architecture and poor encryption or data protection system; unregulated entities and products due to risk linked to anonymity of FinTech enabled transactions especial within the spheres of Blockchain technology; development of application software that can be used to steal customer data and information, and persistent malware and cyberattacks. To be specific, the above vulnerabilities have made FinTech a safe haven for money laundering.

For instance, cryptocurrency trading and investments in the form of financial assets are executed on platforms that are unregulated. This resulted in reported cases of theft or where users could not protect their rights. The non-traceability of cryptocurrencies is one feature that makes money laundering flourish within the FinTech ecosystem because users can transfer suspicious assets without trace, since the exchange channels can bypass the regulated financial institutions. Within the context of money laundering, it is easy to wash the illicit money clean because such transfers obliterate any link with the earlier crime (replacement conduct) via negotiation tools (replacement conduct) to conceal the criminal origin of the goods or items. The complex nature of FinTech-based transactions makes it challenging to succinctly identify the three stages of money laundering - Placement, Integration and Layering.

In the traditional sense, money laundering denotes the introduction of illegal cash funds through commercial and retail banking systems into the economy to legitimize or conceal the criminal origin. The evolution of FinTech and innovation of payments products may mutate the traditional forms of money laundering in recent times. The paradigm of money laundering faces a major drift in the context of this evolution, and understanding the magnitude and direction of FinTech induced money laundering is extremely crucial for policy formulation and implementation. A good understanding of

the dynamics of FinTech-induced money laundering is also important for designing anti-money laundering policies that do not only focus on cash proceedings but from more sophisticated crimes (cybercrime, market manipulation, insider trading, per-to-per lending, money transfers etc.). The disruption of FinTech in the financial world and its far-reaching adoption by the market makes it a veritable platform for money laundering (Hetzer, 2003). The ability to FinTech to execute trades at a global level, the high speed and volume of transaction execution, and complexity and diversity of financial instruments, makes them fertile ground for money laundering.

Scholars have argued that the only coping strategy for the FinTech -induced money laundering or fraud is the application software tools that has the capacity to detect money laundering activities irrespective of the technology architecture or complexity of financial transactions. Specifically, continuous evolution of the financial and the complex nature of money laundering violations has strengthened the advocacy for efficient technology-based or software solutions to combat money laundering activities. Improving data analytics and effective technological solutions that detect potential money laundering activities before it crystallizes is an important toolkit for investigators to protect money laundering. This sub-section of the empirical literature focuses on studies that investigate the relationship between FinTech related activities and money laundering. In particular, the section reviewed studies that investigated technological-based solutions for combating money laundering. Shen et al. (2021) analyzed the disruption of interdependent contraband smuggling, money, and money laundering (ICSML) networks of a transnational criminal organization (TCO) through four interconnected networks. These networks include incentives flowing from the laundering network to the physical and money networks, money moving from the money network to the laundering network, financial support from the money network to the smuggling network, and money flowing from the physical contraband smuggling network to the money network. The author utilized this model to delineate the functions of the interdependent networks - the physical contraband smuggling network is responsible for transporting contraband from suppliers to consumers, potentially across international borders; the money network manages the funds generated from smuggling and directs it to either support the physical smuggling network or the laundering network; and the laundering network conceals the illicit origin, with the possibility of utilizing FinTech as part of the laundering network.

Segovia-Vargas (2021) developed a neural network technique for capturing money laundering and terrorism financing – through transactions through FinTech platforms – that focuses on geographic, transactional, product, and inherent non-transactional characteristics. The model uses an innovative transaction abnormality indicator, based on the variance of the variables to detect non-transactional money laundering and terrorism financing related activities. Eifrem (2019) argued that the emergence

of FinTech has created an avalanche of avenues for smart and sophisticated criminals to apply complex and complicated networks to evade prosecution during money laundering. Most traditional tools for detecting money laundering may not be effective in capturing these complex transactions because they focus on discrete data. Discrete data-based tools are ineffective and costly in spotting or detecting shared characteristics of typical money-laundering networks. Even where the tools detect the network, it does not provide any true context to the nature, structure, and characteristics of the network. Eifrem (2019), therefore, suggested that with graph technology, significant improvements can be made in identifying complex technological based money laundering transactions, because of its predictive power in mining the truth from data and potential to quickly pinpoint areas of concern.

Domashova & Mikhailina (2021) introduced an innovative framework for identifying organizations susceptible to money laundering through the utilization of machine learning techniques. The three models employed - methods for evaluating model quality, algorithms for selecting optimal hyperparameters, and ensemble machine learning methods - indicate that the identification of the most vulnerable or suspicious organization occurs during the opening of a current account. The discovery made by Domashova & Mikhailina (2021) is highly enlightening as it paves the way for the development of tools to combat money laundering and the creation of lists of early warning systems. Singh & Best (2019) explored the use of visualization techniques in effectively recognizing patterns of money laundering activities and highlighted the application of link analysis in identifying suspicious bank transactions, particularly for proof-of-concept purposes. Zhang et al. (2023) investigated machine learning strategies for constructing a national anti-money laundering index using the random forests five-factor model. The researchers determined that the random forests five-factor model exhibited a high prediction accuracy rate (86.31%) and demonstrated good out-of-sample predictive capability for constructing the national anti-money laundering index. The authors contended that the random forests five-factor model surpasses other computational models such as OLS and relaxed LASSO.

Turki et al. (2020) examined the impact of the adoption of regulatory technology to prevent money laundering in Bahrain. The study used primary data of 100 bank staff with expertise in compliance and multivariant analytical technique. The authors found that regulatory technology prevents money laundering to a highly statistical extent through time saving, cost, and transaction monitoring, technology-based KYC (Know Your Customer) are not effective in preventing money laundering. Tertychnyi et al. (2022) proposed interpretable predictive and time-aware machine learning typology for monitoring system for anti-money maundering that addresses three important require - associating explanations and risk estimates to each alert, generating timely alerts, and generating accurate and non-redundant alerts. Ifrani (2019) used normative legal research to examine the effect of FinTech in

opening opportunities for money laundering, and the result indicates money laundering technique is constantly changing due to FinTech innovation. The authors argued that money laundering constitutes a persistent risk to FinTech due to the complexity of the transactions (complicated and sophisticated), which makes it possible for the users to evade regulatory oversight. FinTech must analyze and build a legal argument to answer the formulated problems.

Some scholars, however, are of the opinion that regulatory returns and renditions should focus on high frequency data that can reveal the characteristics of money laundering. This line of studies further argued that with such high frequency data, technology-based solutions to money laundering is a mirage. Canhoto (2021) examined the feasibility of using technical and contextual affordances of machine learning algorithms to detect and prevent FinTech-induced money laundering. They found that absence of large training datasets and high frequency data on money laundering methods limits the ability of regulators to use machine learning. They recommend the use of reinforced machine learning and unsupervised learning for suspicious behavior, but not money laundering.

In Nigeria, the country has been committed to the development of FinTech through National Financial Inclusion Strategy (NFIS) introduced in October 2012. This commitment is in relation to the four dimensions of FinTech including mobile-based financial services, web-based financial services, POS-based financial service, and ATM-based financial services. These are discussed in the following sub-sections.

4.5.1 Mobile-based Financial Services

Mobile-based financial services refer to the application of a mobile phone for accessing financial services and executing financial transactions, it covers transactional as well as non-transactional services including financial information viewing on a mobile phone of the user (AFI, 2012). It used to execute mobile banking by accessing a wide array of mobile banking and services as well as executing them to meet customer need. Through mobile-based financial services mobile money transactions are executed which are transactional services using which money are transferred electronically via mobile networks. The mobile money is often guided by the local laws and business model, and the operators are mostly mobile network operators (MNO) or banks themselves. In most situations they are considered synonymous to 'mobile-based financial services' (AFI, 2012).

In Nigeria, the CBN (2015) issued guideline for mobile financial services which attempted to achieve three objectives; (i) ensure development in mobile money services which clearly defined its stakeholders and their role and responsibilities, (ii) provides specification of technical and business requirements required from the participants of the mobile money services industry as well as (iii)

promoting safety and effectiveness of mobile money services with the aim of enhancing user confidence in the services. In addition, the guideline outlined models of mobile financial services which is similar to AFI's (2012); these are bank-led mobile financial services where a single bank or consortium of banks joined together to deliver the service, and also the non-bank led Model in which corporate organizations that has been licensed by the CBN deliver the mobile money services (CBN, 2015). Literature documented that mobile-based financial services is increasing rapidly in Nigeria. In 2022, a rapid growth has been recorded in which the transaction rose by 128% in the first four months of the year (January to April) 2022. In specifics, the transaction rose from 67 million in January to 153 million in April according to the data from Nigeria Interbank Settlement System (NIBSS). In terms of the value of the transaction, it rose by 172.2%, which is from N1.8 trillion as at April 2021 to N4.9 trillion in April 2022 (Bailey, 2022). In terms of usage, mobile banking which did not exist in 2010 has grown to 31 units per 100,000 adults in 2015 while the target was 62 units per 100,000 adults by 2020 (CBN, 2018). This implied that mobile-based financial service is an important contributor to the FinTech growth in the country.

4.5.2 Web-based Financial Services

Web-based financial services are the provision of financial services through the internet (world wide web). This product has two intuitive appeals. (1) It has wide coverage because users of financial services in any part of the world can have access to the product and execute financial transactions. (2) Given that it is empowered by the internet; it is considered a service that is considered cheaper than other FinTech-based financial products - a good example is internet banking. A web-based financial services provide an opportunity for individuals to access financial services from across the globe (Hasan, et al. 2013). Web-based financial services are considered easy to use and implement with minimum level of interruption (Hasan, et al. 2013). Despite that web-based financial services enhances the speed of transactions as well as its overall efficiency, most of the operating banks face critical challenges in relation to management of customer data, given the fact that web-based financial services providers such as Mint, Personal Capital, Venmo and Yodlee collect customer data with the intent of assisting them in managing their money, paying their bills and making pre-retirement arrangement (Clements, 2022). Thus, recent evidence indicates that banks are restricting web-based financial services providers from accessing their customers' data with view to protect customer financial data and enhance its security against theft (Clements, 2022) which can later be used for financial crimes such as money launderings.

In Nigeria, the use of web-based financial services is in the raise, aside banks that provide internet banking services, there exist more than 250 web-based financial service providers in the country. The top thirteen web-based financial service providers aside banks include Flutterwave, Interswitch, paystack, paga, carbon, remita, vorgepay, Opay, Lidya, Kuda, PiggyVest, FairmMoney, and ChipperCash (Udegbunam, 2021). The growth in the number of web-based financial service providers signifies the growth in FinTech which indicates the need to explore how such could affect the electronic money laundering which is in the raise due to growth in FinTech Faccia, et al. (2020).

4.5.3 ATM-based Financial Services

An ATM is an electronic banking devise which enables customers to execute transactions such as deposits, withdrawals, payments of bills as well as transfers between accounts using their credits or debit cards without the assistance or intervention of bank representative or teller cashier (Kagan, 2022). In Nigeria, the National Financial Inclusion Strategy proposed the increase in the number of ATMs from 11.8 units in 2010 to 203.6 units per 100,000 adults by 2020 (CBN, 2012). By 2015, significant progress has been recorded as the number of ATMs increased from 11.8 units per 100,000 adults in 2010 to 88.5 units per 100,000 adults in 2015. Despite this progress having been achieved in 2015, the targets remained 203.6 units per 100,000 adults by 2020 (CBN, 2018).

4.5.4 POS-based Financial Services

POS-based Financial Services allows consumers to pay bills and taxes as well as transfer money within and outside a country from a retail point using cash, cards, or e-wallets. In Nigeria, the National Financial Inclusion Strategy proposed an increase in the number POSs from 13.3 units in 2010 to 850 units per 100,000 adults in 2020 (CBN, 2012). The target was to ensure at least 62 units per 100,000 adults concerning access to Mobile Banking by the year 2020 (CBN, 2012). By 2015, considerable progress has been recorded, the number of POSs increase from 13.3 units per 100,000 adults in 2010 to 442.6 units per 100,000 adults in 2015. Despite this progress in 2015, the targets remained 850 units per 100,000 adults for POSs, respectively, by 2020 (CBN, 2018).

4.6 Financial Regulation

Kumar (2014) defined financial regulations as laws, rules and regulations governing the workings of financial institutions which provides the financial institutions with the basic guidelines for promoting financial system stability, consumer protection, fair competition, as well as the prevention and reduction of financial crimes. With respect to money laundering which is the dependent variable in this study, Nigeria has followed the suit of other nations in the promulgation of AML/CFT regulations

in 2013 (Nasir, 2019). However, these laws were found to be ineffective not only in design but in implementation, in specific, Nasir (2019) posits the existence of deficiencies in the present mechanism adopted to combat money laundering in Nigeria, on the basis of which suggest the required antidotes that will facilitate the effectiveness of such legislation amendments and promulgation of new legislation.

Researchers around the world have made an effort in investigating the relevance of financial regulation in FinTech-Money Laundering nexus. Pandey et al. (2023) used bibliometric and content analysis to examine FinTech publication trends in banking and finance literature, to highlight future research agendas, gaps in literature, research trends, intellectual structure, concurrent themes, and most influential studies. They identified stock market integration, credit sourcing, lending, crowd funding and blockchain technology as the five clusters with publication concentration. This is representing an attempt broaden the intellectual structure of the empirical contextual coverage, including methodological contributions, and geographical focus. The studies tend to focus less on regulatory approach to FinTech. Few studies on the regulatory approach to FinTech tend to focus on promoting innovation or put differently as driving private sector innovation. In practice, however, most financial system regulators across the globe do not have the statutory mandate of promoting private sector innovation. We argue that financial system regulators across should focus on their primary mandate, which is the public interest theory of regulation, that is, mitigate or protect public harm.

Across the globe, regulators traditionally adopt three regulatory approaches to FinTech – ignore, liken, or regulate. However, the financial system is the most regulated sector across the globe. The agility of FinTech in offering innovative services and in providing innovative services and products to consumer, and the electronic based structure of their services such as e-government services, e-payments, and e-invoice, as well as the risk they pose to the integrity of the financial system means that the regulatory approach should be regulate. Regulators must also address the operating approaches of FinTech operators "if it works here, it works anywhere." Such an approach poses serious risk to the financial system, especially during execution because of differences in financial structure, legal system, and institutional quality. For instance, regulatory quality for monitoring due diligence, AML/CTF issues, and technology architecture could pose serious challenges for regulators in developing countries and hinder effective regulation of the financial system. FinTech operators, these issues could affect their ability to attract investment or execute contracts with financial institutions. It could also increase human and operational costs and alter the IT infrastructure. The diagram figure 4.4 highlights the primary and secondary goals and benefits of regulations from a financial perspective.

Figure 4.4: Financial Perspective of Primary and Secondary Goals of Regulation

(source Authors Creation)

In this empirical review, the study aligns the review to the public interest theory of regulation, by focusing on the channels through which FinTech could protect public harm with emphasis on money laundering. Scholars slightly disagree on the stage and level of FinTech regulation. Some scholars are of the opinion that preventing public would entail regulating technology and the national level as against industry level (Allen, 2024; Nalluri & Chen, 2024). Nalluri & Chen (2024) argued that regulating technology at the national level would ensure a good combination of reliability and safety. They further argue national level regulation would help financial infrastructure safety and optimize accelerated FinTech adoption in line with the public interest theory of regulation. Fletcher et al. (2021), however, argued that the success of counter-terrorism finance programs and emergence of several hundred different types of cryptocurrencies may encourage terrorist groups to use cryptocurrencies for money laundering. Cryptocurrencies are created to avoid regulation and secure users' anonymity. These unique properties make it extremely difficult for regulators to effectively regulate cryptocurrencies as well as a veritable platform for money laundering. They opined that attempts to

regulate cryptocurrencies or regulatory threat may push users to seek illicit means to use cryptocurrencies to avoid regulation.

Regulatory threats that push users to seek illicit means to use cryptocurrencies to avoid regulation may complicate regulation and promote money laundering. Hiding predicate crimes and acts of money laundering within a technological web would pose serious challenge for regulators. For instance, Tiwari et al. (2023) identified technological innovations, purpose of laundering, Predicate crime, and actors involved as the four factors the choice techniques launderers adopt in money laundering. This assertion is consistent with the stakeholder, structural coupling, public value, rational choice theories of launders motivation. To avoid this, they recommended that cryptocurrencies should be treated as component of technology with financial components and regulation should rest with private sector technology companies in the form capture theory of regulation.

The basis of the recommendation is fourfold. First, he pseudo-anonymous characteristics of cryptocurrencies means that user is never required to reveal his or her 'real-world' identity, even when the transactions are traceable to a certain public key or computed that is linked to the user. Second, cryptocurrencies are designed to avoid regulation, which is a common feature of traditional financial institutions, through the peer-to-peer platform. The irreversibility and near instantaneous nature of cryptocurrency transactions makes regulation difficult. Finally, cryptocurrencies have outpaced regulation and policy, and law enforcement institutions are only playing catchup. Xu et al. (2024) examined the effect of FinTech adoption on Australia's sustainable mineral management policies for industry 4.0 with the ARDL estimation technique. They found short term positive association between green mineral extraction, technological readiness and FinTech adoption, but negative association between environmental compliance, government support for FinTech in mining, and sustainable mining technologies in the short and long-run. This finding brings the importance of regulating FinTech at the industry level.

Furthermore, the emergence of digital-only banks that provide banking services with no physical presence is an issue of concern with respect to financial regulation, more especially with respect to the AML/CFT regulations. These types of banks, like their physical counterparts, are required to comply with money laundering regulations as they are obliged to have trained compliance officers with respect to the prevailing AML/CFT regime (Odu, 2021). Tt has been suggested that Nigeria, like other AMF/CFT implementing countries needs to consistently take deep research that can enable the country to identify various policies and measures required for proactive dealing with emerging money laundering threats brought by advancement in the banking system by the digital systems such as the emergence of FinTech including the digital-only banks and Payment Service Banks (Odu, 2021). The

essence is to assess various vulnerabilities that could emerge due to weaknesses in the existing AML/CFT regulations to be in tandem with global standards put in place regarding money laundering (Odu, 2021). In addition to AML/CFT regulation, the primary law guiding the financial sector in Nigeria is Banks and Other Financial Institutions Act 2020 which also has significant impact on FinTech Companies in Nigeria. This law which repealed the Banks and Other Financial Institution Act (1991) has some notable provisions that could affect FinTech. For instance, under the Banks and Other Financial Institutions Act 2020, FinTech companies are recognized under the definition of "Other Financial Institutions" (OFIs) as well as their licensing requirements, regulatory and supervisory power of the CBN over these OFIs. Therefore, the expectation of this study is that the existence of financial regulation stimulates the influence of FinTech on money laundering, thus, proposed to be a potential moderating variable.

4.6.1 Adapting Financial Regulation in the Age of FinTech and RegTech

Douglas W. Arner, along with his collaborators, has made significant contributions to understanding the regulatory challenges and opportunities presented by the rise of FinTech and RegTech (Regulatory Technology). His research emphasizes the need for reconceptualizing financial regulation to adapt to the rapidly changing financial landscape driven by technological advancements. Here are some key insights from his notable works on FinTech regulation:

4.6.1.1 Transformative Impact of FinTech and RegTech on Financial Regulation

Arner, Barberis, and Buckley (2016) explore the impact of FinTech and RegTech on financial regulation in their paper "FinTech, RegTech, and the Reconceptualization of Financial Regulation,". The authors argue that the emergence of FinTech and RegTech has fundamentally transformed the nature of financial services and regulatory supervision. This paper suggests that existing regulatory frameworks must be reconceptualized to better manage the risks and harness the benefits associated with these technological advancements.

- **New Approaches to Regulation and Supervision**

In another significant work, Arner, Barberis, and Buckley (2017) further elaborate on the necessity for new regulatory approaches. The study emphasizes that technological innovations in the financial sector require a dynamic and flexible regulatory framework that can effectively manage both the risks and opportunities presented by FinTech.

- **Regulatory Sandboxes and Smart Regulation**

Zetzsche, Buckley, Arner, and Barberis (2017) address specific regulatory tools in their paper "Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation,". This work examines

the use of regulatory sandboxes as a means to foster innovation while maintaining regulatory oversight. The authors advocate for "smart regulation"—a regulatory approach that balances innovation, risk management, and financial stability, ensuring that regulatory frameworks evolve alongside technological advancements.

- **Regulatory Implications During the COVID-19 Pandemic**

In the context of the COVID-19 pandemic, Arner, Buckley, Zetzsche, and Veidt (2020) discuss the intersection of digital finance and the informal economy in their paper "Digital Finance, COVID-19, and Informality: Regulatory Perspectives." This research highlights the critical regulatory challenges faced during the pandemic and offers insights into how digital financial services can foster financial inclusion while managing associated risks, particularly in developing economies.

- **Sustainable Digital Finance and Green Finance Ecosystems**

The work by Arner, Buckley, Zetzsche, and Veidt (2020) titled "Sustainable Digital Finance: Building an Ecosystem for Green Finance," focuses on how digital finance can be leveraged to support sustainable development. The authors propose that digital financial services can play a pivotal role in building ecosystems that promote green finance, and they explore the regulatory considerations necessary for fostering such an ecosystem.

- **Stablecoins: Risks, Potential, and Regulation**

In "Stablecoins: Risks, Potential and Regulation, Arner, Auer, and Frost (2020) discuss the emergence of stablecoins and their potential impact on the financial system. The paper examines into the associated risks, such as financial stability and consumer protection, and provides a comprehensive overview of the regulatory considerations for stablecoins.

- **The Evolution of FinTech and its Regulatory Impact**

Arner, Barberis, and Buckley (2016) provide a comprehensive overview of the evolution of FinTech since the global financial crisis in "The Evolution of FinTech: A New Post-Crisis Paradigm?" This work examines how technological advancements have reshaped financial services and necessitated changes in regulatory frameworks, highlighting the dynamic interplay between innovation and regulation.

- **Strategies for Digital Financial Inclusion in Emerging Markets**

In "Digital Financial Inclusion: Strategies for Emerging Markets," Arner, Buckley, Zetzsche, and Veidt (2019) explore the potential of digital financial services to enhance financial inclusion in emerging markets. The paper discusses regulatory strategies to maximize the benefits of digital finance while mitigating the associated risks, emphasizing the role of inclusive regulatory frameworks in supporting financial inclusion.

In light of the growing connection between FinTech and money laundering risks in Nigeria, there is a clear need for research that examines the moderating effect of financial regulation and literacy. Douglas W. Arner's research underscores the importance of adaptive, inclusive, and forward-looking regulatory frameworks to manage the challenges posed by technological advancements in the financial sector. Applying these insights to the Nigerian context is crucial for developing robust strategies to mitigate money laundering risks while fostering innovation. Such research will be instrumental in guiding policymakers, regulators, and stakeholders to ensure a balanced approach to FinTech development and financial security.

4.7 Financial Literacy

National Financial Inclusion Strategy (2022-2024) defined financial literacy as individual's knowledge and understanding of financial products and concepts which eventually influence his/her attitudes thereby impacting on his/her financial decisions. Evidence from the CBN's (2022) Strategy Leveraging Agent Networks for Women's Financial Inclusion documented that financial literacy among other variables such as young population and increased penetration of smartphones are the key reasons for the rapid adoption of FinTech services in Nigeria. In line with this, it is suggested that building financial capabilities in terms of financial literacy among populace will likely enhance adoption, thus, it is recommended that financial and sectoral regulators such as CBN should devise a cohesive approach for driving mass literacy of FinTech users via partnerships with civil society organizations (CBN, 2022).

Nigeria has been characterized with low financial literacy as about one third of the population were said to have low financial literacy of which majority are women (CBN, 2022). In addition to women, those individuals residing within rural areas as well as smallholder farmers formed significant portion of individuals lacking the financial literacy in the country (CBN, 2022). Thus, it is expected that financial literacy will stimulate the influence of FinTech on money laundering, such that existence of low literacy among the population will lessen the influence of FinTech on money laundering.

4.8 FinTech and Anti-Money Laundering Efforts in Developing Economies

Studies have been undertaken on FinTech and money laundering and their interactions in many developing countries. In Kenya, Mwangi and Njuguna (2020) explored the impact of mobile money and FinTech on financial inclusion and money laundering risks in Kenya. The findings reported that Kenya's success with mobile money has significantly increased financial inclusion but also necessitated stronger anti-money laundering (AML) frameworks to prevent misuse. A different dimension was taken in Ghana, where Owusu-Ansah and Gyamfi (2019) looked at the regulatory

environment for FinTech and its implications for financial crimes, including money laundering, and found that Ghana's regulatory framework must be proactive and adaptable to effectively manage the risks associated with the rapidly evolving FinTech sector. A similar approach was undertaken by in South Africa by Owusu-Ansah and Gyamfi (2019) which discussed how South Africa's FinTech sector is regulated to mitigate money laundering risks. The finding emphasizes the use of technology, such as artificial intelligence, to enhance AML efforts and suggests that regulatory systems must leverage these tools to keep up with the complexities introduced by FinTech innovations.

Outside Africa, Singh and Kumar (2020) analyzed how digital finance boom has impacted money laundering risks and regulatory responses in India, the finding revealed that the country faces challenges in balancing the benefits of digital finance with the need for effective AML controls and recommended that regulatory systems must evolve to keep pace with the rapid growth of digital financial services. An extension of this idea was made in Southeast Asia by Tan and Thio (2020) who in addition to the impact of FinTech on AML challenges considered such impact also on financial inclusion. The finding revealed that FinTech promotes financial inclusion but requires robust regulatory frameworks to prevent money laundering. The lessons from Southeast Asia are applicable to other regions, including Nigeria, highlighting the importance of balanced regulatory approaches. In Middle East and North Africa (MENA), Hassani and Silva (2018) examined how FinTech and regulatory technology (RegTech) can mitigate money laundering risks in the MENA region and found that important insights into how FinTech can be exploited for money laundering and emphasizes the need for integrating RegTech solutions to enhance AML measures effectively.

The finding from these studies has some implications for Nigeria. It highlights the need for balancing innovation and regulation because rapid growth of FinTech offers significant benefits for financial inclusion but also introduces new challenges for financial crimes like money laundering. Both Nigeria and similar economies must balance fostering innovation with maintaining robust regulatory controls. The findings also have some implications for regulatory adaptation since developing economies are continuously adapting their regulatory frameworks to address the unique risks introduced by FinTech. Hence, there is a need for regulatory systems to be flexible and responsive to keep pace with technological advancements. Furthermore, the studies also gave some insight into technological solutions such as blockchain and AI which present both opportunities and challenges for combating money laundering. Their integration into AML frameworks can enhance the effectiveness of monitoring and control mechanisms. The studies also highlight the need for collaborative approaches for effective anti-money laundering efforts in the FinTech sector which requires collaboration between

governments, regulatory bodies, and FinTech companies. This collaboration is crucial for developing comprehensive strategies that address the complexities of financial crimes in the digital age. Lastly, it highlights the global lessons and local context within developing countries like Nigeria where each country's regulatory environment must be tailored to its unique economic and technological context, but shared challenges and solutions highlight common pathways for effective regulation.

4.9.1 Relevant Literature and Identification of Research Gaps

The existing literature on FinTech and money laundering primarily focuses on the role of technological advancements in improving financial systems. However, despite the growing interest, critical gaps remain regarding the dual impact of FinTech—its benefits and vulnerabilities—particularly in developing economies. This section highlights relevant studies from top-tier journals and incorporates key content from empirical data to demonstrate the research gap and justify the focus of this study.

Within the extent literature, studies have been undertaken on the interplay between FinTech, Financial Innovation, and Money Laundering. For instance, Dorfleitner et al. (2017) highlight FinTech's transformative role in enhancing financial efficiency and inclusion. However, such benefits are often coupled with risks, including vulnerabilities to illicit financial activities. Similarly, Merton (1995) emphasizes the need for regulatory oversight to mitigate the unintended consequences of financial innovations. These studies predominantly analyse developed economies like the UK, US, and France, as illustrated by Shillito (2016) and Stewart & Jurjens (2017). In developing countries, particularly Nigeria, there is insufficient research exploring the relationship between FinTech and money laundering, despite its global prominence (IMF, 2021). Nigeria ranks among the top 20 countries for money laundering incidents, highlighting the urgent need for region-specific analyses (FSB, 2022; Alam, 2022). Despite these contributions to the body of knowledge, there is still limited empirical evidence on the negative impacts of FinTech, particularly in facilitating money laundering. There is also a lack of research addressing these challenges in the context of developing economies such as Nigeria. Hence, this study addressed this gap through the examination on the influence of FinTech on Money Laundering from the perspective of developing country, with Nigeria as area of study.

There is also growing evidence on the role of Regulatory Technology (RegTech) and Regulatory Quality on Money Laundering. Study of Arner, Barberis, and Buckley (2017) proposed RegTech as a mechanism for improving compliance efficiency and reducing regulatory burdens. However, such advancements face significant contextual barriers, including corruption and weak regulatory enforcement, which are prevalent in developing economies. In practice, there are pronouncement on the limitations in monitoring FinTech Platforms, for instance, Nigeria's Central Bank (CBN) recently highlighted the limitations in monitoring blockchain-based platforms like Binance, where $26 billion passed through unidentified sources within one year. This underscores the need for enhanced regulatory systems tailored to digital financial platforms in developing contexts. Despite this theoretical and practical insights, there is insufficient focus on regulation particularly financial regulation in addressing the FinTech and money laundering nexus. To address this gap, the current

study integrate the moderating role of financial regulation in the relationship between FinTech and money laundering.

Additionally, there are also growing evidence on the role of Financial Literacy on Financial Crimes including money laundering. A study by Lusardi and Mitchell (2014) demonstrates the role of financial literacy in mitigating fraud and improving financial outcomes. Similarly, Panos and Wilson (2020) examine financial literacy's influence on cryptocurrency adoption. However, these studies are largely focused on developed economies, leaving a gap in understanding financial literacy's moderating role in curbing illicit activities in developing nations.

In Nigeria, where financial literacy rates remain low, the susceptibility of users to exploitation through FinTech platforms is a growing concern (IMF, 2021). This highlights the importance of understanding financial literacy's role in moderating the risks associated with FinTech adoption. However, there is limited analysis of financial literacy as a moderating variable in FinTech-enabled money laundering as well as insufficient exploration of financial literacy challenges in countries with high out-of-school populations. These gaps have been addressed in this study through the integration of financial literacy as a moderator in the relationship between FinTech and money laundering.

4.10 Summary

The chapter aimed to achieve a comprehensive conceptual and empirical review of literature on the relationship between FinTech and money laundering and the moderating effect of financial regulation and financial literacy in the relationship. These were achieved by the chapter as it reviewed conceptual literature on money laundering and FinTech, the relationship between FinTech and financial markets, relationship between FinTech blockchain and cybersecurity as well as the link between FinTech and payment system fraud. The literature on the concept of CBDC and its implications to money laundering was reviewed. The chapter also attempted to review empirical literature on the relationship between FinTech and money laundering. In achieving this, emphasis was placed on the relationship between four dimensions of FinTech examined in this study including mobile-based financial services, web-based financial services, ATM-based financial services, and POS-based financial services. Empirical literature was also reviewed on the potential moderating effects of financial regulation and financial literacy on the relationship between FinTech and money laundering.

5.0 RESEARCH METHODOLOGY

5.1 Overview

This Chapter examines the research methodology to be used in the project which includes research philosophy, research technique, research design, population, sample and sampling techniques, operational definition and measurement of variables, questionnaire and interview design and data collection, data analysis as well as ethical considerations.

5.2 Research Philosophy

Research philosophy consists of the researcher's belief system or understanding of research design, in terms of how research phenomena should be generated, analyzed, and utilized (Saunders et al. 2007). This belief system or understanding is based on a systematic and logical body of knowledge which the researcher is expected to be conversant with because the centrality of research philosophy establishes whether certain things, we know are false or true. It also borders on a systematic and logical procedure in legitimately making assumptions from various experiences and understanding the composition of the world. The importance of this section or a critical question is how well a researcher can explain and defend his/her philosophical choices based on epistemological and ontological stances.

A thorough comprehension of a researcher's perspective is of utmost importance. The researcher's philosophical stance serves as the foundation for assumptions, strategies, and analytical perspectives on the relationships between variables. The significance of philosophical understanding in research is twofold. Firstly, it enables researchers to tailor their research designs to accommodate the unique constraints of various subject areas. By recognizing and acknowledging these limitations, researchers can develop designs that go beyond their previous research experiences. Secondly, philosophical understanding aids researchers in selecting an appropriate research strategy, whether it be objective or subjective. However, this decision should be based on a research strategy that is widely accepted and recognized as sound academic practice, as different strategies are rooted in distinct philosophical paradigms.

Second is the efficiency in making the most appropriate choice of research design. Research philosophy assists the researcher in understanding the limitations of each research design, its basic assumptions, and its characteristics. Such knowledge is immeasurable in choosing the appropriate research design in a timely and efficient manner. Finally, research philosophy helps in assisting the researcher in classifying the research design. Having a good understanding of the characteristics of the different research designs, the fundamental assumptions underpinning each design, and the nature of data of each design helps the research in understanding the nature of evidence or data required, the

nature of collecting the evidence or data collection, and how that evidence or data provides answers to the objectives of the study, or fundamental questions investigated.

A comprehensive comprehension of the research philosophy is crucial for researchers as it aids in the selection of reliable data collection methods, research strategies, and methodological or data analytical techniques. In other words, a researcher's understanding of different research approaches and their assumptions about the world significantly impact their choices regarding research strategy, research design, analytical techniques, and data collection methods. Particularly in the field of social sciences, researchers must be aware of the philosophical commitments that shape their research design choices (Saunders et al., 2007). According to Lincoln & Guba (1985), a philosophical paradigm should align with a researcher's worldview, their perception of truth and reality (ontology), and their approach to acquiring knowledge about that truth or reality (epistemology).

5.2.1 Ontology

The philosophical paradigm consists of different views about the nature of the world (Oates, 2014). Ontology, therefore, is the assumptions about the nature of reality or the study of "being", "existence" or reality (Oates, 2014). Ontology as a philosophical paradigm is only relevant when there is an established body of knowledge or existing theories. It shapes the researcher's perspectives of research objects and the world, and the objectives of a research project. Identifying ontology from the beginning aspect of the research is essential in determining the research design. The process establishes the primary essential attributes, entities, or structures that individuals perceive as crucial within a particular area of research. It involves concentrating on particular issues that aim to validate assertions, such as the grounds for causal claims and capabilities.

In natural and social science research, the analytical spotlight is on the debate between relativism and realism. Relativism and realism are important concepts or perception of truth. Relativists perceive the concept of truth to be different from one social group to another or from one individual to another. Relativists view a context-dependent standard of falsity or truth is futile or scientific laws 'may not be quite immutable.' Thus, truth depends on the views of the researcher since scientific laws have not been perfectly discovered. This concept is very important, especially in social science research, because what is truth can vary from place, time, and views of the observer. In the context of my study, the risk of FinTech is still emerging, and the effect of FinTech on money laundering could vary from place, time, form, and nature. Realists define the world or phenomena as external and concrete, while arguing that a researcher can only draw conclusive correlations between variables or make progress in science through observation (Easterby-Smith et al. 2008). Easterby-Smith et al. (2008) further argued

that internal realists concentrate more on observation process (epistemology) and they accept that scientific laws once discovered are absolute and independent from further observation. Diametrically opposite to realism is nominalism which is based on personal experience and perception of important events.

5.2.2 Epistemology

Epistemology focuses on what is considered valid knowledge. Epistemology strives to resolve important questions on the constituents of accepted knowledge (or ought to constitute) in a certain field of endeavour. The two fundamentally different but competing thoughts in epistemology are: positive (realism) epistemology and phenomenological (or normative, interpretive) epistemology. In social science, epistemology is crucially important, because it helps in validating the legitimacy of a particular body of knowledge and provides a framework for reliable, dependable, and representative answers. Within the context of social reality, epistemology assists the researcher in validating the social reality of empirical, logical, autocratic, and intuitive knowledge, through acceptable theory of knowledge.

Ontology, therefore, must be fused with epistemology as the two are equally dependent and conceptually impossible to differentiate in the context of social science research. For instance, a discussion on the concept of meaning (epistemology) is a discussion about the concept of a meaningful reality (ontology). We further analyze the debate on social science research within the context of positivism and interpretivism.

5.2.2.1 Positivism/Scientific Method

Positivism is based on the idea that reality can be uncovered through experimentation and observation, regardless of human influence. It is often seen as the preferred approach of natural scientists, involving the study of observable social phenomena to establish general laws. Many social science studies rely on examining established theories to forecast or clarify a social occurrence. Social science research tends to favor objectivity over subjectivity, utilizing a methodical and exact logical reasoning process. Given positivism's belief that social events can be quantified, it is commonly linked with quantitative analytical techniques. This assumption is generally criticized because of the inadequacies of positivism. Collins and Hussey (2014) for instance, argued that (1) capturing complex phenomena in a single measure could be misleading (2) researchers are not absolutely objectives because their values and interest could affect the outcome of the research (3) highly structured research design imposes constraints on the results and may ignore other relevant findings (4) individual perspectives are

important in understanding the outcome of research and (5) it is impossible to exclude from their social context.

Within the context of natural and social science research, positivism enables the researcher to limit his/her research activities to data collection and analysis, since positivism believes that truth is static, and objective, that is replicable (Dudovskiy, 2022). For this study's purpose, we align ourselves to a positivist school that relative is objective, static and replicable. So, we limit the research activities to data collection and analysis to establish the effect of FinTech on money laundering using qualitative data. The study technically goes beyond data collection and analysis by explaining the "why" behind the causal relationship and offering suggestions for improvement, which falls into the realm of interpretivism/social construction.

5.2.2.2 Interpretivism/Social Constructionism

Interpretivism argues that realities are based on a researcher's interpretation of their social realities based on an ontological premise. Social environment and roles influence researchers and social actors interpretation or creation of realities (Robson, 2011). Interpretivism offers a subjective approach to understanding and explaining social reality, primarily utilizing qualitative research methods. Unlike positivism, which posits that reality remains constant regardless of the research process and requires the researcher to remain detached from the findings, interpretivism involves constructing meanings and interpretations derived from the perspectives of the participants involved. This study involves the interpretivist philosophy, recognizing its relevance and advantages, especially in exploring the complex interactions between FinTech and money laundering. Accordingly, we employed qualitative methods to analyze these phenomena, focusing on how regulatory quality and financial literacy intersect to elucidate the relationship between FinTech and money laundering.

5.3 Research Technique

Research techniques refer to the method used by the researcher in collecting the data for the study (Kumar, 2013). In this, Kumar (2013) identified eleven techniques being used in collecting data in a research study including observation (side visit and contextual inquiry), survey/questionnaire, focus group, interviews, diary studies, brainstorming, game storming, web analytics, playtesting, A/B testing, as well as other research methods. Despite the various techniques available in the literature, this study uses survey/questionnaire and interview techniques as a method of collecting the data of this study. The survey questionnaire and interviews can be justified by the study's objective, nature of data required, and measurement adopted for the quantitative analysis, which is Likert measurement scale.

5.4 Research Design

The research design is considered as the overall strategy deployed by the researcher in integrating different components of the research into a more coherent and logical approach to ensure that the research problem is effectively addressed, research questions comprehensively answered, and the research objective adequately achieved. In specific, research design constitutes a clear blueprint for data collection, measurement, and analysis of data. Research design is also defined as the architecture or blueprint that guides the researcher in undertaking the study. Therefore, in this study, a mixed-mode research design was deployed comprising both quantitative and qualitative approaches. The mixed-mode research design helps a policy researcher to obtain a better understanding of complex phenomena quantitatively through numbers via basic statistical analyses as well as qualitatively through the view of experts in the field of study (Creswell, 1999). This enables policy research to view the world through multiple lenses and methodologies that provide robust responses to the needs of various stakeholders including academics and policymakers compared to a single method or research approach (Creswell, 1999).

One crucial aspect of utilizing mixed methods is the exploratory sequential design. Initially, qualitative data is gathered and analyzed, followed by the collection and analysis of quantitative data. This method enables researchers to explore initial inquiries and formulate hypotheses. Subsequently, the quantitative data is utilized to verify or support the qualitative findings. The decision to employ a mixed method is influenced by several factors. Firstly, merging both types of data allows researchers to leverage the detailed, contextual insights of qualitative data and the generalizable, externally valid insights of quantitative data, thereby addressing the limitations of each type of data. It is commonly argued that purely quantitative or qualitative studies struggle to capture the lived experiences of the population, whereas the combination of qualitative and quantitative data enhances and enriches the outcomes. Purely qualitative studies may lack generalizability as they often reflect the experiences of a limited number of respondents, while quantitative data can validate qualitative findings. Secondly, mixed methods offer greater flexibility in research design, allowing researchers to combine elements from various types of studies to produce the most informative results. This approach is less constrained by disciplines and established research paradigms, enabling the integration of theory generation and hypothesis testing in a single study, a feature not typically found in standalone qualitative or quantitative studies.

Quantitative approach was used to examine the influence of FinTech channels (mobile-based financial services, web-based financial services, ATM-based financial services, and POS-based financial services) on money laundering with financial regulation as a moderator. While the qualitative approach was used to obtain insights on FinTech and money laundering issues from the perspectives of regulators. Towards this end, a survey and interview were conducted. The survey was conducted using questionnaires through data collected from FinTech users in Nigeria, while the interview was conducted through key informants from five regulatory bodies relating to FinTech and money laundering in Nigeria which include CBN, NFIU, EFCC, ICPC, NDLEA and the Ministry of Justice The data collected was cross-sectional as it was collected at one-point in time using questionnaire and interview designed for the purpose.

It is important to note that quantitative studies are largely categorized into four (4) types, namely: survey, correlational, causal-comparative, and experimental (Springer, et al, 2013). A survey approach would be deployed in this study as it allows researchers to contact a wide range of respondents to obtain the responses. This is in line with previous research in Nigeria relating to FinTech such as EFInA (2016) which had used survey strategies in conducting their studies. Similarly, the measurement of variables has been obtained from previous studies relating to use of information and communication technology (Türel, Özdemir, and Varol (2017), Money Laundering (NFIU, 2021) and Financial Regulation and financial literacy (Turki, et. al, 2020).

For qualitative studies, the most common approaches are interviews and observations (Jamshed, 2014). However, interviews were selected for this study because it sought the views of the respondents rather than observing their behaviors. Key informant interviews (KII) were conducted with relevant staff from six FinTech and money laundering-related regulatory bodies: the Central Bank of Nigeria (CBN), Nigerian Financial Intelligence Unit (NFIU), Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices Commission (ICPC), National Drug Law Enforcement Agency (NDLEA), and the Ministry of Justice. Thirteen questions were asked, focusing on all the objectives. The qualitative interviews with these regulators were conducted to verify and validate the findings from the survey analysis (Creswell & Miller, 2000).

5.5 Quantitative Research Design

The section discusses the population, samples, and sampling techniques as well as operational definition of the variables, questionnaire design, data collection and data analyses techniques deployed for the quantitative research which was meant to achieve objectives one to three of the study.

5.5.1 Population, Samples and Sampling Techniques

The study's population was drawn from Nigeria's FinTech User, which includes regulators, companies, users, and other stakeholders. The target population consists of 32,363,047 FinTech users, based on the CBN's 2019 report. Due to the impracticality of surveying the entire population, a purposive sampling method was used to ensure that the most relevant respondents were included. This approach allows for focused data collection while maintaining robustness and contextual relevance.

Sample Size Calculation: The sample size was determined using Krejcie and Morgan's (1970) formula, which recommends a sample size of 384 respondents for populations exceeding 1,000,000. Recognizing the possibility of non-response, we distributed an additional 30% of the calculated sample size to account for low response rates. The calculation for the total distributed questionnaires is as follows:

$$30\% \text{ of } 384 = 0.3 \times 384 = 115.2 \text{ (rounded to 126 for practicality).}$$

Adding this to the initial 384:

$$384 + 126 = 510 \text{ questionnaires distributed.}$$

The decision to add 30% more questionnaires is consistent with best practices in survey research to counteract potential low response rates.

Stratified Sampling Process: The study utilized stratified sampling techniques to ensure proportional representation across Nigeria's six geopolitical zones (Northcentral, Northeast, Northwest, Southeast, South-south, and Southwest), as detailed in the EFInA (2020) report. The stratification process ensured that the sample reflected the diverse population distribution in each zone. Within each zone, respondents were selected based on their relevance and accessibility within the FinTech ecosystem.

Response Rate and Validity: Out of the 510 distributed questionnaires, 248 valid responses were received, representing a response rate of 48.6%. Although this is lower than the calculated sample size of 384, it is a common response rate for survey-based research in Nigeria, particularly in studies involving diverse stakeholders. The 248 responses, while not exhaustive, provide a substantial and representative dataset for analysis, given the stratified sampling framework.

5.5.2 Operational Definition and Measurement of Variables

This section presents the operational definitions and measurements of key variables of the study which include FinTech with four dimensions (mobile-based financial services, web-based financial services, ATM-based financial services, and POS-based financial services) as independent variable, money laundering as dependent variable and financial regulation as moderating variable.

1. ***Operational Definition and Measurement of FinTech:*** FinTech refers to the combination of two words "financial" and "technology." It is considered a relatively new term in financial systems, and it is used to describe any emerging technology that financial institutions use to deliver financial services to their customers in newer, faster, more effective, and cheaper ways than traditional methods (Barasch, 2019). In this study, FinTech is operationalized using four dimensions including mobile-based financial services, web-based financial services, ATM-based financial services, and POS-based financial services. Each of the dimensions will be measured using four items adapted from the Personal ICT Usage scale developed by Türel, Özdemir and Varol (2017). The items have been confirmed to have strong internal consistency reliability as reflected in the Cronbach Alpha of 0.85. This value is above the commonly suggested threshold of 0.70 recommended by Nunnally (1978). All the items for all four dimensions of FinTech will be measured using a five-point Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5).

2. ***Operational Definition and Measurement of Money Laundering:*** In this study money laundering is operationalized using the definition offered by Korejo, Rajamanickam, & Said, (2021, p. 726) which defined money laundering as "the *process of conversion of illicit money which comes out of the crime which is then intermixed with the licit money to make appear legitimate, and it becomes very difficult to distinguish the legitimate money from the illegitimate one*". This variable is measured using eleven Money Laundering Indicators developed by Nigeria Financial Intelligence Unit (NFIU). The NFIU serves as the primary national agency responsible for receiving disclosures from reporting organizations, analyzing these disclosures, and generating intelligence to be shared with competent authorities. It operates independently within the Central Bank of Nigeria and acts as the central coordinating body for the country's AML/CFT/CPF framework. Consequently, its Money Laundering Indicators pertaining to Financial Fraud in Nigeria can be regarded as the most suitable indicators of money laundering within the Nigerian context. The five-point Likert scale ranging

from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Agree (5) would be used in measuring all the 11 items that measured money laundering.

3. ***Operational Definition and Measurement of Financial Regulations:*** Financial regulations here refer to laws and rules that govern the workings of financial institutions which basically focus on ensuring stability, fair competition, consumer protection, as well as the prevention and reduction of financial crimes in the financial system (Kumar, 2014). In line with this definition, financial regulation in this study is operationalized as actions taken by regulators to prevent financial crimes within the financial systems. Thus, the Money Laundering Prevention Scale with 5 items developed by Turki, et al. (2020) was used in measuring financial regulation. This scale's measures have sufficient internal consistency as reflected in the Cronbach Alpha of 0.737 (Turki, et al, 2020). The five-point Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Disagree (5) would be used in measuring this variable.

4. ***Operational Definition and Measurement of Financial Literacy:*** Financial literacy is generally defined as having the knowledge and ability to use financial products and make financial decisions. Huston (2010) made a succinct distinction between financial literacy and financial knowledge by arguing that *"financial knowledge is an integral dimension of, but not equivalent to, financial literacy… financial literacy has an additional application dimension which implies that an individual must have the ability and confidence to use his/her financial knowledge to make financial decisions"* Thus, in developing a measurement for financial literacy, the analytical focus knowledge of the product and ability to appropriately apply the knowledge. In measuring financial literacy, we adopt the approach of Huston (2010) who argued that *"financial education is an input intended to increase a person's human capital, specifically financial knowledge and/or application (i.e., financial literacy)".* This implies that high primary and secondary school enrollment increases financial literacy and vice versa. The five-point Likert scale ranging from Strongly Disagree (1), Disagree (2), Neutral (3), Agree (4) and Strongly Disagree (5) would be used in measuring this variable.

5.5.3 Questionnaire Design

Cross sectional approach of data collection is employed as the data were collected at once within a specific period. Data is planned and collected using questionnaires to be designed for the purpose. The

items/questions/measures tested in the questionnaires were adapted and modified from previous studies based on the quality of the measures as stated in operational definition and measurement of variables. Therefore, the questionnaire is divided into two sections. Section A contains demographic information of the respondents in terms of gender, marital status, age, source of income, geographical location, and qualification. Section B covers the main variables of the study including money laundering, FinTech (mobile-based financial service, web-based financial services, ATM-based financial services, and POS-based financial service), financial regulation and financial literacy.

5.5.5 Data Collection

There are two types of data broadly classified into primary and secondary data. Therefore, these two types of data were collected in used in the study as discussed in the following sub-sections.

5.5.5.1 Primary Data

Primary data was obtained by collecting fresh data from primary sources or repurposing existing data for a different objective (Pandey & Pandey, 2021). This data is gathered through experiments or surveys. When it comes to surveys, primary data can be acquired through various methods such as observation, face-to-face interviews, phone interviews, online surveys, sending questionnaires by mail, and self-administered questionnaires. For this research, primary data was gathered using a research questionnaire and interviews created for the study.

5.5.5.2 Secondary Data

Secondary data were obtained from various reliable sources such as technical publications, including manuals, handbooks, data sheets, and standards, alongside books and journals. Additionally, official publications from Central government entities, state governments, local bodies, private data services, and computer databases serve as valuable sources of secondary data (Pandey and Pandey, 2021). For this study, secondary data have been primarily utilized for the literature review. The sources include publications from the Central Bank of Nigeria (CBN) related to FinTech, such as ATM-based financial services, POS-based financial services, and mobile-based financial services, as well as data derived from academic journals, government reports, and organizational publications relevant to the research objectives.

5.5.6 Data Analysis

The research employed both Statistical Packages for Social Science (SPSS) and Partial Least Square (PLS) Structural Equation Modeling (SEM) in its analysis.

5.5.6.1 Statistical Packages for Social Science (SPSS)

The SPSS software was employed to carry out descriptive statistics such as calculating percentages, means, modes, and standard deviations for the variables under study. This involved comprehensive steps starting with data preparation, entry, and coding, which are initiated immediately after data collection to ensure accuracy and consistency. SPSS is highly regarded for its robust capabilities in handling these preliminary stages of data analysis, facilitating the smooth transition to further analytical processes. Moreover, SPSS is instrumental in data screening and initial testing phases, providing essential tools for identifying and addressing issues such as response bias, missing values, and outliers. It also supports normality tests to assess the distribution of data, factor analysis to explore underlying data structures, and reliability testing to ensure the consistency of measurements. These functionalities make SPSS a preferred choice for researchers looking to perform comprehensive data analysis in various fields (Pallant, 2020; Field, 2018; Bryman & Cramer, 2011).

5.5.6.2 Partial Least Square (PLS) and Structural Equation Modeling (SEM)

Partial Least squares (PLS) and Structural Equation Modeling (SEM) are used to achieve the study's three research objectives. In specifics, objective one examines the relationship between money laundering and FinTech, while objective two examines the moderating effect of financial regulation on the relationship between money laundering and FinTech and objective three examines the moderating effect of financial literacy on the relationship between money laundering and FinTech. Thus, these objectives will be achieved through testing of the three hypotheses of the study using PLS-SEM (H1, H2 and H3).

The utilization of PLS-SEM can be rationalized due to the relatively intricate nature of the research model, which encompasses both direct and moderating effects. This aligns with the recommendation put forth by Hair et al. (2014), advocating for the use of PLS in a complex research environment. Furthermore, PLS-SEM allows for the examination of both direct and moderating effects within a single research model and analysis, unlike SPSS which can only assess moderation effects through hierarchical regression utilizing multiple models. This distinction arises from the fact that SEM permits the evaluation of the significance of path coefficients, the assessment of moderating effects, as well as the evaluation of predictive relevance.

It is important to note that PLS-SEM used a two-step process. These are measurement model and structural model. The measurement model is used to evaluate the instruments' reliability and validity

and the overall quality of the measures, while the structural model is used to test the hypotheses of the study and fitness of the model. For the PLS-SEM measurement model four criteria are used in its evaluation (Hair et al., 2013; Hair et al., 2012; Hair et al., 2011; Fornell & Larcker, 1981). Firstly, a researcher needs to evaluate indicator reliability using its loading using a cutoff value of ≥.40. Secondly, the internal consistency reliability needs also to be evaluated using a composite reliability of ≥.70. Thirdly, the convergent validity also needs to be evaluated using Average Variance Extracted (AVE) of ≥.50, and lastly, discriminant validity needs to be evaluated using the squared root of AVE. This approach is popularly known as the Fornell-Larcker Criterion. Following the evaluation of the measurement model, the researcher then evaluates the PLS-SEM structural model using four criteria which are in line with the suggestion of Henseler et al., (2009) and Hair et al., (2011). In this, the researcher needs to first evaluate the significance of path coefficients using 5000 bootstrapped samples and the number of valid samples from the distributed questionnaires. The purpose of this is to enable the test of the research hypotheses. The second criterion is to evaluate the coefficient of determination (R-squared), using a threshold suggested by Hair et al., (2011), which are .25, .50 and .75 classified as small, moderate, and substantial, respectively. The third evaluation criterion is the assessment of the effect size of all the independent variables individually on the dependent variable, this is undertaken using the suggested cutoff values of F-squared (f^2) that range from .02, .13 and .35 which was recommended by Cohen (1988) as small, medium, and large effects, respectively. The last criterion for the evaluation of the structural model is the evaluation of the predictive relevance of the model which is in line with the recommendation of Gaisser (1974) and Stone (1974), which suggest the use of construct-cross validated redundancy (Q^2). The suggestion is that any model whose (Q^2) is above zero is considered predictive relevance (Hair et al., 2011, Hair et al., 2016).

5.6 Qualitative Research Design

The section discusses the interview subjects, the interview questions, and the methods used in analyzing them.

5.6.1 Interview Subjects

The subjects used in conducting the key informants' interviews (KII) were experts from six FinTech and money laundering related regulatory agencies including CBN, NFIU, EFCC, ICPC, NDLEA and the Ministry of Justice. The use of KII instead of Focus Group Discussion (FGD) form of interviewed has been justified by the nature of research objective which seek to elicit information from specific organization through specific individuals relevant to the subject of the research. Literature documented that KII has been better than FGDs as it provides more in-depth information about the study as it is

conducted with individuals that have special knowledge or specific information relating to the research or issue being investigated (Ayegbeli, 2013). Therefore, these justified the deployment of the KII in this study. The qualitative interviews with these regulators were conducted to validate the findings from the survey analysis, ensuring that the study captures a comprehensive perspective on the subject.

5.6.2 Interview Questions

According to Creswell and Miller (2000), combining quantitative survey analysis with qualitative interviews is essential for validating findings and achieving a comprehensive understanding of the research topic. This study employs qualitative methods to complement the quantitative data, ensuring robust and well-rounded insights.

For qualitative studies, the most common approaches are interviews and observations (Jamshed, 2014). Interviews were chosen for this study because they sought the views of respondents rather than observing their behaviours. This approach aligns with the argument by Ehrentraud, Ocampo, Garzoni, and Piccolo (2020), which emphasizes the necessity of obtaining evidence from the perspective of regulators to ensure a balanced analysis.

The study came up with fifteen questions to achieve its objective. These questions were reached based on the research objectives, reading through the literature and preliminary discussion with experts on FinTech and money laundering issues relevant to the regulatory agencies. These questions are (1) What do you define as "money laundering"? (2) What type of money laundering crimes are prevalent in Nigeria and why? (3) Do you think financial innovation has any effect on money laundering? (4) Aside from digital platforms, what other channels do money launderers use to conceal the source of illicit proceeds? (5) Are the current laws adequate in curtailing financial technology-induced money laundering? (6) Is there any law that specifically focuses on technology-based money laundering? (7) Can financial literacy reduce money laundering and is the level of financial literacy in Nigeria adequate in preventing financial technology-induced money laundering? (8) Is there any educational policy and/or curriculum that specifically focuses on increasing the level of financial literacy in Nigeria? (9) Which digital finance product (ATM, internet banking, POS, mobile banking, etc.) is commonly used for money laundering? (10) Do you think the emergence of cryptocurrency could amplify the effect of financial technology on money laundering? (11) What are the challenges associated with the use of technology in countering money laundering in Nigeria? (12) Do you have any partnership with internal and external stakeholders in addressing technology-induced money laundering? (13) How would you describe the effectiveness of those partnerships (if any)? (14) What recommendations would you put in place to prevent financial technology induced money laundering? (15) Is there any need to

strengthen the bilateral and multilateral partnership with your internal and external stakeholders to prevent technology-induced money laundering.

5.6.2.1 Linking Interview Questions to Research Objectives

This section outlines the importance of carefully designed interview questions to effectively addressing the research objectives. It details how each set of questions is strategically crafted to align with and fulfil the specific goals of the study.

Summary of Question Design and Alignment

This study carefully designs interview questions to effectively address its research objectives, ensuring alignment and comprehensive coverage of the topic.

- **Baseline Knowledge Assessment:** Questions 1 and 2 assess the respondents' knowledge of money laundering issues, establishing confidence in their subsequent responses. These questions are not directly tied to specific objectives but are critical given the diverse respondent pool.
- **Objective 1 (FinTech and Money Laundering):** Questions 3 and 4 focus on examining the effects of FinTech on money laundering in Nigeria. Question 4 also validates the responses to Question 3, ensuring consistency.
- **Objective 2 (Regulatory Quality):** Questions 5 and 6 explore the moderating effect of regulatory quality on the relationship between FinTech and money laundering, including evaluations of existing frameworks.
- **Objective 3 (Financial Literacy):** Questions 7 and 8 assess financial literacy's role in mitigating money laundering risks associated with FinTech, including evaluations of educational initiatives and policies.
- **Additional Insights and Industry Recommendations:** Questions 9 and 10 test respondents' knowledge of digital finance products for broader insights. Questions 11 to 14 seek practical recommendations to prevent technology-induced money laundering, while Question 15 targets financial institutions' perspectives.

The detailed alignment of these questions with research objectives is provided in the appendix. This structured approach ensures a comprehensive and balanced analysis of the interplay between FinTech, regulatory quality, financial literacy, and money laundering. (Creswell & Miller, 2000; Ehrentraud et al. 2020; Jamshed, 2014).

5.6.3 Analysis of the Interview Data

The data from the KII was analyzed using thematic analysis which was manually conducted. Braun and Clarke (2006) outlined five steps of thematic analysis including (i) familiarization with the data including transcribing, reading and re-reading as well as noting down the initial ideas, (ii) generating initial code by jotting small phrase or keyword representing a specific idea (iii), then searching for themes across the data by collating codes into potential themes by way of reading and re-reading through repeated recycle several times produce identifiable themes, (iv) reviewing themes to meet the research objectives and (v) producing the report with selection of vivid and compelling extract examples.

5.7 Robustness Test Analysis

Robustness test is conducted by to tests whether same result can be obtained using other approaches. The essence is to have some level of confidence of the reliability of method or approach used by obtaining closely same results under different methods and approaches. Therefore, to validate the empirical findings of the main analysis obtained using primary data, robustness test was undertaken using secondary data.

5.7.1. Variables used in the Robustness Test Analysis

The variables of the robustness test were selected in relation to the variables of the main study. For FinTech adoption which is the independent variable the monetary value of proxies of financial technology (POS, ATM, Mobile Phone, and internet banking) were used. For financial regulation, which is one of the moderators, regulatory quality was deployed as a proxy while financial literacy data was used for the second moderator. For the money laundering level of corruption and money laundering data was used alongside other control variables including GDP, trade openness and money market were deployed.

5.7.2 Data and Observations for the Robustness Test Analysis

The robustness test was conducted using annual data collated from the Ministry of Justice, Central Bank of Nigeria database, and World and Development Indicators. It covered the period of 15 years from 2008 – 2022. The decision for the time frame is influenced by data availability. The Central Bank of Nigeria started publishing FinTech data in January 2003, though under the broad categorisation of payment channel. From 2008, started publishing a disaggregated data on FinTech. The data are disaggregated into Web-Based, Point-of-Sales, Mobile Payment, and ATM transaction, in terms of their volume and value.

5.7.3 Analytical Procedure for the Robustness Test Analysis

Autoregressive Distributed Lag (ARDL) was used for the robustness test. It is a form of statistical technique used in econometrics to examine long-term relationships across number of variables using time series data (Nkoro & Uko 2016). This methodological approach serves as a vital tool for researchers whose purpose of the study centered on the analysis of evolving dynamics of economic variables and estimating their interconnections over time. Considering its robustness in testing both long term and short-term relationships ARDL models are used in wider empirical econometric analysis in many fields including but not limited to macroeconomics, finance, and other domains for which time series data is commonly applied. Thus, ARDL offers a versatile framework for exploring the dynamic interactions between variables, particularly in relation to non-stationary time series as well as differential integration orders among variables (Kripfganz & Schneider, 2023). Therefore, for this robustness test the ARDL co-integration test is employed to examine the correlations between financial technology and money laundering in Nigeria, both in the long-run and short-run.

5.8 Pilot Study

This subsection discussed the pilot study which was conducted with the primary aim of validating the interview questions and pre-testing the instrument before its administration for the main study. The section discussed the justification for conducting the pilot study, the Cronbach Alpha test, additional reliability analysis using composite reliability, analysis of convergent and discriminant validity of the instrument.

5.8.1 Justification for the Pilot Study

In a research study a pilot study is conducted on a small-scale basis to ascertain the feasibility of the proposed larger study (Teijlingen & Hundley, 2001). There are several justifications for conducting a pilot study as provided by Teijlingen and Hundley (2001) which include the development and testing adequacy of research instruments/questionnaire, assessing the feasibility of a (full-scale) using a small-scale survey as well as developing a research question and research plan among others. In specifics, the justification for conducting a pilot study in this research is to test the validity and reliability of the instrument developed in this study. Therefore, a small-scale study using 60 questionnaires was undertaken for this purpose.

5.8.2 Result of the Pilot Study

For the qualitative interview data, consent letters were submitted to Central Bank of Nigeria (CBN), Nigerian Financial Intelligent Unit (NFIU), Economic and Financial Crime Commission (EFCC),

Independent Corrupts Practices Commission (ICPC), Nigerian Drugs Law Enforcement Agency (NDLEA) and Federal Ministry of Justice of Nigeria on requesting their consent to participate in the research. Feedback was received from the agencies conveyed their acceptance indicating interest and full support to participate in the research work, considering the significance of the research to their respective organizations. In this, the initial seventeen Key Informants Interview (KII) questions were presented to the experts for validation which were later trimmed to thirteen questions, the remaining four questions were either merged with relevant questions or dropped based on lesser importance.

For quantitative data collection to be valid and reliable for a study, it is important to pre-test the questionnaire to be used (Sun, et al., 2014). This can be achieved in two stages. Firstly, is face validity, this is to ensure the validity of the content of the instrument by seeking experts' assistance to read the content of the questionnaire and suggest the amendment of potential areas of ambiguity to enhance the quality of the instruments (Sun, et al., 2014). To achieve this, the questionnaire was subjected to an assessment of content validity in both technical and language evaluation. In this, the questionnaires were sent to experts in survey-related studies for evaluation to see the face content validated of the questionnaire. Of these experts, are from CBN, NFIU, EFCC, ICPC, NDLEA and Federal Ministry of Justices while the others are senior lecturers and associate professors in the Nigerian universities who are experts in finance-related research and have a sound knowledge of instrument development. Through such an evaluation, some amendments were made to the questionnaire.

The second stage was empirical validation of the instrument through pilot testing. The essence here is to ensure the reliability and internal consistency of the measures (Arain, Campbell, Cooper, and Lancaster, 2010). In the pilot test, about 60 questionnaires were distributed to users of FinTech in Kano, Nigeria, Kano is chosen because is the highest populated state in Nigeria and has the heterogenous nature of FinTech users in the country. The pilot data was collected within two weeks and analyzed. The analyses involve assessment of Cronbach Alpha, a common measure of internal consistency reliability (Nunnally, 1994). In addition, composite reliability was also used as an additional measure of determining internal consistency reliability (Hair et al., 2011). Therefore, in this, sixty (60) questionnaires were administered to potential respondents for their responses to the questions therein, which is consistent with the suggestion of Johanson and Brooks (2010) of using 30 to 50 cases for pilot study. Out of the 60 questionnaires distributed, 52 were successfully retrieved and utilized for the pilot study.

5.8.2.1 Cronbach Alpha Test

In conducting the pilot study, the responses were analyzed using Cronbach Alpha which is a common measure of internal consistency reliability (Nunnally, 1994). The Cronbach Alpha test how responses across the questions of each construct are consistent for all the reflective constructs. For instance, whether the response across the five items measuring Mobile-Based Financial Service Usage is consistent across all the respondents. The result is presented in Table 5.1 below.

Table 5.1 Cronbach Alpha Test (Source: Authors creation)

Constructs	**No of Items**	**Cronbach's Alpha**
Mobile-Based Financial Service Usage	5	0.902
Web-Based Financial Service Usage	5	0.810
ATM-Based Financial Service Usage	5	0.900
POS-Based Financial Service Usage	5	0.890
Money Laundering Exposure	11	0.821
Financial Regulation	5	0.990
Financial Literacy	5	0.898

The result from Table 5.1 revealed the requirements for Cronbach's Alpha have been achieved in line with the threshold of 0.70 suggested by Nunnally (1994). This implied that the items of each construct work together in explaining the constructs for internal consistency. To further confirm the internal consistency of the items, composite reliability was also measured as presented in the following subsection.

5.8.2.2 Composite Reliability

Composite reliability is an alternative measure of internal consistency reliability (Hair, et al., 2011). Like Cronbach Alpha it measures the extent to which the items measuring a particular construct are consistent across various responses. This is used as an additional measure of internal consistency reliability. The fact is that when PLS-SEM is used by the researcher, it was stressed that the composite reliability to be better than Cronbach's Alpha (Hair et al., 2011). The result of the composite reliability is presented in Table 5.2 below:

Table 5.2: Composite Reliability (Source: Authors creation)

Constructs	No of Items	Composite Reliability
Mobile-Based Financial Service Usage	5	0.812
Web-Based Financial Service Usage	5	0.965
ATM-Based Financial Service Usage	5	0.915
POS-Based Financial Service Usage	5	0.875
Money Laundering Exposure	11	0.833
Financial Regulation	5	0.911
Financial Literacy	5	0.899

The results from Table 5.2 above indicate that all the variables are within the acceptable thresholds of internal consistency reliability. Specifically, the variable value of 0.70 for composite reliability as recommended by Hair, et al. (2011). Thus, the items used in measuring these reflective constructs contained in Table 5.2 can be said to have internal consistency.

5.3.3 Constructs' Discriminant and Convergent Validity

In addition to the reliability analysis of the instrument, Confirmatory Factor Analysis (CFA) using convergent and discriminant validity measures as suggested by Hair, et al. (2011) was also conducted as presented in Table 5.3 below.

Table 5.3: Constructs' Discriminant and Convergent Validity (Source: Authors creation)

Constructs	1	2	3	4	5	6	7	AVE
Mobile-Based Fin Serv Usage	**0.698**							0.555
Web-Based Fin Serv Usage	0.633	**0.717**						0.528
ATM-Based Fin Serv Usage	0.618	0.557	**0.856**					0.735
POS-Based Fin Serv Usage	0.616	0.624	0.530	**0.679**				0.600
Money Laundering Expo	0.538	0.650	0.361	0.521	**0.719**			0.541
Financial Regulation	0.403	0.270	0.309	0.427	0.373	**0.699**		0.608
Financial Literacy	0.612	0.563	0.502	0.604	0.703	0.596	**0.891**	0.695

The result from the table 5.3 indicates that requirements for both convergent validity and discriminant validity are also achieved. Specifically, the requirement for convergent validity has been attained as the Average Variance Extracted (AVE) of all the variables reached the threshold of 0.5 and above.

Similarly, the requirement for discriminant validity was also achieved as the square root of AVE of every latent construct is greater than its squared correlation with any other construct in the model. This implied that each of the variables are separate and distinct as no two-variables performs similar functions in the model.

5.9 Ethical Consideration

Saunders et al. (2012) emphasize that ethical considerations arise throughout the entire research process, starting from planning and gaining access to individuals and organizations, through data collection and analysis, and continuing to the reporting of findings. Ethics, in this context, are defined as a set of moral principles or standards of behavior that guide decisions about how we conduct ourselves and interact with others (Blumberg et al., 2011). These ethical guidelines are crucial for shaping research practice and design. Adherence to ethical principles is expected during all phases of data collection to ensure the research process is conducted with integrity and respect for all involved.

Given that the primary goal of research is to address real-world problems, ethical considerations are of paramount importance. They play a key role in maintaining scientific or academic integrity, enhancing the validity of the research, and safeguarding the rights of participants. Ethical considerations help ensure that research is conducted in a manner that respects the dignity and rights of individuals and upholds scientific integrity in collaborations between researchers and society. Specifically, these considerations mandate that participation in studies is voluntary, informed, and ensures the safety of all research subjects. In the study, we rigorously adhere to these ethical principles to prevent any potential harm to participants, intentional or otherwise. Any breach of ethical guidelines could significantly undermine the credibility and validity of the research (Resnik, 2020).

It is generally argued that before commencing with data collection, researchers should submit their proposal to an institutional review board. According to Sule (2023), the internal review board is to *"...check whether your research aims and research design are ethically acceptable and follow your institution's code of conduct. They check that your research materials and procedures are up to code."* Where the proposal is successful, the institutional review board would approve for the research to proceed with data collect. Any amendment or modification to the data collection instrument must go back to the institutional review committee for approval of the modification. We adhered to this tenant by first obtaining the approval of the supervisor and other internal assessors that constitute the

Departmental Institutional Review board. We also ensured that the data collection instrument is structured in consideration of ethical issues. The ethical issued we considered include:

- **Results Communication**: In this study, we adopted the principle of good research commination which involves credible, reliable, and honest communication strategy. We also ensured that we avoid research misconduct such as plagiarism, whether copying someone else's work or self-plagiarism.
- **Potential for Harm: We** evaluated all the sources of harm to the participants, whether legal, physical, social, or psychological. For instance, to protect participants with institutional affiliations from any form of harm, we wrote the institutions and obtained permission for their staff to participate in answering the questionnaire. We also designed the questionnaires in such a way that it gives discretion to the respondent to voluntarily participate or opt out.
- **Confidentiality**: We removed all identifying information from the report to protect the privacy and personal data of the respondents. We are also maintaining respondent confidentiality in storing the data.
- **Anonymity**: is a key feature of the instruments used in this study. To ensure anonymity, we do not collect any personally identifying information such as videos, photos, physical characteristics, IP addresses, email addresses, phone numbers, or names. This guarantees that respondents can participate without revealing their identity.
- **Informed Consent**: the questionnaire is carefully worded to provide all potential participants with the necessary information. This ensures that they fully understand the study's benefits, risks, funding, and institutional approval. By receiving and comprehending this information, participants can make an informed decision about whether to participate.

Voluntary Participation: The questionnaire was structured to ensure that participants could opt out or leave the study at any time without feeling pressured to continue and without needing to justify their decision. It was explicitly stated that their refusal to participate or decision to withdraw would not lead to any adverse consequences. This clear communication was crucial in maintaining voluntary and unbiased participation.

5.9.1 Ethical and Data Approval Procedure

This study employed a rigorous and ethically sound approach to data collection, ensuring strict adherence to established research ethics and guidelines. Data was primarily gathered through questionnaires completed by FinTech users in Nigeria. Given the sensitive nature of the topic money

laundering special attention was paid to safeguarding participants' rights, privacy, and confidentiality. The ethical standards followed were grounded in principles outlined by Saunders et al. (2019) and other established ethical guidelines.

Adherence to Ethical Guidelines

To ensure the research met the highest ethical standards, the following measures were strictly implemented:

Approval by Research Ethics Committees:

- The study adhered to the guidelines set by the University's research ethics panel. Ethical clearance was obtained through a thorough review process that included detailed documentation of the research objectives, survey questions, data collection methods, and ethical protocols. See Appendix E
- The approval confirmed the research's alignment with academic integrity and respect for participants' rights.

Consent from Stakeholders and Participants:

- Proper consent was obtained from both the University and the stakeholders involved in the research. Stakeholders' approval was documented and is included in Appendix F, demonstrating their "buy-in" and agreement with the research objectives.
- Each participant was given a consent form to sign before taking part in the study. The form outlined the purpose of the research, their rights as participants, and assurances of confidentiality and voluntary participation. Samples of signed consent forms are provided in Appendix E.

Respect for Participant Rights:

- Participants were informed about their right to voluntarily participate and withdraw, either partially or completely, at any stage of the study.
- The anonymity and privacy of participants were safeguarded throughout the research process.

Detailed Ethics Clearance Process

Rigorous Ethical Approval Process:

Ethical clearance was obtained before the study began, ensuring that all aspects of the research were ethically sound. This approval process involved submitting comprehensive details about the survey instruments, consent procedures, and methods for handling sensitive data.

Stakeholder Engagement and Involvement:

The researcher actively engaged stakeholders throughout the study. A study visit to Nigeria was conducted to facilitate in-person interactions with stakeholders. This engagement ensured transparency, enhanced stakeholder involvement, and provided an opportunity to share preliminary findings for feedback.

Pilot Testing and Validation:

Ethical clearance was obtained before conducting THE pilot test. The pilot study validated the questionnaire's design and appropriateness, ensuring clarity and relevance for the main study.

Data Security and Confidentiality:

All data collected was handled with strict confidentiality. The information shared by participants was securely stored to prevent unauthorized access, preserving the anonymity and trust of respondents.

Transparency and Documentation:

The research process was fully documented to enhance transparency. Ethical approvals, stakeholder consents, and signed participant forms were included in the appendices to demonstrate compliance with ethical standards.

Ensuring Data Credibility and Integrity

The meticulous adherence to ethical guidelines and the involvement of stakeholders at every stage not only safeguarded the integrity of the research but also ensured the credibility and reliability of the findings. By aligning the study with ethical protocols and respecting participants' rights, the researcher maintained a high standard of academic rigor and integrity throughout the data collection process.

5.10 Summary

This chapter discussed the mixed-mode research methodology used in the study including the research design for both quantitative and qualitative approaches. For the qualitative research design, the population, sampling, and sampling techniques were discussed. It also discussed the techniques used in the study with respect to the collection and analysis of data for ensuring the quality of the measurement as well as the achievement of the research objectives. The techniques used in collecting

the data was survey questionnaire while the analysis was undertaken using both SPSS and PLS-SEM. The use of SPSS was for descriptive and preliminary analyses while that of PLS-SEM was mainly for confirming the quality of the measurement as well as hypotheses testing. The chapter also discussed the ethical considerations of the study. For the quantitative research design, the subject of the KII and their respective organizations, KII questions and the analytical approach were discussed. Furthermore, the chapter also discussed the methodology used robustness test which was deployed in validating the result of empirical evidence obtained from primary data. The chapter also discussed the pilot study conduct to pre-test the interview question and the quantitative survey questionnaire. The result of the pilot test confirmed that the interview questions were relevant in achieving objective of the study while the questionnaire instrument was found to be valid and reliable using different indices and criteria for evaluation. The last part of the chapter was the discussion of the ethical considerations.

6.0 QUANTITATIVE DATA ANALYSIS

6.1 Overview

This chapter presents the quantitative analysis and the results of both preliminary analysis and the main analysis using Partial Least Square Structural Equation Modelling (PLS-SEM). The rationale for the preliminary analysis is to ensure the identification and replacing missing values within the data, it also aims at identification of outliers, conduct analysis of demographic profile of respondents, descriptive analysis of the variables of the study, analysis of non-response bias, as well as normality and multi-collinearity test. For the PLS-SEM analysis is it intended to assess the quality of the data in both its validity and reliability through the assessment of measurement model, this will be followed by the assessment of structural model through which the hypotheses of the study will be examined as well as the quality of the model in terms of its explanatory power and predictive relevance. This analysis was conducted to achieve research objectives one, two and three of the study and answer their corresponding research questions.

6.2. Preliminary Analysis

The preliminary analyses conducted in this study include the analysis of response rate, missing values, conduct analysis of demographic profile of respondents, descriptive analysis of the variables of the study, outliers, non-response bias, normality test, as well as multi-collinearity test among the constructs of the study.

6.2.1. Analysis of the Response Rate

Analysis of the response rate refers to the analysis of the total number of questionnaires returned in comparison of the questionnaires distributed. This analysis is conducted based on the common challenge of survey where it is difficult to have 100% response to the questionnaires distributed. The essence is to find the rate at which the questionnaires were responded and estimate whether such response is within the acceptable rate to support data analysis. The result of this analysis is presented in Table 6.1 below:

Table 6.1- Response Rate Analysis (Source: Authors creation)

Response	**Analysis**
Total number of questionnaires distributed	510
Total number of questionnaires returned and usable	248
Response rate	48.62%

Table 6.1 revealed that 510 questionnaires were distributed, out of which 248 were returned after follow-up. This gives a total response rate of 48.62% based on the questionnaires distributed, but total response based on the sample size of 384 responses is 64.58%. This response is considered sufficient in line with the recommendation of Sekaran (2003) who suggested a response rate of 30% to be adequate for survey studies. It is also consistent with the study of Mailu, et al (2021) which documented that a survey hardly gets a response rate above 40%. This outcome implies that the response meets the threshold and is adequate for the data analysis.

6.2.2 Missing Values

There are 10,186 data points in the study which have been arrived at by multiplying 49 items or questions (excluding demographic items) with 248 cases (responses). Out of the total 10,186 data points none was found to be missing. Although there is a general recommendation of replacement of missing values in as much as the responses missing is 5% and below, as this is considered an insignificant amount in comparison to the overall responses (Tabachnick & Fidell, 2007), however, this is not an issue in this study as the study has no missing value. Table 6.2 presents the missing value analysis confirming that none of the values was missing in the dataset.

Table 6.2- Missing Value Analysis (Source: Authors creation)

Constructs	**Values Missing**
Mobile-based Financial Services Usage	0
Web-based Financial Services Usage	0
ATM-based Financial Services Usage	0
POS-based Financial Services Usage	0
Money Laundering Exposure	0
Financial Regulation	0
Financial Literacy	0
Total Data Points (41 Questions x 249 Responses)	**10,168**
Missing Value	**0**
Percentage	**0%**

The implication of this is that the respondents fill all the questions within valid questions with no questions remaining unanswered. The suggestion within the literature is that existence of the many

unanswered questions within a particular questionnaire which is more than 5% indicates the need to drop such questions from the analysis (Tabachnick & Fidell, 2007). Thus, in this study having no missing values indicates that all questionnaires are valid for inclusion in the data analysis.

6.2.3 Demographic Profile of Respondents

The demographic analysis presented here consists of all the demographic profiles of the respondents contained in the research questionnaire including location, gender, age, occupation, and education. This is presented in Table 6.3 below.

Table 6.3- Demographic Profile of the Respondents (Source: Authors creation)

Demographic Information	**Frequency**	**Percentage**
Location		
FCT Abuja	133	53.6%
Northcentral States	4	1.6%
Northeastern States	58	2%
Northwestern States	67	27%
Southeastern States	3	1.2%
South-southern States	2	0.8%
Southwestern States	34	13.7%
Total	**248**	**100%**
Gender		
Male	129	52%
Female	119	48%
Total	**248**	**100%**
Age		
30 Years and Below	80	32.3%
31 to 40 Years	92	37.1%
41 to 50 Years	59	23.8%
Above 50 Years	17	6.9%
Total	**248**	**100%**
Occupation		
Self-employed	62	25%
Employed	170	68.5%

Others	16	6.5%
Total	**248**	**100%**
Education		
PhD	18	7.3%
Masters' Degree	128	50.8%
First Degree	92	37.1%
Diploma/NCE/Equivalent	10	4.0%
Others	2	0.8%
Total	**248**	**100%**

The analysis of the demographic profile of the respondents in Table 6.3 revealed that the majority of the respondents are domiciled within the Federal Capital Territory (FCT) of Nigeria, which is Abuja, this accounts for 53% of the respondents. The remaining respondents are domiciled in northcentral, northeast, northwest, southeast, south-south and southwestern states which account for; 1.6%, 2%, 27%, 1.2%, 0.8%, and 13.7%, respectively. In terms of gender, the majority of the respondents are male which accounts for 52% of the respondents while the rest are female which accounts for the remaining 48% of the respondents.

In terms of the ages of the respondents, those within the age bracket of 31 to 40 years constitute the largest proportion of the respondents which accounts for 37.1% of the respondents, this is followed by those within the ages of 30 years and below which constitute about 32.3%. Those between the ages of 41 to 50 years constitute about 23.8%. The least are those within the age of 51 years and above which constitutes only 6.9% of the respondents. For the type of occupation of the respondents, about 25% of the respondents are self-employed, 68.5% are employed individuals whether by private or public sector institutions while the remaining 6.5% are either students or unemployed.

In terms of qualifications, only 7.3% of the respondents have a PhD, while 50.8% of the respondents have master's degrees in addition to their bachelor's degrees and HNDs, 37.1% have either first degree or a Higher National Diploma (HND), 4.0% of the respondents have either diploma or National Certificate of Education (NCE) while the remaining 0.8% have other forms of certifications.

6.2. Outliers

According to Aggarwal and Yu (2001), an outlier is a data point whose value differs significantly with the rest of the data based on certain criteria. The existence of an outliner within a dataset can potentially distort t-statistics for the estimators, thus, rendering the results of the study meaningless for practical

applications. To address the issues of outlier, two measures are proposed to detect them using both univariate and multivariable outlier's analysis.

For the analysis of univariate outliers, Tabachnick and Fidell's (2007) recommended the use of cut-off values of ± 3.29 ($p < .001$). In line with this recommendation none of the respondents was found to be an outlier within the entire dataset. In consideration of the absence of univariate outliers, an attempt was made to examine the multivariate outliers, this was carried out using the Mahalanobis distance (D^2) (Afzal, et al., 2021). This has been defined as "the distance of a case from the centroid of the remaining cases where the centroid is the point created at the intersection of the means of all the variables" (Tabachnick & Fidell, 2007:74). Therefore, based on 41 observed variables of the study, the chi-square revealed the value 63.69 ($p = .01$). Thus, using this threshold value, none of the responses within the dataset was found to be a multivariate outlier. Hence, having found no single outlier among the dataset, the final data remained 248 cases.

6.2.2.1 Descriptive Statistics of the Study's Variables

The analysis of descriptive statistics in this section is limited to the latent construct which was measured using the Likert scale. Demographic variables are not included here because they are categorical. For instance, a gender is 1 for male and 2 for female, so will not have an average or mean between male and female. In the case of the latent variable, minimum, maximum, mean and standard deviation values were computed because they were measured using a Likert scale of 1 to 5; in which 1 = strongly disagree, 2=disagree 3= neutral, 4= agree and 5 = strongly agree. To facilitate the interpretation of the descriptive analysis, the 5-point scale was divided into three categories: low, moderate, and high. Scores below 3 were categorized as low, scores above 3.5 were categorized as high, and scores falling in between were categorized as moderate. The descriptive statistical results are presented in Table 6.4.

Table 6.4- Descriptive Statistics of the Latent Variables (Source: Authors creation)

Constructs	N Statistic	Minimum Statistic	Maximum Statistic	Mean Statistic	Std. Deviation Statistic
Mobile-based Financial Services Usage	248	1	5	3.86	.903
Web-based Financial Services Usage	248	1	5	3.64	.972

ATM-based Financial Services Usage	248	1	5	3.88	.915
POS-based Financial Services Usage	248	1	5	3.62	.991
Money Laundering Exposure	248	1	5	3.17	.925
Financial Literacy	248	1	5	3.60	.910
Financial Regulation	248	1	5	3.44	.957

From Table 6.4 above, the mean statistics of the latent constructs range between 3.88 and 3.17. In specific, the mean value of Mobile-based Financial Services Usage was 3.86 while the standard deviation was .903, which indicates that the respondents have high agreement with the questions relating to Mobile-based Financial Services Usage. Web-based Financial Services Usage has a mean value of 3.64 and a standard deviation of .972 which also depicts that the respondents have high agreement concerning the questions asked about Web-based Financial Services Usage. ATM-based Financial Services Usage has a mean score of 3.88 and a standard deviation of .915 which shows that the respondents have high agreement to the questions relating to the ATM-based Financial Services Usage. Similarly, the mean scores of POS-based Financial Services Usage were 3.62 and a standard deviation of .991 implying that the respondents have a high agreement concerning the questions asked about the POS-based Financial Services Usage. The mean score of financial literacy, 3.60, and the standard deviation, also .910, implied also that the respondents agreed with the questions asked for it. Differently, the mean scores of money laundering exposure were 3.17 and the standard deviation was also .925, indicating that the respondents agreed with the questions asked about it. Lastly, the mean score of financial regulation was 3.44 and the standard deviation was .957, this also indicates that the respondents have a moderate agreement with the questions asked concerning financial regulations.

6.2.2.2 Independent Sample t-test for Non-response Bias

In research work, it is often impracticable for respondents to all respond within reasonably the same time. Some respondents need follow-up in order to answer the questionnaire. This variation in the response time brings about the definition of early and late responses, thus, the need to raise an important question of response bias due to follow up with the late respondents. Hence, the non-response bias is characterized by the variations in responses between respondents who reply early and those who reply later, as defined by Lambert and Harrington (1990).

In line with the project plan, the data collection was scheduled to be finished within a three-month timeframe, aiming to obtain 384 responses from the total of 510 questionnaires distributed. However,

after the planned period of three months, only 144 responses were obtained, hence, the need for follow-ups to optimize the response rate. In line with these, an additional two months were slated for follow-ups through frequent reminders via social media and sometimes phone calls. Therefore, the extended period, associated with constant reminders and follow-ups, was considered to potentially be associated with bias in responses. To address this concern, the study follows the recommendation of Armstrong and Overton (1977), which suggest for comparison of early and late responses.

Specifically, Armstrong and Overton (1977) recommend for those responses to be classified into two groups of early and late responses. Therefore, in line with this recommendation, the responses collected within the first three months which were 144 were categorized as early responses, while the responses collected within the additional two months after follow-up which were 104 are categorized under late responses. Armstrong and Overton (1977) also recommend an independent sample t-test in conducting the non-response bias test for early and late responses among the dependent and independent variables. The result of this is presented in Table 6.5:

Table 6.5- Non-Response Bias Test (Source: Authors creation)

Constructs	Response	N	Mean	F	Sign
Mobile-based Financial Services Usage	Early	144	3.83	.478	.490
	Late	104	3.90		
Financial Literacy	Early	144	3.56	.806	.370
	Late	104	3.67		
Web-based Financial Services Usage	Early	144	3.61	3.784	.053
	Late	104	3.69		
ATM-based Financial Services Usage	Early	144	3.88	.031	.860
	Late	104	3.89		
POS-based Financial Services Usage	Early	144	3.59	.169	.682
	Late	104	3.67		
Money Laundering Exposure	Early	144	3.14	.679	.411
	Late	104	3.21		
Financial Regulation	Early	144	3.40	.088	.767
	Late	104	3.50		

The t-tests conducted in Table 6.5 above were used to analyze the independent samples' results. The analysis showed that there were no significant differences in variances and means between early and

late responses. The t-test (sig. 2-tailed) with a significance level of .05 or higher indicated that there was no statistically significant distinction between the means of the early and late responses (Pallant, 2011). Essentially, this means that non-response bias was not a concern in this study, as none of the variables considered had a significant variance at the 0.05 level (Danielsen, K., Iversen, & Holmboe, 2015).

6.2.2.3 Normality Test

The assumption of normality has long been a fundamental aspect of multivariate analysis (Tabachnick & Fidell, 2007). Traditionally, it was believed that statistical estimates from PLS path modelling could still be accurate even when non-normal datasets were used (Wetzels, Odekerken-Schroder, & Van Oppen, 2009). However, this traditional assumption has been challenged due to the recognition that bootstrapped standard error estimates can be greatly inflated by non-normal data that is skewed or kurtotic in nature (Hair, Hult, Ringle, & Sarstedt, 2013). Consequently, this can have a significant impact on the statistical estimation of PLS-SEM path coefficients used in testing research hypotheses (Ringle, Sarstedt, & Straub, 2012). Therefore, Hair et al. (2012) recommend that researchers utilizing PLS-SEM as their analytical tool should continue to assess the normality of the data using Skewness and Kurtosis tests before conducting the main analysis to ensure the data meets the assumption of normality.

Although, besides the normality test using skewness and kurtosis of the data, other tools of testing normality such as the Kalmogorov-Smirnov test and the Shapiro-Wilk test have been used among researchers, however, Hair et al. (2013) cautioned that these approaches offer limited guidance on normal distribution of data. Thus, the key recommendation remains that skewness and kurtosis are the best methods of testing the normality of the data when PLS-SEM is deployed as the tool of data analysis in a study.

Therefore, consistent with the current trend in the application of PLS path modelling among researchers, a normality test was conducted using skewness and kurtosis. The essence is to ensure that the data is normal so that statistical accuracy of path coefficient estimations can be established. Table 6.6 presents the results of skewness and kurtosis for testing the normality of the data.

Table 6.6- Skewness and Kurtosis for Normality Tests (Source: Authors creation)

	N	Skewness		Kurtosis	
Constructs	Statistic	Statistic	Std. Err	Statistic	Std. Error

Mobile-based Financial Services Usage	248	-1.522	.155	2.368	.308
Web-based Financial Services Usage	248	-1.037	.155	.772	.308
ATM-based financial Services Usage	248	-1.255	.155	1.646	.308
POS-based Financial Services Usage	248	-.818	.155	.253	.308
Money Laundering Exposure	248	-.342	.155	-.565	.308
Financial Literacy	248	-1.173	.155	.883	.308
Financial Regulation	248	-.653	.155	.086	.308

Table 6.6 above revealed that that data met an acceptable threshold of skewness and kurtosis as suggested by West, Finch, and Curran (1996) who suggested that the skewness should not be greater than 2 while kurtosis should not be greater than 7. Therefore, it can be concluded that the data is normal for PLS-SEM analysis as none of the variables exceed the threshold suggested.

6.2.2.4 Multi-collinearity

Multicollinearity is another important precondition for multivariate analysis (Tabachnick & Fidell, 2007). This measure requires that two independent variables within the research model should not have a high level of correlation. The implication of two variables having a high level of correlation is that they are doing the same job in the research model, which in essence can distort the statistical estimates of a regression model as well as the statistical significance of the path co-efficient (Tabachnick & Fidell, 2007).

Two different approaches have been proposed for evaluating normality in the context of PLS path modelling. These approaches are tolerance and the Variance Inflation Factor (VIF) (Hair et al., 2013). Tolerance is the variance explained by an exogenous variable not accounted for by any other exogenous variable in the model. On the other hand, VIF is the reciprocal of tolerance (Hair et al., 2013; Hair et al., 2021; Hair et al., 2022). According to Hair et al. (2013), the recommended threshold for tolerance is a value of .20 or lower, while for VIF it is a value of 5 or higher. Deviating from these thresholds may indicate potential issues with multicollinearity. Therefore, the results of multicollinearity using both tolerance and VIF values are presented in Table 6.7.

Table 6.7- Tolerance and VIF for Collinearity Diagnostics (Source: Authors creation)

Constructs	Collinearity Statistics	
	Tolerance	VIF
Mobile-based Financial Services Usage	.456	2.192
Web-based Financial Services Usage	.554	1.806
ATM-based Financial Services Usage	.381	2.626
POS-based Financial Services Usage	.519	1.928
Financial Literacy	.958	1.043
Financial Regulation	.752	1.331

Table 6.7 revealed that multi-collinearity is not an issue in this study as all the variables met the recommended cut-off values for both tolerance and VIF. Specifically, none of the values for tolerance is below 0.20 for all the variables, so also none of the variables has a value for VIF above 5. The mobile-based financial services have tolerance of 0.456 and VIF of 2.192, the web-based financial services have a tolerance of 0.554 and VIF of 1.806, the ATM-based financial services have tolerance of 0.381 and VIF of 2.626, POS-based financial services has a tolerance of 0.519 and VIF of 1.928, the financial literacy has a tolerance of 0.958 and VIF of 1.043 and lastly the tolerance of financial regulation was 0.752 and VIF of 1.331. This implied that the values for tolerance and VIF met the threshold recommended by Hair et al. (2013) for all the independent variables of the study.

6.2.3 Partial Least Square Structural Equation Modelling Result (PLS-SEM)

As stated in the methodology, the analysis using PLS-SEM was undertaken using the two-step process recommended by Henseler, Ringle, and Sinkovics (2009). These are the measurement model and structural model. The measurement model is used to evaluate the instruments' reliability and validity and the overall quality of the measures, while the structural model is used to test the hypotheses of the study and the fitness of the model.

6.2.3.1 Measurement Model Results

Giving the fact that the independent variable – Financial Technology (Usage has four dimensions; Mobile-based Financial Services Usage, Web-based Financial Services Usage, ATM-based Financial Services Usage and POS-based Financial Services Usage which formed the FINTECT Usage, while other variables in the model are all reflective, the measurement model consists of both formative and

reflective constructs. This means that four dimensions of the FinTech Usage; Mobile-based Financial Services Usage, Web-based Financial Services Usage, ATM-based Financial Services Usage and POS-based Financial Services Usage have reflective indicators, and eventually these four dimensions formed the FinTech Usage, which makes FinTech Usage a formative construct. In essence, there are seven reflective constructs; four dimensions of FinTech Usage; the financial literacy, the financial regulation and money laundering exposure, while FinTech Usage remains the only formative construct. Therefore, the measurement of both reflective and formative constructs will be evaluated in this study.

6.2.3.1.1 Reflective Measurement Model

A reflective PLS-SEM measurement model is typically assessed based on four criteria (Hair et al., 2012, Hair et al., 2011, Hair et al., 2013, Hair et al., 2021, Hair et al., 2022, Fornell and Larcker, 1981). The first criterion involves evaluating the reliability of indicators by applying a cutoff value of ≥.70. However, indicators with loadings of ≥.40 may be retained if other criteria are met. The second criterion involves assessing the internal consistency reliability using composite reliability scores of ≥.70. The third criterion involves evaluating the convergent validity using Average Variance Extracted (AVE) scores of ≥.50. The last criterion involves assessing the discriminant validity, which is commonly done using the Heterotrait-Monotrait Ratio (HTMT) along with other criteria such as cross-loading and Fornell and Larcker (1981). The criteria for evaluation require the use of the squared root of AVE. This approach is commonly referred to as the Fornell-Larcker Criterion. The results of the first three criteria are presented in Table 6.8 below.

Table 6.8- Indicator Loading, Composite Reliability and Average Variance Extracted (AVE) (Source: Authors creation)

Constructs	Items	Loadings	Composite Reliability	AVE
ATM-based Financial Services Usage	ATM1	0.907	0.91	0.66
	ATM2	0.750		
	ATM3	0.692		
	ATM4	0.835		
	ATM5	0.873		
Financial Literacy	FL1	0.725	0.93	0.74
	FL2	0.918		
	FL3	0.856		

	FL4	0.927		
	FL5	0.861		
Financial Regulation	FR1	0.786	0.93	0.72
	FR2	0.832		
	FR3	0.876		
	FR4	0.860		
	FR5	0.883		
Mobile-based Financial Services Usage	MB1	0.899	0.90	0.66
	MB2	0.601		
	MB3	0.731		
	MB4	0.877		
	MB5	0.902		
Money Laundering Exposure	MLE1	0.665	0.93	0.57
	MLE10	0.809		
	MLE11	0.817		
	MLE2	0.670		
	MLE3	0.490		
	MLE4	0.639		
	MLE5	0.826		
	MLE6	0.817		
	MLE7	0.833		
	MLE8	0.821		
	MLE9	0.798		
POS-based Financial Services Usage	POS1	0.812	0.92	0.71
	POS2	0.847		
	POS3	0.762		
	POS4	0.870		
	POS5	0.904		
Web-based Financial Services Usage	WB1	0.852	0.92	0.70
	WB2	0.748		
	WB3	0.798		
	WB4	0.869		
	WB5	0.901		

6.2.3.1.1.1 Indicator Reliability

Evaluation of indicator reliability has been considered as the first step in assessing reflective measurement model in PLS-SEM analysis (Hair Jr, et al., 2021). This involves the examination of how much variance of an indicator is explained by its latent construct, thus, a higher variance explained, signifies the indicator reliability. Hair Jr, et al., (2021) further explained that to compute variance of an indicator explained by its latent construct, indicator loading need to ne squared, giving a bivariate correlation between indicator and its construct. Simply put, the indicator reliability is simply its communality. The common threshold used in measuring the reliability of an indicator is the indicator loading, which is required to be above 0.708 (Hair Jr, et al., 2021). However, loadings of ≥.40 can only be deleted, if its deletion can lead to an increase in AVE, otherwise, it can be retained within the measurement model (Hair et al., 2011). When this threshold is achieved, it indicates that the construct explains more than 50 per cent of the variance of an indicator, thereby providing an acceptable level of indicator reliability (Hair Jr, et al., 2021). The results are provided in Figure 6.1 and Table 6.8 below.

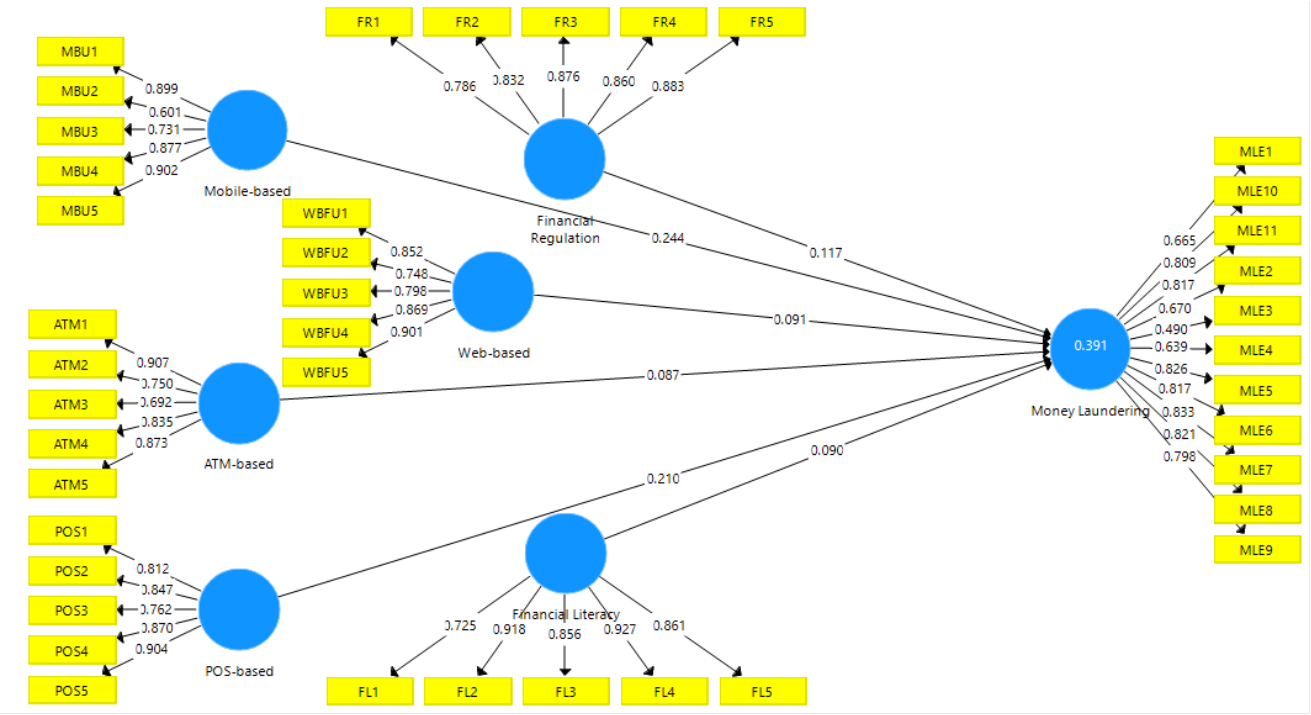


Figure 6.1: Reflective Measurement Model (Source: Authors creation)

The indicator loadings in Figure 6.1 and Table 6.8 above revealed that all the indicators of reflective constructs achieved an acceptable level of indicator reliability as none is below the minimum cut-off

value of 0.40 as suggested by Hair, et al., (2011), in fact most of the indicators met the requirement of 0.708 suggested by Hair Jr, et al., (2021). Specifically, the loadings for money laundering exposure ranged from 0.490 to 0.833, that of financial regulation ranged from 0.786 to 0.883, that of financial literacy ranged from 0.725 to 0.921, while those of the FinTech dimensions including Mobile-based financial services Usage that ranged from 0.601 to 0.902, Web-based financial services Usage ranged from 0.748 to 0.901, ATM-based financial services Usage ranged from 0.692 to 0.907 and lastly POS-based financial services Usage which ranged from 0.762 to 0.904 respectively. In essence, none of the indicator fall below the minimum cut-off value of 0.40 Hair, et al., (2011).

6.2.3.1.1.2 Internal Consistency Reliability

Assessment of internal consistency reliability is the second step in the reflective measurement model. Internal consistency is considered as the degree to which indicators work together in measuring a construct (Hair Jr, et al., 2021). For researchers that deployed PLS-SEM as an analytical tool, the commonly recommended measure of internal consistency reliability is Jöreskog's (1971) composite reliability. The common agreement among researchers is that higher values for the composite reliability depict better reliability(Hair Jr, et al., 2021). For example, in exploratory studies, values ranging from 0.60 to 0.70 are considered acceptable, while values ranging above 0.70 are considered good, whereas values above 0.95 are considered problematic, due to the tendency of rendering indicators redundant, with much likelihood to affect construct validity (Hair Jr, et al., 2021).

Furthermore, apart from the composite reliability, another indicator of internal consistency reliability is Cronbach's alpha. It is worth noting that the cut-off value for Cronbach's alpha is identical to that of the composite reliability. Nevertheless, when it comes to PLS-SEM, the evaluation of internal consistency reliability places less emphasis on Cronbach's alpha. This is primarily due to the assumption made by Cronbach's alpha that the indicator loadings are uniform across the entire population (Hair Jr, et al., 2021).

Hence, as a result of the limitations of Cronbach's alpha in evaluating internal consistency reliability, this study utilized composite reliability to assess internal consistency reliability. As shown in Table 6.8, all the composite reliability values fall within the acceptable threshold of 0.70 and above, with none reaching the problematic level of 0.95 (Hair, et al., 2021). Specifically, the composite reliability for ATM-based financial services Usage was 0.91, financial literacy was 0.93, financial regulation was 0.93, mobile-based financial services Usage was 0.90, money laundering exposure was 0.93, POS-based financial services Usage was 0.92, and Web-based financial services Usage was 0.92. In

conclusion, all the variables have achieved an acceptable level of composite reliability, confirming the internal consistency reliability of the measures.

6.2.3.1.1.3 Convergent Validity

Assessment of convergent validity is the third criteria for the evaluation of reflective measurement model. Convergent validity measures the extent to which construct converged together in explaining the variance of its associated indicator (Hair, et al., 2021). The common measure used in the evaluation of convergent validity is the Average Variance Extracted (AVE) of all indicators associated with a given construct. AVE is calculated as the summed total of squared loadings divided by the number of indicators (Hair, et al., 2021). In a much simpler term, AVE is similar to the commonality of a construct. The commonly acceptable threshold for the AVE is 0.50 and above, when this is achieved, it means that the construct explains more than 50% of the variance of its indicators (Hair et al., 2022). In this study, the result in Table 6.8 revealed that all the constructs achieved an acceptable level of convergent validity as the AVEs of all the constructs exceeded the minimum threshold of 0.5. The lowest was 0.57 for money laundering exposure while the highest was 0.74 for financial literacy. This, in essence, signifies that all the variables explain more than 50% of their associated indicators, depicting a strong level of convergent validity.

6.2.3.1.1.4 Discriminant Validity

Assessment of discriminant validity is the fourth step in the evaluation of the reflective measurement model. This criterion measures the degree to which a particular construct is empirically different from other constructs within the structural model of a study. The approach of assessing discriminant validity was proposed by Fornell and Larcker (1981), which requires that the squared root of AVE of a given construct should be higher than its squared correlation with any other given construct within the structural model (Fornell & Larcker, 1981). This approach is known as Fornell and Larcker's (1981) criterion. In addition to the criterion proposed by Fornell and Larcker (1981), researcher also deployed cross-loading (Hair, et al, 2011), which requireds that the laodings of a given construct should be higher than its cross-loading.

However, recently it was argued that the above metrics are not suitable for assessing discriminant validity when PLS-SEM is in use (Henseler, Ringle, & Sarstedt, 2015). The key argument by Henseler, et al., (2015) was thatthe Fornell–Larcker criterion has limited power in distinctively differentiating constructs especially in instances where the indicator loadings of constructs in question differ only

slightly. This argument was made on the basis of inability of Fornell–Larcker criterion to differentiate all indicator loadings are between 0.65 and 0.85).

As an alternative to Fornell–Larcker criterion, the heterotrait–monotrait ratio (HTMT) was recommended by Henseler et al., (2015) for the assessment of discriminant validity. The HTMT has been considered as "the mean value of the indicator correlations across constructs (i.e., the heterotrait–hetero method correlations) relative to the (geometric) mean of the average correlations for the indicators measuring the same construct (i.e., the monotrait–hetero method correlations)" (Hair, et al., 2021:79). In relation to HTMT, the problem of discriminant validity exists at the presence of high HTMT values. In specifics, Henseler et al. (2015) suggest a threshold of 0.90, thus, in a structural model, constructs with HTMT values above the recommended threshold are conceptually very similar. Therefore, any construct with HTMT value above 0.90 can be said to lack discriminant validity. This means that constructs that are conceptually distinct should have HTMT values of 0.85 and below (Henseler et al., 2015). Table 6.9 presents the HTMT results.

Table 6.9- Discriminant Validity [Heterotrait-Monotrait Ratio (HTMT)] (Source: Authors creation)

Constructs	ATM-based	Financial Literacy	Financial Regulation	Mobile-based	Money Laundering	POS-based	Web-based
ATM-based							
Financial Literacy	0.15						
Financial Regulation	0.51	0.15					
Mobile-based	0.79	0.19	0.47				
Money Laundering	0.53	0.19	0.40	0.57			
POS-based	0.76	0.14	0.42	0.67	0.52		
Web-based	0.69	0.08	0.45	0.67	0.46	0.55	

From Table 6.9, it is evident that the HTMT values of all the constructs are less than cut-off value of 0.90, which suggests that they all achieved the acceptable level of discriminant validity as Henseler et al., (2015) recommended that any construct with HTMT value of 0.85 and below could be said to have achieved the discriminant validity requirement.

6.2.3.1.2. Formative Measurement Model

It can be recalled that, the three hypotheses of the study are in relation to FinTech which has four dimensions including mobile-based financial services Usage, web-based financial services Usage, ATM-based financial services Usage and POS-based financial services Usage that formed the construct. This is essence bring about the assessment of formative measurement model. Therefore, Hair et al. (2021) proposed three criteria to evaluate the formative measurement model. These criteria include assessing the convergent validity, addressing collinearity issues, and determining the significance and relevance of the formative indicators. The subsequent sub-sections delve into a detailed discussion of these criteria.

6.2.3.1.2.1 Convergent Validity of Formative Measurement Model

The initial step in evaluating a formative measurement model is to assess convergent validity. Convergent validity in formative measurement models is defined as the level of correlation between the construct being measured formatively and the reflectively measured variable(s) of the same concept. This method, also known as redundancy analysis, was introduced by Chin (1998) and is widely accepted in the field (Hair, et al., 2021). Researchers like Cheah, et al. (2018) recommend that researchers planning to use this method should incorporate an alternative measure of the formative construct in their research questionnaire. Alternatively, a single global item that captures the essence of the construct can be used as an alternative measure (Sarstedt, et al., 2016). Additionally, Hair et al. (2022) proposed a simpler approach, suggesting that the correlation between the formatively measured construct and reflectively measured item(s) should be 0.708 or higher. This indicates that the construct explains more than 50% of the variance of its alternative measure.

To achieve this, a correlation analysis was performed between the formatively measured construct and reflectively measured items, an alternative measure of FinTech Usage. The result revealed that all the dimensions with reflective measures explained more than 50% of the variance of FinTech Usage. The result is presented in Table 6.10 below.

Table 6.10- Convergent Validity of Formative Measurement Model (Source: Authors creation)

Constructs	FinTech	Mobile	Web	ATM	POS
FinTech	1				
Mobile-based Financial Services Usage	.846**	1			

Web-based Financial Services Usage	.805**	.592**	1		
ATM-based Financial Services Usage	.879**	.683**	.606**	1	
POS-based Financial Services Usage	.822**	.579**	.491**	.668**	1

The result in Table 6.10 above revealed that the requirement for the convergent validity of the formative measurement model has been met as all the reflectively measured items (mobile-based financial services Usage, web-based financial services Usage, ATM-based financial services Usage and POS-based financial services Usage have a correlation above the minimum recommended threshold of 0.708 with the formatively measured construct (FinTech Usage). Specifically, the correlation ranged between 0.822 and 0.879. This implies that the reflectively measured items explain more than 50% of the variance of the alternatively measured formative construct (FinTech Usage).

6.2.3.1.2.2 Assessment of Collinearity

Assessment of collinearity issue is the second criterion for the assessment of formative measurement model. Empirically, collinearity occurs in a situation where high correlation exists between two or more indicators in a formative measurement model (Hair, et al., 2021). Existence of high correlation signifies the increase in the standard error of the weights of indicator, leading to type II errors, that is false negatives. In a situation where there is high level of collinearity, such even increases the chances of changes in the signs of indicator weights, such that the interpretation of the statistical values becomes cumbersome (Hair, et al., 2021). For instance, such a sign change can result in a situation where a highly performed company to be interpreted as a poorly performed enterprise due to the negative weight in an indicator.

Empirically, the common standard metric used in assessing the collinearity among indicators of a formative construct is Variance Inflation Factor (VIF). The commonly accepted maximum cut-off value for VIF among the researchers that use PLS-SEM is value below 5. This implies that VIF values of 5 or above are an indication of collinearity problems. To overcome the issue of collinearity when it happens in a researcher, Hair et al. (2022) recommended that the elimination of one of the highly correlated indicators or merging the two indicators to establish a new indicator that explains the domains of the merged indicators.

Therefore, in assessing whether collinearity exists among the four dimensions of FinTech Usage as a formative construct, VIF was deployed in line with Hair's suggestion, et al (2021). The result in Table 6.11 revealed that all the four indicators of FinTech Usage have VIF below the maximum cut-off value of 5, which signifies that collinearity is not an issue with respect to the four indicators

Table 6.11- Assessment of Collinearity of between Formative Indicators (Source: Authors creation)

FinTech Formative Indicators	VIF
ATM-based Financial Services Usage	2.66
Mobile-based Financial Services Usage	2.25
POS-based Financial Services Usage	1.97
Web-based Financial Services Usage	1.77

6.2.3.1.2.3 Significance and Relevance of the Formative Indicators

Assessment of the significance and the relevance of the formative indicators is the third step in the evaluation formative measurement model. This criterion requires the examination of the level of statistical significance and relevance (i.e., size) of the weights of the formative indicators (Hair, et al., 2021). This is carried-out by regressing the formatively measured construct on its indicators. The essence of this regression is to estimate the relative importance of each of the indicators in forming the construct. The approach used in testing the significance of the indicator weights is bootstrapping procedure, it is undertaken through the derivation of standard errors without necessarily relying on any distributional assumptions (Hair, et al., 2014). The bootstrapping result is assessed using the t-values at significant value of significance level of 5% for a t-value above 1.96 (two-tailed test) or significance

levels of 1%, and even 10% probabilities based on t-value above 2.576 and 1.645 (two tailed), respectively. The result of this approach is presented in Table 6.12 and Figure 6.2, respectively

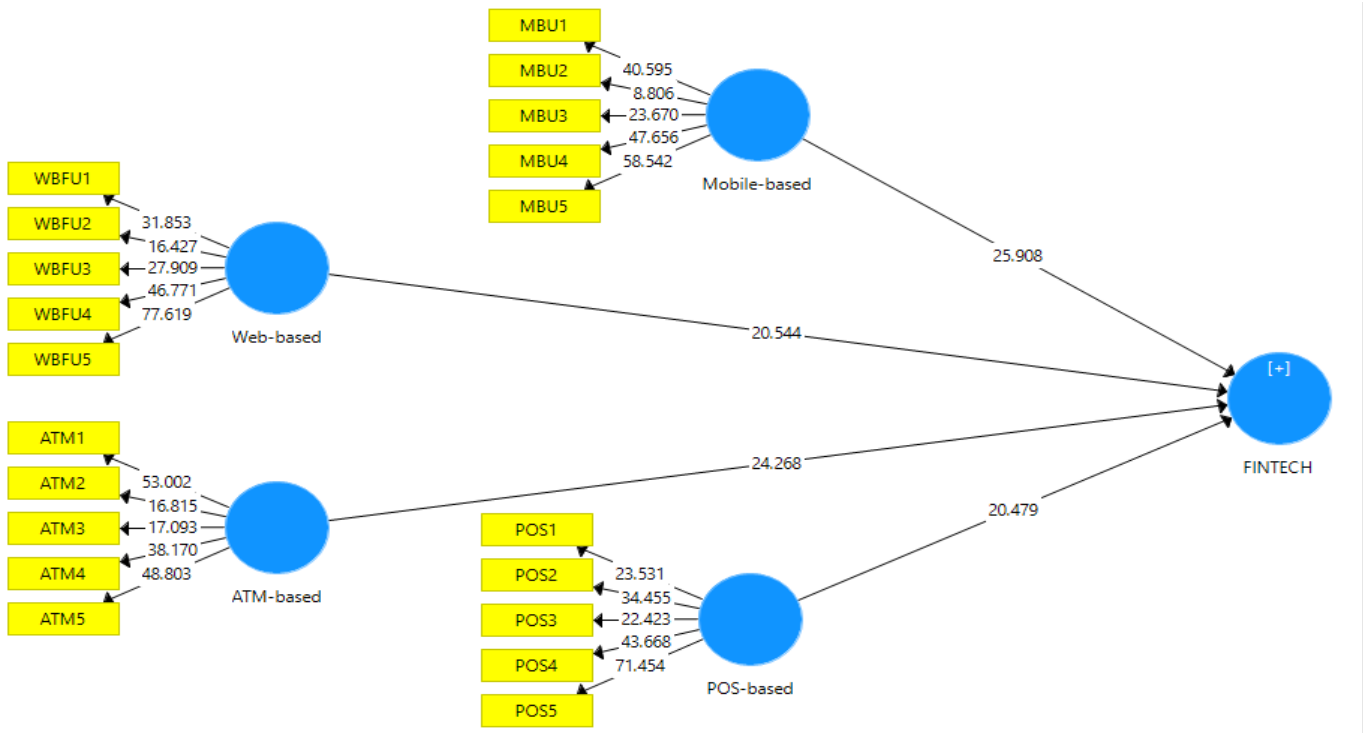


Figure 6.2: Significance of Path-Coefficients of Formative Indicators of FinTech Usage (Source: Authors creation)

Table 6.12- Assessment of Significance of Path Coefficients of Formative Indicators (Source: Authors creation)

Formative Relationship	Beta	SE	T Statistics	P Values
ATM-based Financial Services Usage -> FinTech Usage	0.31	0.01	24.27	0.00
Mobile-based Financial Services Usage -> FinTech Usage	0.29	0.01	25.91	0.00
POS-based Financial Services Usage -> FinTech Usage	0.30	0.01	20.48	0.00
Web-based Financial Services Usage -> FinTech Usage	0.29	0.01	20.54	0.00

The results in Table 6.12 and Figure 6.2 above revealed that all four formative indicators of FinTech Usage including ATM-based Financial Services Usage, Mobile-based Financial Services Usage, POS-based Financial Services Usage and Web-based Financial Services Usage are significant and relevant

in forming the construct. Specifically, the relationship between ATM-based Financial Services Usage and FinTech Usage is found to be significant (t-value = 24.27) which is beyond the minimum cut-off value of t-value =2.576 significance level at 1%, this implies that ATM-based Financial Services Usage is relevant in forming FinTech Usage as a formative construct. The relationship between Mobile-based Financial Services Usage and FinTech Usage was also found to be significant (t-value = 25.91) which is beyond the recommended threshold of t=2.576 significance level at 1%, which also confirmed that Mobile-based Financial Services Usage is significant in forming FinTech Usage as a formative construct. Likewise, the relationship between POS-based Financial Services Usage and FinTech Usage was also found to be significant (t-value = 20.48), beyond the minimum cut-off value of 2.576 significance level at 1%, which also confirmed that POS-based Financial Services Usage is relevant in forming FinTech Usage as a formative construct. Lastly, the relationship between Web-based Financial Services Usage and FinTech Usage was also found to be significant (t-value = 20.54), which is beyond the minimum cut-off value of 2.576 significance level at 1%. This implies that Web-based Financial Services is relevant in forming FinTech Usage as a formative construct.

6.2.3.2 Structural Model Results

After assessing both reflective and formative measurement models, the researcher proceeds to evaluate the PLS-SEM structural model based on four criteria, as suggested by Henseler et al. (2009), Hair et al. (2011), Hair et al. (2021), and Hair et al. (2022). The assessment of the PLS-SEM structural model involves five criteria, in accordance with the recommendation of Hair et al. (2021) and Hair et al. (2022). The first criterion involves examining the collinearity among the predictor variables, namely FinTech Usage, Financial Literacy, and Financial Regulations. The second criterion entails evaluating the significance of path coefficients using 5000 bootstrapped samples and the number of valid samples from the distributed questionnaires. This step enables the testing of research hypotheses. The third criterion focuses on evaluating the coefficient of determination (R-squared) using predefined thresholds proposed by Hair et al. (2011), Hair et al. (2021), and Hair et al. (2022). These thresholds classify R-squared values of .25, .50, and .75 as small, moderate, and substantial, respectively. The fourth criterion involves assessing the effect size of each independent variable on the dependent variable individually. This assessment utilizes suggested cutoff values of F-squared (f^2) ranging from .02, .13, and .35, which were recommended by Cohen (1988) to represent small, medium, and large effects, respectively. The final criterion for evaluating the structural model is the assessment of its predictive relevance, as recommended by Gaisser (1974) and Stone (1974). This assessment utilizes construct-cross validated redundancy (Q^2), where any model with a Q^2 value above zero is considered

to have predictive relevance, as stated by Hair et al. (2011), Hair et al. (2016), Hair et al. (2021), and Hair et al. (2022).

6.2.3.2.1 Evaluation of Structural Model for Potential Collinearity

In line with the guideline given by Hair, et al. (2021), assessment of potential collinearity among the predictors is the first criterion in the evaluation of PLS-SEM structural model regression. This is given the fact that the structural model relationship is derived based on the coefficients used in estimating the regression equations, on this basis, there could be the likelihood for the standard errors of estimates to be biased by depicting strong correlations among the predictors, this in essence brings about the need to examine the predictors for potential collinearity (Sarstedt & Mooi, 2019).

It is important to note that this process is like what has been performed for the formative measurement model, however, in this case, the concern is on the main constructs, not the dimension since the hypotheses of the study are centred on it instead of the dimensions. Therefore, the VIF analysis was conducted for the examination of potential collinearity between FinTech Usage, Financial Literacy and Financial Regulation. The result is presented in Table 6.13.

Table 6.13- Collinearity Assessment of the Structural Model (Source: Authors creation)

Constructs	VIF
FinTech Usage	1.96
Financial Literacy	1.04
Financial Regulation	1.31

From Table 6.13 the VIF for the three predictor variables are 1.96, 1.04, and 1.31, respectively. This implied that collinearity is not an issue in this study since the VIF of all the predictors is below 5. It can be recalled that Hair et al. (2021) suggested that VIF values of 5 and above indicate a probable collinearity issue among the predictor variables in a structural model.

6.2.3.2.2 Evaluation of the Significance of Path Coefficients for Hypotheses Testing

Assessment of the significance of PLS-SEM path coefficient for testing the research hypotheses is the second criteria for the evaluation of PLS-SEM structural model. This is also similar to the assessment of significance and relevance of path-coefficients for testing the importance of formative indicators in forming a formative construct. The approach was performed through bootstrapping of standard errors,

which served as a basis for computing t-values of path coefficients, or on the alternative, the computation of confidence intervals (Streukens & Leroi-Werelds, 2016). The criterion for assessment is that a path coefficient is considered significant at the 5% level, provided that no value zero that falls within the confidence interval of 95%. Normally, the percentile method is commonly applied in the construction of the confidence intervals (AguirreUrreta & Rönkkö, 2018).

(Hair, et al. 2021) further explained that the relevance of the path coefficients falls usually between the values of −1 and +1, where path coefficients which are closer to −1 are considered as strong negative relationships while those falling closer to +1 are regarded as strong positive relationships. (Hair, et al. 2021) further noted that values could fall far below −1 and above +1, which may technically occur when there is high potential for collinearity. It was also asserted that there could be instances where path coefficients could be larger than +/−1, when these occur, the values are not acceptable as they signify a potential multicollinearity problem. Thus, in this case multicollinearity reduction methods of either elimination or merging of constructs need to be implemented. Interestingly, this problem has not been witnessed in this study as the path coefficients are not more than +/−1 for all the hypothesized relationships.

Hair, et al. (2021) elaborated on the concept of path coefficients, which explains the connection between exogenous and endogenous variables. In a PLS-SEM framework, path coefficients on standardized data typically indicate how changes in the standard deviation unit of a specific predictor construct affect the values of the endogenous construct, while keeping another predictor constructs constant. For instance, a path coefficient of 0.505 suggests that a one-unit increase in the standard deviation of a predictor construct results in a 0.505 standard deviation increase in the endogenous construct. The authors emphasized the importance of considering the research context when interpreting the magnitude of a path coefficient, recommending that researchers analyze total effects, which encompass both direct and indirect effects, when examining structural model outcomes (Hair, et al. 2021). It is essential to note that evaluating total effects provides a comprehensive understanding of the relationships within the PLS-SEM structural model (Roldán, and Carrión, 2016). The relationships within the structural model are illustrated in Table 7.14 and Figure 7.3.

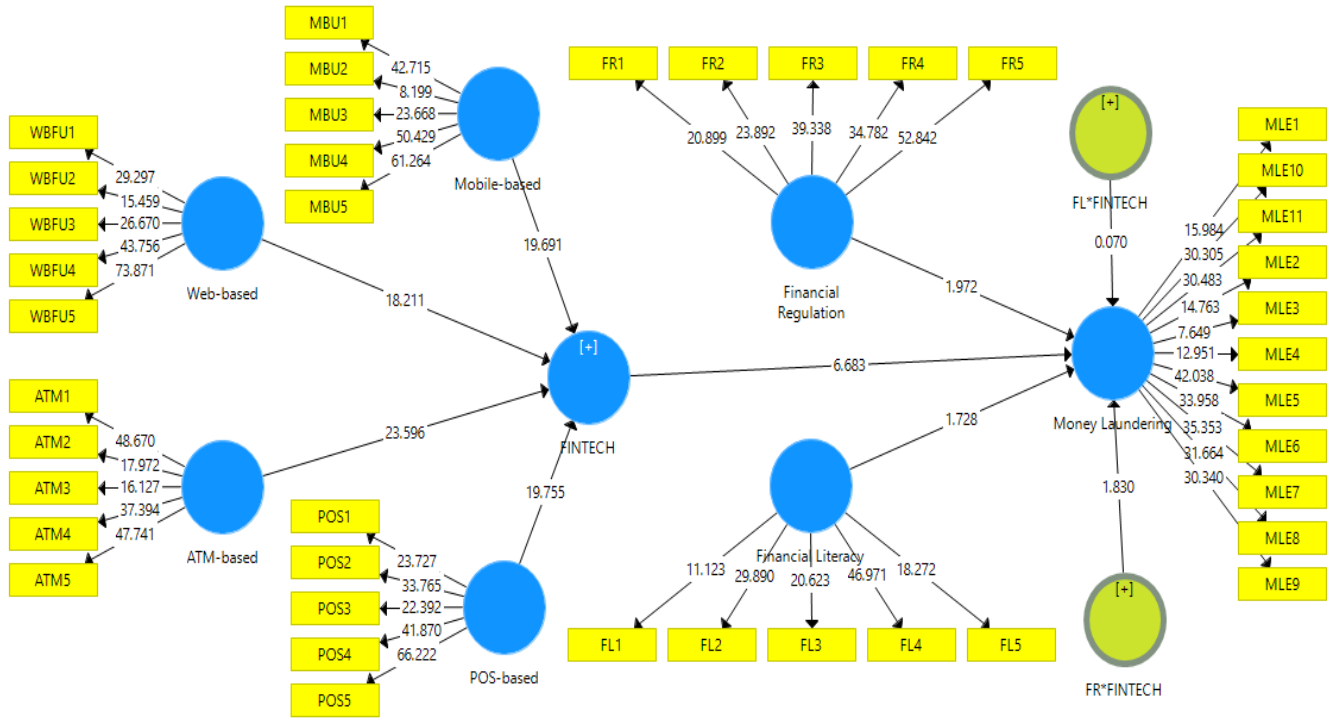


Figure 6.3: Structural Model Relationships Combining Direct and Indirect Effects (Total Effects) (Source: Authors creation)

It is apparent from Figure 6.3 that the structural model integrates both direct and indirect effects, revealing the total effects within the model, which aligns with the recommendation of Nitzl, et al. (2016) who argued that utilizing total effects in PLS-SEM structural models offers a comprehensive understanding of the connections between variables. More specifically, Figure 6.3 illustrates the outcomes of both the direct impact of FinTech Usage on Money Laundering Exposure and the moderating effects (indirect effect) of financial regulation and financial literacy on the association between FinTech Usage and Money Laundering Exposure. The path coefficients, t-values, and p-values can be found in Table 6.14.

Table 6.14 - Path Coefficient for Hypotheses Testing 8 (Source: Authors creation)

Hypotheses	Relationship	Beta	SE	T Statistics	P Values	Decision
H1	FinTech Usage -> Money Laundering	0.47	0.07	6.68	0.00	Supported
H2	Financial Reg.*FinTech -> Money Laundering	-0.07	0.04	1.83	0.03	Supported
H3	Financial Lit.*FinTech -> Money Laundering	0.00	0.03	0.07	0.47	Not Supported

The result in Table 6.14 revealed that two out of the three hypotheses of the study were supported. Specifically, hypothesis one proposed that FinTech Usage has a significant positive effect on money laundering exposure in Nigeria. The result in Table 6.14 supports this postulation (β =0.47, t =6.68, p= 0.00). This finding implies that a one-point increase in FinTech Usage will likely result in a 0.47-point increase in money laundering exposure to Nigerian citizens. This finding can be supported by the policy brief given by the Inter-Governmental Action Group against Money Laundering in West Africa -GIABA (2020) which posited that despite the enormous opportunities offered by digital finance including FinTech, it is still associated with emerging money laundering and terrorism financing challenges. The fact is that FinTech could pose new areas of vulnerability through different forms of new technologies due to its ability to give rise to an increase in the number of financial players as well as its potential in easing cross-border transactions, however, increase the level of complexity of transactions monitoring for financial institutions and authorities. GIABA (2020) further posits that the relative ease associated with the creation of mobile money accounts by individuals also offers equal opportunity to criminals who can decide to open multiple accounts through which proceeds from illicit activities can be laundered. Thus, GIABA (2020) challenged mobile money service providers to put in place certain mechanisms for efficient and effective monitoring in such a way as to flag and report suspicious cases of transactions and engage competent staff that will ensure compliance with all the available regulatory frameworks associated with these financial technologies.

The finding is also consistent with the earlier evidence provided by Ramage (2012) concerning a mobile money platform called MobillCash which extends its business in such a way to enable persons to register with the platform using their credit cards by providing all the details including details of credit card and number of SIM to enable purchases online. All processes, the users of MobillCash can purchase intangible goods items online, which implies that it can be utilized to launder money into intangible goods. Odu (2020) found that digital finance presents a distinct array of challenges and risks

due to the various supply channels, services, and products provided by service providers, including ATM-based, mobile-based, POS-based, and web-based financial services.

However, the finding contradicts that of other researchers especially from the perspective of developed countries. For instance, a recent study by Bodescu, Achimb and Rusc (2022) established a negative correlation between AML index and adoption of technology including FinTech, such that an increase of the usage of Internet and adoption of technology including FinTech leads to a decrease in the risk of money laundering risk. This contradictory finding could not be surprising as GIABA (2020) highlights that developing countries in West Africa are associated with regulatory gaps in FinTech, and even where such regulations exist, they are associated with certain loopholes that may lead to distortions and violation of the level playing field principle among operators of FinTech, which may eventually increase the potentials for financial crimes. Earlier findings from developed countries also revealed that the use of technology including FinTech usage has the potential to reduce the pervasiveness of money laundering (Vaithilingam & Nair, 2007). The contradiction in finding can be justified by the assertion of Anichebe (2020) who posited that FinTech is a double-edged sword, on one hand, it offers immense opportunities for businesses and individuals through which payment settlement is being made in faster and more efficient ways, while on the other hand, it fuels illegalities including money laundering, that makes illegally gained financial proceeds to have a legitimate appearance in eyes of the public.

Hypothesis two proposed that financial regulations moderate the relationship between FinTech Usage and money laundering exposure in Nigeria. The result in Table 6.14 supports this postulation (β =-0.07, t =1.83, p= 0.03). This finding implies that financial regulation weakens the positive effect of FinTech Usage on money laundering exposure. It means that the increase in money laundering exposure of Nigerian citizens due to FinTech usage could be lessened by the existence of strong financial regulation. Put differently, when FinTech interacts with financial regulation the result will be a reduction in money laundering by 0.7 points or 7%. Therefore, despite the rapid increase in the use of FinTech in Nigeria, which has the potential of exposing citizens to money laundering in the country, the existence of strong AML/CFT regulation could reduce such threats by combating the potential effect of FinTech on money laundering exposure.

The finding is consistent with the view of Pan (2012) who posited that financial regulations are designed to prevent money laundering and terrorism financing such that it results to healthy competition amongst providers of financial services as well as the efficiency and innovation. This also consistent with IMF (2022) which stressed that an effective anti-money laundering/counter financing of terrorism regulatory framework must address risk issues relating to prevention, detection and

punishment of illegal funds entering financial system as well as terrorist individuals, organizations and/or activities that fund such activities. This signifies that the existence of financial regulations including those relating to AML/CFT may reduce money laundering. Although there is primary AML legislation in Nigeria known as the Money Laundering (Prohibition) Act, 2011 the country also formulated a national strategy on AML known as the Nigeria Anti-money Laundering and Combatting the Financing of Terrorism National Strategy 2018 – 2020, which stipulates the policies and strategies designed to address money laundering challenges, developing countries such as Nigeria have been cautioned on the needs of their regulatory bodies to be making an active consultation with relevant technology stakeholders to enact anti-money laundering regulations which could be tailor-made, practical as well as potentials to pre-empt technological advancements (Anichebe, 2020). This means that to further curb the increase in money laundering exposure that will be caused by accelerated FinTech Usage in the county, relevant technology stakeholders must be consulted to strengthen the financial laws and regulations relating to FinTech.

Hypothesis three suggested that financial literacy plays a moderating role in the connection between FinTech Usage and money laundering exposure in Nigeria. Nevertheless, the findings presented in Table 6.14 did not validate this hypothesis ($\beta = 0.00$, $t = 0.07$, $p = 0.47$). Consequently, it can be inferred that financial literacy does not influence the association between FinTech Usage and money laundering exposure within the Nigerian population. This indicates that the extent of financial literacy among Nigerians may not have a significant impact on either strengthening or weakening the rise in money laundering exposure resulting from the widespread use of FinTech services.

The above finding is contrary to the expectation of this study, which anticipates that lower financial literacy can weaken the increase in money laundering exposure of Nigerians caused by rapid FinTech Usage, and higher financial literacy can strengthen the increase in money laundering exposure of Nigerians caused by rapid FinTech Usage. This anticipation is based on the finding of Fujiki (2020) who discovered that owners of crypto currencies in Japan are "tend to have higher financial literacy, which in essence could increase their possibility of involving into money laundering. The anticipation was also based on the World Bank (2021) that financial education led to sustained behavioral changes, which implied that individuals with financial skills will be more likely to engage in certain financial behaviors such as money laundering than those having no financial knowledge. The finding could be justified by the fact that the sample was not purposively selected to include only individuals with financial expertise, rather it gives equal chance to all members of the populations.

6.2.3.2.3 Evaluation of Coefficient of Determination (R-squared)

Assessment of the coefficient of determination popularly known as R^2 is the third criterion in the evaluation PLS-SEM structural model. Specifically, with respect to PLS-SEM, R2 is one of the criteria used in evaluating the model's explanatory power. It represents the variance of the endogenous construct explained by all the exogenous constructs in the (Shmueli & Koppius, 2011), thus, it is considered an important metric in evaluating the predictive power of the PLS-SEM structural model (Rigdon, 2012). In terms of its statistics, R^2 ranges from 0 to 1, whereas higher values indicate a greater explanatory power of the model (Hair, et al. 2021). The rule of thumb for evaluating R^2 is that values of 0.25, 0.50 and 0.75 are considered weak, moderate, and substantial respectively within social science (Hair, et al. 2011). Generally, R^2 values depend on the research context, with many disciplines considering an R^2 value of 0.10 as acceptable and satisfactory (Raithel, et al. 2012).

Hair, et al. (2021) asserted that researchers need to be aware that the value of R^2 increases with the number of predictor constructs, the higher the number of predictors, the higher could be the value of the R^2. The result of the R^2 is presented in Figure 6.4 and Table 6.15 below.

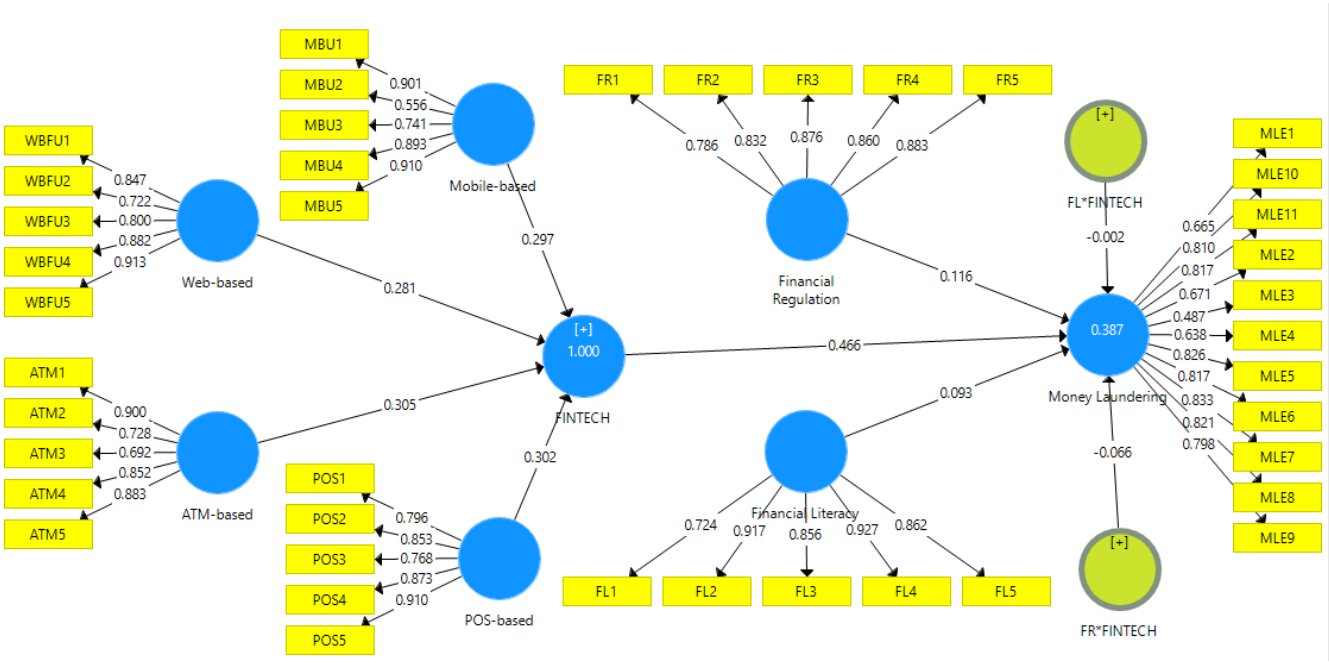


Figure 6.4: Structural Model (Source: Authors creation)

It is evident from Figure 6.4 that the structural model has three predictors; one direct FinTech Usage and two indirect (financial regulation and financial literacy) which explained about 38.7% of the variations in money laundering exposure, as further revealed by Table 6.15.

Table 6.15- Assessment of Coefficient of Determination (R-Squared) (Source: Authors creation)

Endogenous Constructs	R-squared
Money Laundering Exposure	38.7%

The result of the r-squared revealed that FinTech Usage as a direct predictor together with financial regulation and financial literacy explained 38.7% of changes in R-squared. Therefore, this value can be considered as satisfactory in line with Raithel, et al. (2012), as it is greater than the weak category specified by Hair, et al. (2011).

6.2.3.2.4 Evaluation of Effect Sizes (f^2)

Assessment of the effect size (f^2) is the fourth criterion in the evaluation of the PLS-SEM structural model, it is assessed through the removal of selected predictor variables to understand how such could affect the R^2 value of an endogenous construct in the model (Hair, et al. 2021). The f^2 effect size metric is commonly similar to the estimation of the size of the path coefficients (Hair, et al. 2021). (Hair, et

al. 2021) posited that f^2 provides a rank order relevance of the predictor constructs on the endogenous variable, it also another criterion for understanding the explanatory power of PLS-SEM structural model. The result of effect size is presented in Table 6.16.

Table 6.16- Assessment of Effect Sizes (f2) (Source: Authors creation)

Constructs	f^2	Effect Size
FinTech Usage	0.18	Medium
Financial Literacy*FinTech	0.00	None
Financial Regulation*FinTech	0.01	Very Small

The (f^2) effect size analysis indicated that FinTech Usage ranks highest in explaining money laundering exposure as an endogenous construct, followed by the interaction between Financial Regulation and FinTech Usage, and lastly the interaction between Financial Literacy and FinTech Usage. The coefficient analysis also confirmed that FinTech Usage significantly impacts money laundering exposure and the interaction between Financial Regulation and FinTech Usage. However, the interaction between Financial Literacy and FinTech Usage was found to not significantly influence money laundering exposure. These findings align with (Hair, et al. 2021) assertion that the f^2 effect size metric is akin to estimating the size of path coefficients.

6.2.3.2.5 Evaluation of Predictive Power of the Model

The evaluation of the PLS-SEM structural model concludes with the assessment of its predictive power. To measure the predictive power, researchers can employ various prediction statistics that quantify the extent of prediction error in the indicators of a specific endogenous construct (Hair, et al., 2021). Hence, researchers must focus on the key endogenous construct of the model when analyzing prediction errors. One commonly used metric for quantifying prediction error is the root-mean-square error (RMSE) (Hair, et al. 2021). RMSE is calculated as the square root of the average of the squared differences between the predictions and the actual observations.

Another criterion for the evaluation of the predictive power of the structural model is the predictive relevance of the model using construct-cross-validated redundancy (Q^2) suggested by Gaisser (1974) and Stone (1974). The suggestion is that any model whose (Q^2) is above zero is considered to have predictive relevance (Hair et al. 2011, Hair et al. 2016; Hair et al. 2021; Hair et al. 2022). Therefore, this approached is used in this study, and the result is presented in Table 6.17.

Table 6.17- Assessment of Predictive Relevance (Q^2) (Source: Authors creation)

Construct	SSO	SSE	Q^2 (=1-SSE/SSO)
Money Laundering	2728.00	2218.81	0.19

The result of the construct-cross validated redundancy (Q^2) presented in Table 6.17 revealed that the model has predictive power as the Q^2 of the model is above zero (0.19), which implies that the model of the study has predictive relevance. This means that the model of the study can predict what it was proposed to predict even in the presence of missing cases within the dataset, thus, confirming the predictive relevance of the model.

6.3 Summary

This chapter aimed to analyze the quantitative data collected using a survey questionnaire to achieve objectives one, two and three of the study as well as answer their corresponding research questions. Towards achieving this objective, the chapter conducted a preliminary analysis to evaluate the quality of the data to be used for the analysis, which has been confirmed to meet all the laid down requirements for quantitative analysis. While the main analysis was conducted using PLS-SEM, it is important to mention that this analytical tool has two-stage criteria. The first criterion is evaluating the reliability and validity of the data, which was confirmed to be valid and reliable through four different forms of measurement model evaluation criteria. The second stage was the hypotheses testing and evaluation of the quality of the model. The outcome from the test of the hypothesis revealed that FinTech usage would likely increase money laundering if not properly controlled. Interestingly, it was also found that the existence of financial regulation weakens the influence of FinTech usage on money laundering. Unexpectedly, no moderation effect of financial literacy was established although the initial postulation was that higher financial literacy would strengthen the influence of FinTech usage on money laundering given that highly financial literate users would be more likely to commit illicit behavior using FinTech for money laundering.

7.0 QUALITATIVE DATA ANALYSIS

7.1 Overview

This chapter analyzes the qualitative data of the study, which was collected through interviews with regulatory agencies. It has been asserted that qualitative data analysis serves as a crucial tool to deepen understanding, contextualize findings, and provide nuanced insights that complement quantitative research outcomes (Belotto, 2018). In the scope of FinTech and money laundering, qualitative analysis can be instrumental in interpreting the lived experiences, perceptions, and behaviors of individuals and communities affected by these phenomena (Sampat, Mogaji, & Nguyen, 2024). Qualitative data analysis was conducted using thematic analysis based on the five steps proposed by Braun and Clarke (2006), as discussed below. Also, the table on Appendix I provide full details of the steps and criteria used in the thematic analysis.

Key informant interviews (KII) were conducted with high-level officers and specialists who are major decision-makers. This group included individuals in executive roles such as Assistant and Deputy Directors, Chief Executives, Technical Advisers, and Legal Attorneys, all responsible for Money Laundering and FinTech regulations. These experts were drawn from six regulatory agencies: the Central Bank of Nigeria (CBN), Nigerian Financial Intelligence Unit (NFIU), Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices and Other Related Offences Commission (ICPC), National Drug Law Enforcement Agency (NDLEA), and the Ministry of Justice. The use of KII, rather than Focus Group Discussions (FGD), was justified by the research objective, which aimed to elicit information from specific organizations through individuals who are highly relevant to the subject. According to Ayegbeli (2013), KII is preferred over FGDs as it provides more in-depth information due to the involvement of individuals with special knowledge or specific information related to the research issue. The interviewees, experts in money laundering and FinTech participated in the interviews conducted at their respective offices in Abuja, the Federal Capital Territory of Nigeria. See Appendix J for the full list and details of the participants.

Justification for Conducting the Thematic Analysis.

Thematic analysis was employed in this study not only as a standalone qualitative analysis technique but also as a complementary method to validate the findings from the quantitative survey. This approach is grounded in the need to ensure methodological triangulation, which enhances the reliability and robustness of research outcomes (Flick, 2018). Below are the key justifications:

Triangulation for Enhanced Validity:

- Combining thematic analysis with survey data allows for methodological triangulation, a process that integrates multiple methods to confirm and validate findings (Patton, 2015). This approach reduces the likelihood of bias associated with using a single method and provides a more comprehensive understanding of the phenomena under study.
- Thematic analysis was used to explore deeper contextual insights, ensuring that the themes emerging from survey responses were consistent with and enriched by qualitative narratives.

Capturing Nuanced Perspectives:

- While surveys offer breadth, thematic analysis provides depth by uncovering the underlying reasons, motivations, and perspectives behind respondents' quantitative choices (Clarke & Braun, 2013). This dual approach enabled the research to validate and contextualize patterns observed in the survey findings.
- For example, themes related to stakeholder perceptions of FinTech's role in money laundering were analyzed to confirm and elaborate on survey data trends.

Integration of Quantitative and Qualitative Insights:

Thematic analysis helped bridge gaps between the quantitative results and participants' lived experiences. It allowed the researcher to validate survey findings by cross-checking them against qualitative data, offering a richer, multidimensional view of issues like regulatory challenges and financial literacy gaps (Bryman, 2016).

Mitigating Limitations of Surveys: Surveys often rely on predefined questions and response categories, which may limit the depth and flexibility of the data collected. Thematic analysis addressed this limitation by providing an open-ended framework for respondents to express their perspectives, thereby validating and expanding the quantitative results (Braun & Clarke, 2021).

Building Trustworthiness and Credibility:

By using thematic analysis to validate survey findings, the study adhered to trustworthiness criteria in qualitative research, including credibility, dependability, and conformability (Nowell et al., 2017). This ensured that the themes identified were not only relevant but also grounded in multiple forms of data.

Alignment with Mixed-Methods Approach:

The integration of thematic analysis within a mixed-methods framework aligns with best practices for conducting comprehensive research in complex fields like FinTech and money laundering. This approach reinforced the survey findings, offering robust evidence to support conclusions (Creswell & Plano Clark, 2017).

The use of thematic analysis to validate survey findings was essential for ensuring the study's methodological rigor and comprehensive understanding. This approach not only confirmed the reliability of the survey results but also provided richer insights into participants' perspectives, enhancing the study's contribution to literature on FinTech, financial literacy, and money laundering.

7.2 Selection of Agencies for Key Informant Interviews

The selection of the Central Bank of Nigeria (CBN), Nigerian Financial Intelligence Unit (NFIU), Economic and Financial Crimes Commission (EFCC), Independent Corrupt Practices and Other Related Offences Commission (ICPC), National Drug Law Enforcement Agency (NDLEA), and the Ministry of Justice for the key informant interviews was strategic, given their pivotal roles in regulating FinTech and combating money laundering in Nigeria.

7.2.1 Central Bank of Nigeria (CBN)

The CBN is the primary regulatory authority for the banking and financial sector in Nigeria. It oversees the implementation of monetary policies, ensures financial system stability, and regulates payment systems, including FinTech innovations. CBN's regulatory frameworks and policies are critical in shaping the operational landscape for FinTech companies, making it a crucial player in discussions about financial innovation and money laundering prevention. The CBN implements measures to mitigate money laundering and terrorism financing risks in various financial institutions, including Payment Service Banks and FinTech companies (CBN, 2022)

7.2.2 Nigerian Financial Intelligence Unit (NFIU)

The NFIU is responsible for receiving, analysing, and disseminating financial intelligence to combat money laundering, terrorism financing, and other financial crimes. It acts as a central repository for financial information in Nigeria. NFIU's role in analysing financial transactions and identifying

suspicious activities is vital for understanding and preventing money laundering within the FinTech sector (CBN, 2023)

7.2.3 Economic and Financial Crimes Commission (EFCC)

The EFCC is Nigeria's foremost anti-corruption agency, tasked with investigating and prosecuting economic and financial crimes, including money laundering and fraud. Given its mandate to combat financial crimes, the EFCC's insights are essential for exploring the regulatory challenges and enforcement strategies related to FinTech and money laundering (CBN, 2023)

7.2.4 Independent Corrupt Practices and Other Related Offences Commission (ICPC)

The ICPC focuses on preventing and investigating corruption in public and private sectors. It also conducts public education on the evils of corruption. The ICPC's role in anti-corruption complements the efforts of other agencies in combating money laundering, providing a broader perspective on regulatory and enforcement challenges in the FinTech industry (CBN, 2023)

7.2.5 National Drug Law Enforcement Agency (NDLEA)

The NDLEA is responsible for eliminating the growing, processing, manufacturing, selling, exporting, and trafficking of hard drugs. It also works to prevent the use of financial systems for drug-related money laundering. As money laundering often intersects with drug trafficking, NDLEA's involvement offers valuable insights into the nexus between FinTech, financial crimes, and drug-related money laundering (NDLEA, 2023)

7.2.6 Ministry of Justice

The Ministry of Justice provides legal advice to the government, represents the state in legal matters, and ensures the enforcement of laws and regulations. The Ministry of Justice's legal expertise is critical for understanding the regulatory framework, legal challenges, and enforcement mechanisms related to FinTech and money laundering (Chitimira, H. and Animashaun, O. (2023)

The inclusion of these agencies in the key informant interviews was essential to gain a comprehensive understanding of the regulatory environment, enforcement challenges, and collaborative efforts required to combat money laundering in the rapidly evolving FinTech sector in Nigeria (Ayegbeli, 2013).

7.3 Result of the Qualitative Analysis

Qualitative data analysis serves as a complementary lens through which researchers can deepen their understanding of the risk of money laundering on FinTech usage. Therefore, by exploring user experiences (Regulators perspective), contextual factors, emergent themes, and longitudinal dynamics, qualitative methods reaffirm and enrich the findings derived from quantitative research, ultimately yielding a more comprehensive and nuanced understanding of this complex phenomenon (Belotto, 2018).

In this study, qualitative data analysis was conducted using thematic analysis based on the five steps identified and recommended by Braun and Clarke (2006). In conducting the analysis, the researcher first familiarized herself with the data by reading and re-reading it. She then transcribed the data and noted initial ideas. This was followed by the generation of initial codes, achieved by writing down small phrases or keywords. These initial codes were read and reread through which identifiable themes were generated for each of the thirteen questions. The themes were then reviewed to enable the attainment of the research objectives. Lastly, the result is presented with selected compelling extracts of examples where required.

Comprehensive Analysis of Themes and Insights

The table offers a structured summary of key themes, sub-themes, and insights based on the interview responses.

Table 7.1 Analysis of Themes and Insight (Source: Authors creation)

S/N	Themes	Sub-Themes	Detailed Insights
1	Understanding Money Laundering	Definitions and Perspectives	Regulatory definitions from agencies (e.g., EFCC, NFIU, CBN)
2		Types of Money Laundering Crimes	Prevalent types such as terrorism financing, fraud, tax evasion, and illegal trade
3		Methods of Concealment	Digital (cryptocurrency, mobile money) and non-digital (informal savings, cash handling)
4		Economic and Social Impact	Consequences on financial system integrity, national

			security, and societal stability
5	Impact of FinTech on Money Laundering	Digital Financial Platforms	Usage of mobile-based, web-based, ATM-based, and POS-based systems in illicit activities
6		Cryptocurrency and Blockchain	Role of blockchain in anonymizing transactions; specific cryptocurrencies used in laundering
7		Unintended Consequences of FinTech	Increased ease of illicit fund transfers; regulatory challenges with cross-border transactions
8		Positive Contributions of FinTech	Enhancements in financial inclusion, transparency, and legitimate economic activities
9	Challenges in Regulation	Adequacy of Legal Frameworks	Gaps in existing laws, absence of technology-specific AML legislation
10		Effectiveness of Regulatory Partnerships	Collaboration among CBN, EFCC, NFIU, and international bodies like FATF and GIABA
11		Enforcement and Monitoring Challenges	Issues with corruption, cronyism, and lack of capacity in enforcement agencies
12		Technological Disruptions in Regulation	Difficulty in keeping pace with evolving digital finance innovations
13	Role of Financial Literacy	Impact on Fraud and Money Laundering	Influence of financial literacy in detecting and preventing fraud and laundering

14		Educational and Awareness Campaigns	Existing programs to promote digital and financial literacy in Nigeria
15		Barriers to Financial Literacy	High illiteracy rates, lack of infrastructure, and socio-economic challenges
16		Integration of Financial Literacy with AML Efforts	Role of literacy in encouraging compliance and reducing misuse of digital platforms
17	Policy and Regulation Recommendations	Strengthening AML Frameworks	Proposals for more robust AML laws, including technology-specific regulations
18		Role of Partnerships	Enhancing bilateral and multilateral cooperation; improving information sharing and harmonization
18		Developing Smart Regulation	Leveraging RegTech for real-time monitoring, reporting, and compliance
20		Promoting Digital Financial Literacy	Strategies for embedding literacy programs in digital financial services
21	Effectiveness of Internal and External Partnerships	Internal Partnerships	Collaboration among domestic agencies such as CBN, NFIU, EFCC, and NDLEA
22		External Partnerships	Cooperation with FATF, GIABA, and other international organizations
23		Success Stories and Challenges	Examples of effective partnerships; areas requiring improvement

24		Capacity Building Initiatives	Training programs to strengthen institutional and personnel capabilities
25	Recommendations for Technological Innovations	Leveraging RegTech Solutions	Proposals for AI, machine learning, and blockchain-based AML monitoring tools
26		Implementation of Biometric Authentication	Use of biometrics for KYC (Know Your Customer) and fraud prevention
27		Cryptocurrency Monitoring Tools	Tools for tracking and regulating cryptocurrency transactions
28		Addressing Cybersecurity Risks	Strategies for mitigating ransomware, malware, and other cyber threats in digital finance
29	Institutional Challenges and Opportunities	Capacity and Resources	Limitations in manpower, technology, and funding for AML enforcement
30		Ethical and Cultural Barriers	Issues of corruption, political interference, and societal attitudes towards regulation
31		Policy Adaptability	Ability of agencies to adapt to fast-paced technological advancements
32		Learning from International Best Practices	Insights from other countries' successful AML frameworks and FinTech regulations

7.3.1 Regulators Understanding Money Laundering

Before understanding the impact of FinTech on money laundering from regulatory Perspectives in Nigeria, the study explores the understanding of regulators on money laundering. In doing so, the study referred to the definition of money laundering from the literature, which has been as the illegal process of concealing the source of criminal or illegal proceeds by making it appear to have come from a legal business or venture (Odu, 2020). Thus, regulators were asked to define money laundering from their

perspectives, several definitions were provided but all revolved around the same meaning as any attempt to make illegally acquired money appear as if legitimately obtained through manipulating its true source. In this, a respondent from CBN defined the term "money laundering" as:

> *"Money laundering refers to the process of making illegally obtained money appear legal or legitimate by disguising its true origins. It is a method used by individuals or organizations involved in illegal activities, such as drug trafficking, bribery, fraud, or corruption, to "clean" their proceeds and integrate them into the legal financial system. Money laundering involves several stages, including placement (introducing illicit funds into the financial system), layering (concealing the source or movement of the funds through complex transactions), and integration (making the money available for legal use). The goal of money laundering is to make the illicit funds difficult to trace or detect by authorities (Money Laundering Control Expert – CBN)."*

This implied the definitions offered by regulators coincide with those available within the extent literature, and the respondents have good grasp of the subject. To dive deep into the understanding of money laundering from the regulatory perspective, the respondents were asked what the types of money laundering which are most prevalent in Nigeria and why such happened. They provide several types of money laundering that are prevalent. For instance, a respondent from NDLEA states that:

> *"Nigeria serves drug trafficking transit point, with the earnings from this unlawful trade frequently subjected to money laundering processes to make them appear legitimate. Money launderers employ diverse strategies, including smuggling cash, establishing shell corporations, and employing layering techniques, to hide the source of proceeds tied to drug-related activities (Money Laundering Control Experts - NDLEA)."*

Therefore, after following the steps of the thematic analysis these were identified as the most common types of money laundering in Nigeria. Experts through the interviews mentioned different types of money laundering. Some experts mentioned more than one while others mentioned at least one of them. Thus, the steps outlined by Braun and Clarke (2006) were followed including (i) familiarization with the data including transcribing, reading and re-reading as well as noting down the initial ideas, (ii) generating initial code by jotting small phrases or keyword representing a specific idea (iii), then searching for themes across the data by collating codes into potential themes by way of reading and re-reading through repeated recycle several times produce identifiable themes, (iv) reviewing themes

to meet the research objectives and (v) producing the report with selection of vivid and compelling extract examples. Thus, the following themes emerged which also serve as the types of money laundering in Nigeria:

1. **Advance fee fraud (commonly known as "419 scams"):** This involves enticing victims with promises of large sums of money in exchange for advance fees. The scammers typically use fake identities, emails, or letters to dupe victims into sending money. Once received, the funds are often laundered through complex financial transactions.
2. **Trade-based money laundering**: This method involves manipulating trade transactions, such as over- or under-invoicing, to move illicit funds across borders. Criminals may also use fraudulent documents, multiple invoicing, or mispriced goods to disguise the true value of goods being traded.
3. **Public sector corruption:** Nigeria has faced significant challenges with corrupt practices in its public sector. Embezzlement, bribery, and kickbacks are common methods through which illicit funds are obtained and subsequently laundered.
4. **Drug trafficking proceeds:** Nigeria serves as a transit point for drug trafficking, and the proceeds from this illegal activity are often laundered to legitimize the funds. Money launderers may use various methods, such as cash smuggling, shell companies, or layering techniques, to conceal the origins of drug-related proceeds.

7.3.2 Effect of Financial Technology on Money Laundering

To support objective one and research question one which seek to examine the relationship between FinTech and money laundering in Nigeria as postulated by Technological Determinism Theory, respondents from the six regulatory agencies were interviewed to obtain important insights on the effect of financial innovation on money laundering from their perspectives. For instance, one of the respondents from EFCC states that:

> "*Certainly, financial innovation can indeed influence money laundering. As financial systems and technologies advance, they can have both positive and negative effects on money laundering. On the positive side, innovation can aid in enhancing compliance measures and regulatory frameworks. Technologies like AI and machine learning can be used to analyze vast financial data, identify patterns, and detect suspicious transactions more efficiently. However, from a negative standpoint, criminals can exploit emerging financial technologies for money laundering. Innovations like digital currencies, such as*

cryptocurrencies, offer anonymity and enable cross-border transfers, complicating efforts by authorities to track and uncover illicit funds (Money Laundering Control Expert -EFCC)."

Analysis of the overall responses revealed both positive and negative effects of technology on money laundering which is consistent with the literature where evidence showed that technology could have both positive and negative impact on money laundering (Tropina, 2014; Bjelajac, 2011; Venkatesh, Jamalian, & Maharous, 2020). Therefore, observing the steps of thematic analysis, the following themes have been identified from both positive and negative viewpoints:

1. **Positive Effects:**
   i. **Enhanced Compliance Measures:** Financial innovation can facilitate the development of improved compliance measures and regulatory frameworks. Advanced technologies, such as artificial intelligence and machine learning, can be leveraged to analyze large amounts of financial data, identify patterns, and detect suspicious transactions more effectively.
   ii. **Improved Transparency:** Innovations like blockchain technology can enhance transparency and traceability in financial transactions. The immutable nature of blockchain records can make it more difficult for criminals to conceal their illicit activities and launder money.

2. Negative Effects:

i. **Exploitation of New Channels:** Criminals can exploit emerging financial technologies to further their money laundering operations. Innovations like digital currencies (e.g., cryptocurrencies) can provide anonymity and facilitate cross-border transfers, making it challenging for authorities to trace and identify illicit funds.
ii. **Complexity in Financial Structures:** Financial innovations can introduce complex financial structures and instruments that can be used to obscure the true origins of funds. Criminals may use techniques such as layering, smurfing, shell companies, or complex cross-border transactions to launder money more effectively.

The finding from the interview revealed that FinTech has both positive and negative effects on money laundering. Therefore, the study dive deeper to understanding what the most common FinTech tools are used in perpetuating money laundering by the criminals. It was found that any digital finance

product can potentially be utilized for money laundering, depending on the specific circumstances and the methods employed by criminals. In this, a respondent from NFIU states that:

> *"Any digital financial product has the potential for money laundering use, depending on circumstances and criminal tactics. Nevertheless, some digital finance products are more frequently linked to money laundering due to their convenience and potential for anonymity. For example, online payment platforms like e-wallets and peer-to-peer services offer fast, convenient fund transfers, enabling criminals to move illicit funds between accounts or conduct anonymous transactions. (Money Laundering Control Expert – NFIU)"*

Further analysis of the data from the six respondents using thematic analysis, the following themes have been identified which served as the most common digital financial products used for money laundering in Nigeria:

1. **Cryptocurrencies and virtual currencies:** These digital currencies, which operate on decentralized networks and often offer a degree of anonymity, have been associated with money laundering activities due to the difficulty in tracing transactions and identifying the true owners of funds.
2. **Online payment platforms:** These platforms, such as e-wallets or peer-to-peer payment services, provide quick and convenient methods for transferring funds. Criminals may utilize these platforms to move illicit funds between accounts or make anonymous transactions.
3. **Digital remittance services:** These services allow individuals to send money electronically across borders. Criminals may exploit these services to transfer illicit funds, taking advantage of the speed and potential lack of proper identification or due diligence measures.
4. **Online banking:** While internet banking itself is not inherently used for money laundering, criminals may leverage it as a means to transfer funds between accounts or conduct fraudulent transactions, particularly if they have gained unauthorized access to someone's online banking credentials.

The respondents were further asked whether the emergence of cryptocurrency has amplified the effects of FinTech on money laundering. They responded that the emergence of cryptocurrency has indeed introduced new opportunities and challenges with respect to money laundering. While cryptocurrencies offer various benefits such as decentralized networks and faster transactions, they also present certain characteristics that can be exploited by money launderers. For instance, a respondent from NFIU revealed that:

> *"The rise of cryptocurrency has brought forth both fresh prospects and challenges in the realm of money laundering. Cryptocurrencies provide decentralized networks and swift transactions, but they also harbour traits susceptible to exploitation by money launderers, primarily anonymity. Cryptocurrency transactions employ pseudonyms, making it difficult to ascertain the real identities involved, a feature that can be alluring to money launderers (Money Laundering Control Expert - NFIU)"*

An analysis of the responses from experts in money laundering and FinTech-related regulatory agencies revealed the following themes in relation to why the emergence of cryptocurrency amplified the effect of FinTech on money laundering:

1. **Anonymity:** Cryptocurrencies can provide a certain level of anonymity as transactions are conducted using pseudonyms, making it challenging to identify the real-world identities behind the transactions. This anonymity can be attractive to money launderers.
2. **Borderless Transactions:** Cryptocurrencies enable borderless transactions without the need for intermediary financial institutions. This feature can make it easier for money launderers to move funds across borders quickly and discreetly.
3. **Lack of Regulation:** The regulatory frameworks around cryptocurrencies are constantly evolving, and in some jurisdictions, they are still developing. This can create gaps and loopholes that money launderers may exploit.
4. **Tumbling and Mixing Services:** Money launderers use tumbling and mixing services to further obfuscate the source of cryptocurrency transactions. These services break up transactions into smaller parts, mix them with other transactions, and redistribute funds to hinder traceability.

However, it is important to note that the increased usage of cryptocurrencies has also prompted significant efforts by regulators, governments, and financial institutions to address the risks associated with money laundering. Many jurisdictions have implemented or are developing regulations to require cryptocurrency exchanges and service providers to implement anti-money laundering measures and conduct proper customer due diligence. Furthermore, advancements in blockchain analysis and forensic technologies are being utilized to trace illicit transactions and identify patterns associated with money laundering activities within the cryptocurrency space. Collaborative efforts between the private and public sectors are continuously evolving to enhance the transparency and integrity of cryptocurrency transactions.

Through the interview, the study further seeks to understand the challenges associated with the use of technology in countering money laundering in Nigeria. It was found that the use of technology to counter money laundering in Nigeria faces several challenges. For instance, a respondent from CBN disclosed that:

> "*One of the significant challenges is an ever-changing regulatory environment which lies in the constant evolution of the regulatory landscape for technology and anti-money laundering measures. Adapting current regulations to incorporate new technologies and digital platforms, while maintaining effective oversight, presents challenges and necessitates close collaboration between regulatory bodies, financial institutions, and technology providers. (Money Laundering Control Expert – CBN)"*

Further analysis of the responses from experts in the six regulatory agencies using the steps in thematic analysis enabled the identification of the themes relating to the challenges Associated with the Application of Technology in Countering Money Laundering in Nigeria, which include:

1. **Limited Technology Infrastructure:** Adequate technology infrastructure, including reliable internet connectivity and digital infrastructure, is essential for effective implementation of anti-money laundering measures. In regions with limited technology infrastructure in Nigeria, the adoption and implementation of advanced technological solutions can be hindered.
2. **Digital Divide:** Nigeria has a significant digital divide, with a large portion of the population lacking access to digital platforms and technology. This can make it harder to implement and enforce digital-based anti-money laundering measures, as criminals may exploit the gaps in technology adoption.
3. **Lack of Awareness and Training:** Insufficient awareness and training on technology-based anti-money laundering measures can hinder their effective implementation. Both financial institutions and law enforcement agencies may lack the necessary expertise and knowledge to effectively leverage technology in combating money laundering.
4. **Evolving Techniques and Sophisticated Criminals:** Money launderers continually adapt their techniques to exploit vulnerabilities in technology-based systems. They may employ advanced encryption methods, utilize dark web platforms, or employ other sophisticated techniques to evade detection. Law enforcement agencies and institutions must stay updated and continually evolve their technological capabilities to keep pace with these changing tactics.

5. **Dynamic Regulatory Environment:** The regulatory landscape for technology and anti-money laundering measures is constantly evolving. Adapting existing regulations to accommodate new technologies and digital platforms, while ensuring robust oversight, can be challenging and may require strong collaborations between regulatory bodies, financial institutions, and technology providers.
6. **Cross-Border Challenges:** Money laundering often involves cross-border transactions, which require international cooperation and coordination between jurisdictions. Different countries may have varying technological capabilities, regulatory frameworks, and levels of cooperation, making cross-border investigations and enforcement complex.

While the quantitative analysis with respect to the objective one and question one of the study which seek to examine the effect of FinTech on money laundering was limited to Financial technologies, the interview gave ample opportunity to explore whether there are other non-digital platforms use by money launders to conceal source of illicit proceeds, it was found that there are other non-digital platforms apart from digital platforms used by money launderers to hide the source of illicit proceeds in which they mentioned several other channels. For instance, expert from ICPC explained that:

> "*Besides digital platforms, money launderers can employ diverse channels to obscure the origin of illegal proceeds. This may involve investing in high-value properties or real estate ventures to transform illicit funds into seemingly lawful assets. Properties can be subjected to multiple transactions, creating layers of complexity, and obfuscating the funds' true source (Money laundering Control Experts – ICPC)*."

Upon applying the steps of thematic analysis including familiarization with the data through transcribing, reading and re-reading, generating initial code by jotting small phrases or keywords representing a specific idea, searching for themes across the data by collating codes into potential themes through repeated recycle, and reviewing themes to meet the research objectives, the following themes have been identified as follows:

1. **Cash-intensive businesses:** Money launderers may operate businesses that deal primarily in cash to co-mingle illegal funds with legitimate revenue. Examples include casinos, restaurants, nightclubs, or retail stores where large sums of cash transactions are common.
2. **Real estate investments:** Money launderers may invest in high-value properties or real estate projects to convert illicit funds into seemingly legitimate assets. Properties can be bought and sold multiple times to layer and obscure the source of the funds.

3. **Offshore accounts and tax havens:** Money launderers may use offshore accounts and tax havens that offer strict banking secrecy laws and limited transparency. These jurisdictions make it challenging for authorities to trace the illicit funds back to their source.
4. **Trade mis-invoicing:** Criminals may manipulate trade transactions by over- or under-invoicing goods or services to move money across borders without raising suspicion. This involves the use of fraudulent invoices and misrepresentation of the value or quantity of traded goods.
5. **Shell companies:** Money launderers may set up shell companies, which exist only on paper and have no legitimate business operations, to disguise the true ownership and purpose of the funds. These entities can be used to conduct transactions that appear legitimate but are moving illicit funds.
6. **Smurfing:** Also known as structuring, smurfing involves breaking up large sums of money into smaller, less noticeable transactions to avoid suspicion. Money launderers may use multiple individuals or accounts to make multiple deposits or transfers below reporting thresholds, making it harder for authorities to detect the illegal activity.

7.3.3 Role of Regulation in Curtailing Financial Technology Induced Money Laundering

Recalled that research objective two and research question two seek to examine the extent to which financial regulations moderate the relationship between FinTech and money laundering in Nigeria as highlighted by Technological Determinism Theory, which the findings revealed that financial regulation moderates the effects of FinTech on money laundering. It specifically, showed that the existence of strong financial regulation strengthens the effect of FinTech on money laundering. To complement the quantitative results, an interview was conducted on how current laws (as a proxy to financial regulations) impact the influence of FinTech on Financial Regulation. The result from the interview revealed that efforts have been made to develop and implement laws and regulations to address money laundering, including that which occurs through financial technology. With respect to this, a respondent from the Ministry of Justice and CBN revealed that:

> *"The primary legislation governing anti-money laundering efforts in Nigeria is the Money Laundering (Prohibition) Act 2011 (as amended in 2012), along with other related regulations issued by the Central Bank of Nigeria (CBN) and the Economic and Financial Crimes Commission (EFCC). However, the adequacy of these laws in curtailing financial technology-induced money laundering can vary*

depending on several factors (Money Laundering Law Expert – Ministry of Justice).

"The CBN has issued guidelines on the use of financial technology and Anti-Money Laundering Regulation in Nigeria. (Money Laundering Control Expert – CBN)"

Further analysis of the responses using thematic analysis revealed that, in Nigeria like in most jurisdictions, the rapid advancements in financial technology present ongoing challenges for regulatory frameworks. Therefore, after familiarization with the data including transcribing, reading and re-reading, initial codes were generated by jotting small phrase or keyword representing a specific idea, then through those codes, themes were generated across the data by collating codes into potential themes by way of reading and re-reading through repeated recycle several times produce identifiable themes. Eventually, the themes were reviewed thereby arriving at some potential areas where the current laws in Nigeria may face challenges in curtailing financial technology-induced money laundering include:

1. **Cryptocurrencies:** The laws in Nigeria do not provide specific regulations for cryptocurrencies. This can create challenges in effectively addressing the risks associated with cryptocurrency-based money laundering.
2. **Digital Identity Verification:** Adequate digital identity verification plays a crucial role in combating money laundering. However, there may be challenges related to the implementation and enforcement of standardized digital identity verification processes in the Nigerian financial ecosystem.
3. **Cross-Border Transactions:** Money laundering often involves cross-border transactions, which require international cooperation. Although Nigeria has entered into various agreements to enhance international collaboration, challenges related to jurisdictional constraints and differences in regulatory frameworks may still exist.
4. **Ongoing Technological Advancements:** The rapid pace of technological advancements necessitates continuous adaptation of laws and regulations to keep pace with emerging money laundering risks and innovative methods employed by criminals.

It is important to note that to address these challenges, Nigerian authorities have been enhancing their efforts, including ongoing collaborations with international bodies and organizations, to strengthen the legal and regulatory frameworks. This includes ongoing amendments to laws and the development of

specific regulations related to financial technology and money laundering. Moreover, it can be deduced that the effectiveness of laws and regulations in curtailing financial technology-induced money laundering also depends on enforcement efforts, capacity building, and coordination among different stakeholders, including financial institutions, regulatory bodies, and law enforcement agencies.

Additionally, respondents were asked whether there are specific laws designed exclusively to address technology-based money laundering; however, it was found that such laws do not exist in the country. On this, an expert in money laundering law from the Ministry of Justice and an expert from CBN revealed that:

> *"In Nigeria, there is no specific law that exclusively focuses on technology-based money laundering. However, existing laws and regulations, such as the Money Laundering (Prohibition) Act 2011 (as amended in 2012). The Money Laundering Act prohibits money laundering activities regardless of the means used to commit the offence. It encompasses all forms of money laundering, including those that involve financial technology. The Act imposes obligations on financial institutions, including banks and other designated non-financial institutions, to implement anti-money laundering measures and report suspicious transactions. (Money Laundering Law Expert – Ministry of Justice)"*

> *"The guidelines issued by the Central Bank of Nigeria (CBN), encompass various forms of money laundering, including those facilitated by technology. These guidelines address the use of technology in financial transactions and emphasize the importance of adopting appropriate anti-money laundering measures in the digital context. These guidelines outline requirements and expectations for financial institutions to combat money laundering using technology channels. (Money Laundering Control Expert – CBN)"*

Therefore, it can be concluded that while there is no specific law dedicated solely to technology-based money laundering, the existing laws and regulations are intended to be comprehensive and adaptable enough to address money laundering risks, including those arising from advancements in financial technology. However, it is essential for regulators and authorities to continuously assess and update these laws in response to emerging risks and technological developments or to design specific laws relating to technology-induced money laundering.

7.3.4 Role of Knowledge Sharing and Partnership with Internal and External Stakeholders in Addressing Technology-induced Money Laundering

Recall that objective three and research question three seek to examine the extent of financial literacy moderate the relationship between FinTech and money laundering in Nigeria as highlighted by Technological Determinism Theory. Financial literacy was thought in relation to users of FinTech which were the respondents to the survey. With respect to the interview for the qualitative analysis which used regulators as respondents, which are quite believed to have the requisite financial literacy, and their responses was organizational based, the study used knowledge sharing and partnerships as proxy to financial literacy in this respect. The justification is that through knowledge sharing and partnerships country could learn new strategies to curtail technology induced money laundering. To achieve this, the regulators were asked to give perspectives on whether partnership with internal and external stakeholders help in addressing technology-induced money laundering. One of the respondents from NFIU explained that:

> "*Nigeria has taken steps to combat tech-based money laundering through internal and external partnerships. Domestically, institutions like the EFCC and NFIU work to prevent money laundering via technology. Nigeria also collaborates with the private sector, including banks and FinTech firms, to bolster anti-money laundering efforts and secure digital transactions, reducing tech-related laundering risks. Nigeria has established international collaborations in its fight against money laundering. As a member of the Egmont Group, a global network of financial intelligence units, Nigeria shares information and combats money laundering, including tech-related cases, across borders. The country also partners with international bodies like FATF and UNODC to create and enforce anti-money laundering measures, especially those about technology-driven laundering*. (Money Laundering Control Expert – NFIU)"

Analyzing the responses from all the respondents through thematic analysis established two themes of partnerships, which are internal and external collaborations.

1. **Internal Collaboration:** Internally, the Nigerian government has established institutions and regulatory bodies such as the Economic and Financial Crimes Commission (EFCC) and the Nigerian Financial Intelligence Unit (NFIU). These agencies work towards preventing money laundering and illicit financial activities, including those conducted through technology platforms. Additionally, Nigeria has engaged with the private sector, including banks, FinTech companies, and technology service providers, to establish robust anti-money laundering

measures. These collaborations aim to enhance the security and integrity of digital financial transactions, thereby reducing the risk of technology-induced money laundering.

2. **International Collaboration:** Nigeria has also forged international partnerships to combat money laundering. The country is a member of the Egmont Group, which is a global network of financial intelligence units that collaborates to share information and combat money laundering and terrorist financing. This membership allows Nigeria to exchange information with other countries to investigate and prevent money laundering, including those related to technology. Furthermore, Nigeria collaborates with international organizations such as the Financial Action Task Force (FATF) and the United Nations Office on Drugs and Crime (UNODC). These partnerships help Nigeria develop and implement anti-money laundering measures, including those specific to technology-induced money laundering.

Overall, the regulatory agencies in Nigeria acknowledge the importance of partnerships with both internal and external stakeholders in addressing technology-induced money laundering. These collaborations help strengthen the country's capacity to combat money laundering through technological platforms and protect its financial system.

Additionally, the respondents were also asked to offer some insights into the effectiveness of these internal and external collaborations. In this, a respondent from NFIU offer the following insights:

> "*Partnerships in Nigeria have been highly effective in addressing technology-induced money laundering. Agencies such as NFIU and EFCC play key roles in investigating and prosecuting financial crimes, including those involving technology. Nigeria's affiliation with the Egmont Group provides access to crucial information networks, strengthening investigative capabilities and global cooperation against money laundering. This partnership aids Nigeria in preventing money laundering, especially via technology platforms. Collaborations with the private sector allow the implementation of KYC and AML compliance programs, enhancing the detection and prevention of illicit financial activities through technology platforms. (Money Laundering Control Expert – NFIU)"*

However, thematic analysis of the responses from all the agencies revealed that while these partnerships demonstrate Nigeria's commitment to addressing technology-induced money laundering, the effectiveness of these collaborations can vary depending on various factors, which are discussed in the following themes:

1. **Level of Information Sharing:** the openness of the partners in sharing vital information determines the effectiveness of the partnership, where vital information is concealed the aim of the partnership may not be achieved irrespective of the number of partnerships entered.
2. **Resources:** where resources allocated to implement the partnership are not adequate, its effectiveness will be questionable.
3. **Capacity to implement and enforce regulations:** the capacity of the collaborating agencies in the implementation and enforcement of the partnership also determines its effectiveness, where such are lacking, the partnership will be ineffective.
4. **Continual Assessment and Evaluation:** Continual assessment and evaluation of the internal and external partnership is a significant factor in determining their effectiveness. This can be achieved through withdrawing from obsolete ones, maintaining effective ones and exploring new opportunities for fruitful partnership.

The respondents further stressed the importance of strengthening bilateral and multilateral partnerships in effective prevention of technology-induced money laundering. In this, insights were given by a respondent from NFIU, viz:

> "*Enhancing both bilateral and multilateral partnerships with Nigeria's internal and external collaborators is imperative to combat technology-induced money laundering effectively. Strengthening ties with external stakeholders facilitates the alignment of legal frameworks and regulatory standards, closing potential loopholes that tech-savvy money launderers could exploit. This coordinated effort contributes to establishing a coherent and resilient global framework for tackling technology-driven money laundering. (Money Laundering Control Expert -NFIU)*"

Further thematic analysis across the responses from the regulatory agencies revealed important themes with respect to impact of strengthening bilateral and multilateral partnerships on effective prevention of technology-induced money laundering as analyzed below:

1. **Enhanced Information Sharing:** Bilateral and multilateral partnerships can facilitate the exchange of information and intelligence between Nigeria and other countries. This collaboration is crucial in identifying cross-border money laundering activities conducted through technology platforms and coordinating efforts to prevent such illicit financial flows.
2. **Harmonization of Legal Frameworks:** Strengthening partnerships with external stakeholders allows for the harmonization of legal frameworks and regulatory standards. This alignment helps ensure that there are no loopholes that can be exploited by money launderers using

technology. It enables the creation of a consistent and robust global framework to combat technology-induced money laundering.

3. **Capacity Building:** Partnering with external stakeholders provides opportunities for capacity-building initiatives. Nigeria can benefit from technical assistance, training programs, and knowledge sharing from more advanced jurisdictions. These initiatives can enhance the capabilities of Nigerian institutions and stakeholders in combating technology-induced money laundering.
4. **International Cooperation in Investigations:** Bilateral and multilateral partnerships enable greater cooperation between law enforcement agencies and regulatory bodies across jurisdictions. This cooperation is vital in investigating and prosecuting complex cases of technology-induced money laundering that involve multiple countries or jurisdictions.
5. **Access to Technical Expertise:** Collaborating with external stakeholders can give Nigeria access to technical expertise and innovative solutions in the field of financial technology and anti-money laundering. This knowledge transfer can help Nigeria stay abreast of advancements in technology and develop effective measures to counter emerging risks.
6. **Promoting Confidence in the Financial System:** Strong partnerships with external stakeholders contribute to building trust and confidence in Nigeria's financial system. This improves Nigeria's reputation as a responsible and secure financial hub, attracting foreign investment and fostering economic growth.

Overall, strengthening bilateral and multilateral partnerships with both internal and external stakeholders is essential for Nigeria to effectively prevent technology-induced money laundering. It allows for improved information sharing, harmonized legal frameworks, enhanced capacity, international cooperation, and access to technical expertise, all of which are crucial in combating this global financial crime. Nevertheless,

the respondent from regulatory agencies offered some recommendations with respect to the prevention of financial technology-induced money laundering. Several recommendations were made in this regard. For instance, a respondent from the Ministry of Justice recommended that:

> *"To fortify the legal and regulatory framework, it is crucial to update existing laws and regulations, specifically targeting the risks associated with financial technology-induced money laundering. This entails incorporating provisions for robust customer due diligence, comprehensive transaction monitoring, and mandatory reporting of suspicious activities. These updates are essential for staying*

ahead of evolving financial technologies and effectively countering money laundering (Money Laundering Law Expert – Ministry of Justice)"

Furthermore, thematic analysis of the recommendations from all the participating experts in the interview revealed some interesting themes of policy recommendation as shown in the following

1. **Strengthen Regulatory Framework:** Enhance the legal and regulatory framework by updating existing laws and regulations to address the specific risks posed by financial technology-induced money laundering. This should include provisions for customer due diligence, transaction monitoring, and reporting suspicious activities.
2. **Collaboration and Information Sharing:** Encourage cooperation and the exchange of information among regulatory bodies, law enforcement agencies, financial institutions, and technology service providers. This involves creating avenues for sharing information, intelligence, and best practices to detect evolving trends in money laundering associated with financial technology.
3. **Enhance Customer Due Diligence:** Implement robust Know Your Customer (KYC) procedures for financial institutions and technology service providers. This includes verifying the identity of individuals or entities involved in transactions and assessing their risk profiles. Utilize digital identity verification technologies to strengthen the accuracy and efficiency of the KYC process.
4. **Implement Transaction Monitoring:** Create and implement efficient systems for monitoring transactions to identify any suspicious activities carried out on financial technology platforms. Utilize cutting-edge analytics, machine learning, and artificial intelligence methods to detect patterns and irregularities that may indicate money laundering.
5. **Training and Awareness Programs:** Conduct regular training and awareness programs for financial institutions, technology service providers, and relevant stakeholders to educate them about the risks of financial technology-induced money laundering. This will help improve their understanding of red flags, reporting obligations, and the importance of compliance with anti-money laundering regulations.
6. **International Cooperation:** Strengthen international cooperation and collaboration with other countries and international organizations to counter cross-border financial technology-induced money laundering. This includes sharing intelligence, harmonizing regulatory frameworks, and aligning efforts in combating this global issue.
7. **Continuous Monitoring and Evaluation:** Regularly monitor and evaluate the effectiveness of preventive measures and partnerships in addressing financial technology-induced money

laundering. Periodic assessments will help identify areas of improvement, keep pace with evolving threats, and ensure the implementation of adequate preventive measures.

Therefore, it is unarguable that by implementing these recommendations, Nigeria can enhance its ability to prevent financial technology-induced money laundering and protect its financial system from illicit activities.

7.4 Summary

This chapter aimed at analyzing the qualitative data collected through interviews with view to complementing the result from the survey used to achieve the three objectives of the study and answering the corresponding research questions. Towards achieving this, the qualitative analysis was conducted using thematic analysis using the 5 steps identified in the literature. Therefore, analysis of the interview data using thematic analysis produced in line with the three objectives of the study. The result revealed that FinTech has both positive and negative effects on money laundering. The result also revealed that cryptocurrencies and virtual currencies, online payment platforms, digital remittance services and online banking as the most common FinTech tools used in perpetuating money laundering by the criminals. It was also revealed that emergence of cryptocurrency amplified the effect of FinTech on money laundering due to issues of anonymity, borderless transactions, lack of regulation, and tumbling and mixing services. It was also found that challenges associated with the application of technology in countering money laundering include limited technology infrastructure, digital divide, lack of awareness and training, dynamic regulatory environment and cross-border challenges. With respect to the role of financial regulation in strengthening the effect of FinTech on Money Laundering, it was found that efforts have been made to develop and implement laws and regulations to address money laundering, including that which occurs through financial technology, however, the country would likely face some challenges in developing regulatory frameworks with respect to cross-border transactions, cross-border digital identity verification and ongoing technological advancements. Lastly, with respect to the role of knowledge sharing and partnerships, it was found strengthening cross-border knowledge sharing as well as bilateral and multilateral partnerships could serve as an effective mechanism in the prevention of technology-induced money laundering.

8.0 TEST OF ROBUSTNESS

8.1 Overview

The term robustness test has been considered as a process of evaluating the resilience and stability of a system or results under different conditions (Castellazzi et al. 2016). Within the context of technology, robustness involves subjecting the system to different forms of inputs, abnormal loads, or even adverse conditions to assess its performance and reliability (Castellazzi et al. 2016). Literature highlights several ways through which robustness tests can be conducted (Nuijten, 2022). Firstly, in the field of technology, robustness test can be conducted through the identification of potential stressors with the intent of determining the types of stressors or adverse conditions that could affect the system, which could include irregular inputs, high loads, network disruptions, hardware failures as well as other environmental factors. Secondly, it can also be conducted through scenario analysis under different conditions and monitor behaviour under different scenarios. Thirdly, robustness test can be performed through measuring performance metrics such as resource utilization, error rates, response times, as well as system stability indicators during the tests. Therefore, conducting robustness test give a researcher some level of confidence of the reliability of method or approach used by obtaining closely same results under different methods and approaches.

In line with the above background, several studies have argued for and against questionnaire research. The common weaknesses cited in extant literature include response bias, external validity problem, high cost of administering questionnaire, validity of instruments, coverage bias, poor selection of respondents, among others. To ensure that the empirical findings are protected from the above-listed problems, a robustness check using secondary data sources will be undertaken. This approach provides ample opportunity to compare the secondary data results with the main findings of the study.

8.2 Data and Data Sources

To validate the empirical findings of the main analysis, a robustness test was conducted using secondary data. The secondary data included monetary values representing proxies for financial technology (POS, ATM, mobile phone, and internet banking), regulatory quality, corruption, trade openness, broad money (M2), GDP, money laundering, financial literacy, and cash-based transactions. Annual data for the test were collected from the Ministry of Justice, the Central Bank of Nigeria database, and the World Development Indicators, covering the period from 2008 to 2022, based on data availability. Although the Central Bank of Nigeria began publishing FinTech data in January 2003 under the broad category of payment channels, it only started releasing disaggregated data on FinTech

in 2008. This disaggregated data includes information on web-based transactions, point-of-sales, mobile payments, and ATM transactions, categorized by both volume and value, which influenced the chosen period for the robustness test.

The datasets are not without limitations. For instance, most of the variables such as POS, ATM, mobile phone, and internet banking, broad money (M2), money laundering, among others were collated by the Central Bank of Nigeria for regulatory purposes and not specifically for research purposes. However, the datasets have been used extensively by the Central Bank and other scholars for research purposes (Ujunwa et al., 2022; Ujunwa et al., 2021; Onah et al., 2021). Other limitation includes incomplete, inaccurate, or biased due to errors in collection or processing by the source, unknown methodologies, bias in collection, publication lag, researcher's limited control over data collection, insufficient metadata, comparability and compatibility challenges, ethical and legal constraints, and other generalisation risks. For instance, while secondary and university degrees may be used as school enrolment, we used them as a measure of financial literacy due to the strong correlation of the data with financial literacy.

To address these limitations, we took the following steps:

a) Reliance on Credible Sources: To ensure the reliability and credibility of the data, we relied on Central Bank of Nigeria database, Economic and Financial Crime database, and World Bank World Development Indicators.
b) Combining with Primary Data: The dataset is used to validate the findings of primary data.

8.3 Description of Research Variables

The variables are broadly classified into dependent, independent variables, moderating variables, and controlled variables. The subsections present the categorisation of the sections and the justification for selecting the variables.

8.3.1 Dependent Variables – Money Laundering

The dependent variable is money laundering defined illegal process of concealing the source of criminal or illegal proceeds by making it appear to have come from a legal business or venture (Odu, 2020). The anecdotal evidence tends to suggest that financial technology has promoted money laundering. A good example is the accusation by the Asset Recovery Agency of Kenya, (ARA) that Flutter Wave, a Nigeria FinTech was serving as a laundering conduit for Nigerians in Kenya (TechPoint Africa, 2022). Similarly, a US court in Texas sentenced two Nigerians to 27 months in

prison for using their FinTech Company Ping Express U.S. LLC to launder $160 million in fraud earnings to Nigeria (Premium Times, 2022). Such anecdotal evidence from so many reported and convicted cases influenced the decision to empirically investigate this relationship. Money laundering was defined as the total monetary value of proceeds of crime reported by the Economic and Financial Crime Commission (EFCC) in Nigeria each year. This is represented as the natural logarithm of total monetary value laundered in Nigeria and reported by EFCC each year. Money laundering is mathematically represented as follows:

LML = natural logarithm of the total monetary value of laundered money reported by the Economic and Financial Crime Commission. . . . . (8.1)

8.3.2 Independent Variables - Financial Technology

The independent variable of interest is financial technology. Financial technology is defined as payment and settlement through digital platforms. In Nigeria, digital platforms are broadly classified into Web-Based, Point-of-Sales, Mobile Payment, Electronic Cards, ATM, Dollar Denominated Card, NEFT, NIP, EBILLSPAY, Remita, Central Pay, and M-Cash. Intuitively, it would have been plausible to adopt one measure of financial technology. Mudiri (2017), Morawczynski (2015), Rafe and Nitin (2015 & 2016) have argued against studies that adopt only one measure of financial technology, because each product or channel has special implication on the financial system. To circumvent this problem, the four dominant FinTech channels in Nigeria were adopted for the analysis, including Web-Based, Point-of-Sales, Mobile Payment, and ATM transactions. The total monetary value of each channel was used to measure financial technology. The different channels of financial technology are defined as follows:

8.3.2.1 Value of Web-Based Transaction (WBT):

Web-based transactions measure the total value of transactions through the Internet. Internet banking has become a veritable platform for fund transfer, payment, and settlement. Most FinTech companies simply undertake banking transactions online via the Internet. It is also referred to as Internet banking. Most FinTech products are internet-enabled and serve as a significant channel for money laundering. The value of web-based transactions is measured using the natural logarithm and is represented mathematically as follows:

LWBT = natural logarithm of the total monetary value of internet transaction. . (8.2)

8.3.2.2 Value of Mobile-Based Transaction (MMA):

Mobile-based transaction in clear terms is the total value of banking transactions executed through the mobile phone. This is another digital platform for financial transactions. This digital finance platform gained tremendous acceptability in Nigeria because of the high mobile penetration rate. The value of mobile-based transactions is measured using the natural logarithm of the variable, mathematically represented as follows:

LMMA = natural logarithm of the value of the mobile-base transaction. . (8.3)

8.3.2.3 Value of Electronic Transaction (EFT):

This variable is used to measure the relationship between electronic transfer and money laundering. NDIC annual reports revealed that electronic transactions in Nigeria remained the highest form of fraud in the Nigerian banking system since 2009 till date. The natural logarithm of the total value of electronic-based transactions is adopted as a measure of this proxy, mathematically represented as follows:

LEFT = natural logarithm of the value of Electronic Fund Transaction. . (8.4)

8.3.3 Moderating Variables

One cardinal aspect of the study is examining the moderating effect of financial regulation and financial literacy on the relationship between financial technology and money laundering. This implies that financial regulation and financial literacy are the moderating variables for the study. The definition and measurement of the moderating variables is discussed below.

8.3.3.1 Financial Regulation

It has been established in extant literature that financial regulation is measured by regulatory quality, which is a major driver of money laundering (see Barajas et al. 2016; NDIC Annual Report, 2012; Danisman & Demirel, 2019; Wang, Ashton & Jaafar (2019); Zheng, et al. 2018; Greenbaum, Thakor & Boot, 2019; Curt & Mihov, 2018). These studies adopt different measure of regulatory quality. The four commonly used measures of regulatory quality are the corruption perception index by Transparency International (Danisman & Demirel, 2019, and Wang, Ashton & Jaafar (2019), the CPIA transparency, accountability, and corruption in the public sector rating (Greenbaum, Thakor & Boot, 2019; Curt & Mihov, 2018), regulatory quality as measured by the Worldwide Governance Indicators (.Barajas et al, 2016), and the legal codes and enforcement quality espoused by LaPorta et al. (1997, 1998, 1999, 2000). This study will adopt the LaPorta et al. (1997, 1998, 1999, 2000) measures of

regulatory quality since it is the most used for measuring regulatory quality of developing economies. More importantly, the dummies capture the reality of the Nigerian financial system.

LaPorta et al (1997, 1998, 1999, 2000) anchored regulatory quality on the effectiveness of enforcing the decisions or pronouncement of judiciary. LaPorta et al (1999) describe finance as a set of contracts and the effectiveness of finance depend largely on the enforcement of the contracts and the protection of creditors' rights, which largely depend on regulatory quality. The index of enforcement (ENFORCE) and creditors' rights (CREDITOR) are adopted as measures of regulatory quality.

Creditor rights measure effectiveness loan repayment enforcement by banks. There are differences in the legal system in terms of the ability of banks in enforcing loan repayment. For instance, during corporate reorganisation, the power of a bank to remove managers is not universal. During bankruptcy, the right of secured creditors relative to other claimants, is also different across jurisdictions. Four measures of legal rights, based on Nigerian corporate laws, were adopted.

AUTOSTAY: This accesses the easy of gaining access and liquidating a collateral for a defaulted borrower. In jurisdictions where a bank cannot easily possess a collateral upon default by a customer, the regulatory quality is deemed weak. So, we use a binary number of 0 and 1, to measure autostay based on companies and allied matters act, 2020 (CAMA 2020). A value of 0 is assigned if there is a restriction on accessing collateral, and a value of 1 is assigned if there is no restriction.

AUTOSTAY is directly linked to MANAGES. It evaluates the defaulter's capacity to utilize the collateralized assets throughout the reorganization process. In cases where a specific team appointed by the court or creditors takes over the management of the assets or company temporarily, the AUTOSTAY score is 1. Conversely, if the existing management remains in control until a final verdict is reached, the score is 0. The rationale behind this is that in legal systems where the management remains unchanged during the firm's resolution, there is a higher risk of fraud and unethical behavior.

SECURED examines the extent of protection to secured creditors during liquidation. A value of 1 is assigned if secured creditors are ranked first before unsecured creditors in the distribution of proceeds from a bankrupt firm. Conversely, a value of 0 is assigned if non-secured creditors, such as government workers, are prioritized over secured creditors. The intuition is that ranking non-secured creditors in whatever form before a secured creditor discourages lending and weakens regulatory quality.

CREDITOR is the average score of AUTOSTAY, MANAGES, and SECURED. It takes the value between 1 (best) and 0 (worst). Higher creditor value indicates a high quality of regulation and vice versa. Specifically,

CREDITOR = the average score of AUTOSTAY+MANAGES +SECURED.(8.5)

Enforcement is the second pillar of this measure. The effectiveness of higher values of CREDITORS depends largely on enforcement. There could be situations where secured creditors are protected by the provisions of the law, yet enforcement is redundant. Enforcement, therefore, is used to measure the quality of enforcement of extant regulations. Enforcement is broadly divided into CONRISK and RULELAW.

CONRISK assesses the power of government in modifying a signed contract. Where a government can modify a signed contract, the implication is that in such a clime, the government can reduce the government's financial obligation, postpone, or repudiate a signed contract. In such jurisdiction, contract risk is very high CONRISK varies from 10, indicating a low risk of contract modification, to 1, indicating a high risk of contract modification.

RULELAW evaluates the law-and-order tradition of the country, ranging from 10 for a strong tradition to 1 for a weak tradition.

ENFORCE = the average of RULELAW and CONRISK. . . . (8.6)

8.3.3.2 Financial Literacy

Financial literacy is extremely crucial in combating money laundering, given the increasing sophistication in digital financial products. Financial literacy would reduce identity theft and money laundering through effective compliance with password policy to protect identity vulnerability or identity theft. These sophistications include password policy (two or three-way authentication), safe keeping of password and digital products such as ATM, POS and token, detection of fraudulent websites, and user friendliness. Fujiki (2020) recently found that the owners of crypto currencies in Japan *"tend to have higher financial literacy from two perspectives: a measure of objective financial literacy and the experience of financial education at school, and lower financial literacy from three perspectives: the experience of financial education about money management by parents at home, experience of financial troubles, and knowledge about credit cards, than average non owners".* Financial literacy is measured using the World Bank's metric as reported in the World Development Indicator, mathematically represented as follows:

FLT = percentage of people ages 15 and above with the internal capacity to act in one's best financial interest, given socioeconomic and environmental condition.. (8.7)

8.3.4 Control Variables

To ensure that the findings are comparable with similar empirical evidence, other important explanatory variables that capture determinants of money laundering are introduced as controlled variables.

8.3.4.1 Bank Development (BKD):

The level of bank development is another important determinant of money laundering. Banking system in the early stage of development is fraud prone as seen in the history of indigenous banks in Nigeria from 1929 to 1979 (Uche, 1996 a, b & c). Similarly, the ever-increasing disparity in the development of the financial system between developed and developing economies creates opportunity for money laundering. Banking system development is measured using the ratio of liquid liabilities (M2) to GDP. Similar studies that have used this measure are Barboza & Vasconcelos (2019), Choi (2019), Onder and Ozyildirim (2019), and Gokmenoglu & Rustamov (2019). The measure is mathematically presented as:

$$BKD = M2/GDP \quad . \quad . \quad . \quad . \quad . \quad . \quad . \quad (8.8)$$

8.3.4.2 Level of Infrastructure Investment (IFI)

Studies have shown that the ever-increasing disparity in the quality of infrastructure development between developing and developed countries is a major driver of money laundering in developing economies (Uche, 1998). The impact of the level of infrastructure development on money laundering is measured using infrastructure investment as a proxy, mathematically represented as follows:

LIFI = natural logarithm of the value of Infrastructure investment . (8.9)

Table 8.1- Description of Research Variables (Source: Authors creation)

S/N	Variables	Description	Annotation	Data Source
1	Money Laundering	The monetary value of laundering crimes reported to the Economic and Financial Crime Commission (EFCC) in Nigeria each year	lnMNLD = natural logarithm of total monetary value of laundered money reported by the Economic and Financial Crime Commission (EFCC)	EFCC database
2	Financial Technology	Financial technology refers to financial transactions (payments and settlement) through digital	FinTech 1.Web-based = ln (VWBT) 2. Mobile Banking = (MMA).	WDI and Central Bank

		platforms. The digital platforms of interest are web-based, ATM, POS, and Mobile Banking.	3. Electron Fund Transaction = (EFT)	of Nigeria Database
3	Infrastructure Investment	The level of investment in infrastructure development	IFI = ln (IFI)	WDI
4	Financial Regulation	Financial Regulation is a measure of the quality of financial regulation using LaPorta et al.,1997 index quality of enforcement and creditors right.	(FIREG) ENFORCE = the average of RULELAW and CONRISK	WDI
5	Financial Literacy	The number of people with a secondary school certificate or university degree per 100,000 resident population in Nigeria each year	lnFILIT = natural logarithm of number of people with a secondary school certificate or university degree per 100,000 resident population in Nigeria each year.	WDI
6	Bank Development	Bank development is measured by broad money (M2) divided by GDP.	BKD = M2/GDP	WDI

8.4 Techniques of Analysis

Autoregressive Distributed Lag (ARDL) is a form of statistical technique used in econometrics to examine long-term relationships across number of variables within using time series data (Nkoro & Uko 2016). This methodological approach serves as a vital tool for researchers whose purpose of the study centred on the analysis of evolving dynamics of economic variables and estimating their interconnections over time. ARDL holds several key components including the Autoregressive (AR) Component which is used to estimate the correlation between a variable and its preceding values, by addressing in an effective way the serial correlation often said to have been associated with time series data (Nkoro & Uko, 2016). There is also a Distributed Lag (DL) Component which integrates distributed lag components by explaining the delayed effects of one variable over another. This component enables researchers to model dynamic relationships between variables across different periods. The third component is Long-Run and Short-Run Effects, this component of ARDL is applied to facilitate the variation between the consistent equilibrium relationship that exists between variables

that is long-run relationship and the non-consistent adjustments towards the said equilibrium, explaining the short-run relationship. The fourth component of ARDL is the Inclusion of Lagged Variables which is carried out by ARDL models through the integration of lagged values of both endogenous and exogenous variables. it is important to note that the determination of lag lengths of the ARDL model often relies on statistical measures such as the Akaike Information Criterion (AIC) or Bayesian Information Criterion (BIC). The fifth component is called Estimation and Inference which is a component of ARDL models that involves some techniques such as ordinary least squares (OLS) regression. Therefore, in this model, the inference with respect to the coefficients is achieved through standard statistical tests through the consideration of factors such as serial correlation and potential endogeneity. The last component of ARDL is Model Selection which enables ARDL to evaluate the co-integration between variables by signifying the potentials of an enduring relationships. Model selection is often conducted via some forms of tests such as the Bounds test or the Pesaran et al. (2001) test.

Considering its robustness in testing both long term and short-term relationships, ARDL models have used in wider empirical econometric analysis in many fields including but not limited to macroeconomics, finance, and other domains for which time series data is commonly applied. Thus, ARDL offers a versatile framework for exploring the dynamic interactions between variables, particularly in relation to non-stationary time series as well as differential integration orders among variables (Kripfganz & Schneider, 2023).

Therefore, the ARDL co-integration test is employed to examine the correlations between financial technology and money laundering in Nigeria, both in the long-run and short-run. This approach is chosen for several reasons. Firstly, it utilizes the OLS estimator to estimate the co-integration relationship and determine the lag order of the model, which sets it apart from other multivariate co-integration methods like Johansen and Juselius (1990). Secondly, it allows for different variables to be assigned distinct lag-lengths within the model. Thirdly, it enables the simultaneous assessment of the long-run and short-run parameters of the models (Pesaran et al., 2001). The bounds test is employed to estimate the long-run relationship of variables using the Wald test (F statistic). The computed F-statistic is then compared to the critical value provided in Pesaran et al (2001). To utilize the bounds test, all variables must be expressed as order zero for the lower bound and order one for the upper bound. In line with the objectives of the study, the ARDL would be used to estimate the following functional relationships:

Model 1:

Examine the moderating effect of regulation and financial literacy on the relationship between web-based transaction and money laundering in Nigeria. This is represented as:

$$LML = f(LWBT, RQT, LEFT, FLT\ BKD\ LIFI) \quad - \quad - \quad - \quad (8.10)$$

Model 2:

Examine the moderating effect of regulation and financial literacy on the relationship between mobile money adoption and money laundering in Nigeria.

$$LML = f(MMA, RQT, LEFT, FLT\ BKD\ LIFI) \quad - \quad - \quad - \quad (8.11)$$

Model 3:

Examine the moderating effect of regulation and financial literacy on the relationship between electronic fund transfer and money laundering in Nigeria.

$$LML = f(LEFT, FLT, BKD, RQT, LIFI) \quad - \quad - \quad - \quad (8.12)$$

8.5 Discussion of Results

8.5.1 Model 1 – Web-based Transaction and Money Laundering

The discussion of the results is structured along the three models above. Model 1 examines the moderating effect of regulation and financial literacy on the relationship between web-based transaction and money laundering in Nigeria. The analysis relies on annual data from 1984 to 2022. Table 8.2 presents the descriptive results. The result indicates that bank development (BKD) measured as ratio of broad money (M2) to GDP averaged 16.98% within the review period. This indicates exponential growth in money supply in Nigeria within the review period. Increase in money supply, especially, liquid liabilities could translate to the predominance of a cash-based economy, which could be a major driver of money laundering in Nigeria.

Web-based transactions (WBT) averaged US$9.03 billion per annum for the review period. The dataset also suggests a continuous increase in the volume and value of transactions via the web (internet banking). Nigeria's infrastructure investment averaged US$1.25 billion within the review period and the lower value of the standard deviation of US$0.45 indicates that the series are clustered around the mean. The descriptive result also suggests that on average US$0.65 billion is laundered annually in Nigeria. This is consistent with Bakre (2019), who reported that Nigeria loses approximately US$600 million annually to money laundering. A standard deviation of US$0.21 indicates that the data are clustered tightly around the mean. This figure may have underrepresented the amount laundered

annually, as it relies on official sources based on convicted cases. For instance, the Civil Society Legislative Advocacy Centre (CISLAC) projected that Nigeria loses about US$15.7 billion annually to money laundering (CISLAC, 2021).

While the Central Bank of Nigeria has made a giant stride in promoting financial inclusion to 61.1 percent and targets a 95 percent inclusion rate by January 2024, the rate of financial literacy (FLT) is very low. The descriptive result indicates a mean of 25.60 per cent rate of financial literacy in Nigeria. The minimum rate of financial literacy was 11.33 per cent in 2002 and the maximum value of 39.70 per cent rate in 2017. A low standard deviation of 7.99 per cent is an indication that the data is clustered around the mean.

Regulatory quality (RQT) averaged 4.86 percent during the review period. This suggests remarkable improvement in the quality of financial system regulation considering a total scale of 10 percent. This result also suggests that financial system regulatory quality witnessed drastic improvement relative to the regulatory quality of the entire economy. For instance, in 2021, Nigeria scored 15.87 percent in regulatory quality, reflecting the government's perceived ability to create and enforce effective policies and regulations that facilitate private sector growth, as reported by the World Bank.

Table 8.2: Descriptive Result of Model 1 (Source: Authors creation)

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
BKD	16.98	14.46	27.38	9.06	5.99	0.38	1.48	4.58
WBT	9.03	2.50	72.73	1.00	16.16	2.81	10.07	128.98
IFI	1250000000	1110000000	1980000000	531000000	454000000	0.29	1.75	3.00
ML	653000000	693000000	985000000	261000000	213000000	-0.27	2.03	1.92
FLT	25.60	23.92	39.70	11.33	7.99	0.067	1.92	1.89
RQT	4.86	4.84	7.00	3.05	1.23	0.08	1.69	2.75

The presence of multicollinearity among the dependent variables is tested using the results of the Spearman correlation, as presented in Table 8.3. Empirical studies suggest that correlations of less than 80% should not be an immediate source of concern to researchers (Hair *et al*. 2010; Higaki, 2021; Hu *et al*. 2022; Al-Matari, 2022). The correlation between the independent variables ranges between 50 percent and 1 percent, which is less than the 80 percent threshold. This implies that the presence of multicollinearity may not bias the results.

Table 8.3: Spearman Correlation Results (Source: Authors creation)

	LML	LWBT	RQT	LEFT	FLT	BKD	LIFI
LML	1.00						
LWBT	-0.11	1.00					
RQT	0.46***	0.16	1.00				
FLT	-0.10	-0.10	-0.05	-0.02	1.00		
BKD	0.04	0.50***	0.07	0.40***	-0.01	1.00	
LIFI	0.14	-0.08	0.11	-0.15	-0.01	0.00	1.00

Note: * p<0.05, ** p<0.01, *** p<0.10.

BKD (Bank Development) = ratio of broad money to GDP; LWBT (web-based transaction) = natural logarithm of total value of web-based transaction; RQT (Regulatory Quality) = the average of RULELAW and CONRISK; FLT (Financial Literacy) = percentage of people ages 15 and above with the internal capacity to act in one's best financial interest, given socioeconomic and environmental condition; and LIFI (Infrastructure Investment) = natural logarithm of Infrastructure Investment.

Given the reliance on time series data for the analysis, proceeding with the estimation without testing for the stationarity property of the variables could be misleading, as the stationarity properties of the series are critical for applying the ARDL estimation technique. The study employed the Philip-Perron (PP) and Augmented Dickey-Fuller (ADF) tests, and the results are presented in Table 8.4. The null hypothesis states that a unit root test is present, and for it to be rejected, the statistical value for each dimension of the test must be lower than the critical value. The results from the PP and ADF tests show that all variables in the series are stationary at the level, except for the bank development proxy (BKD), which is stationary at the first difference. The series meets the initial requirement for ARDL analysis. Specifically, ARDL is suitable for series that exhibit a combination of stationary properties at the level and first difference. ARDL does not necessitate that all variables are integrated in the same order.

Table 8.4: Philip-Perron (PP) and Augmented Dickey-Fuller (ADF) Unit Root Test Results (Source: Authors creation)

PP Result

Variables	**At Level**			**At First Difference**	
	With Constant	With Constant & Trend	Decision	With Constant	With Constant & Trend
LML	-6.10***	-6.01***	I(0)	-11.80***	-11.92***
LWBT	-0.11	-2.26	I(0)	-9.06***	-10.54***
RQT	-7.67***	-7.46***	I(0)	-25.60***	-29.51***
FLT	-16.50***	-17.83***	I(0)	-23.69***	-24.63***
BKD	-0.72	-2.20		-6.61***	-7.20***
LIFI	-6.22***	-6.28***		-10.68***	-10.53***

ADF Result

Variables	**At Level**			**At First Difference**	
	With Constant	With Constant & Trend	Decision	With Constant	With Constant & Trend
LML	-6.09***	-6.00***		-8.20***	-8.09***
LWBT	0.43	-2.29		-8.99***	-9.17***
RQT	-7.10***	-6.97***		-7.15***	-6.57***
FLT	-7.37***	-7.26***		-6.34***	-6.27***
BKD	-0.90	-2.98		-4.95***	-4.88***

LIFI	-6.22***	-6.27***		-8.74***	-8.62***

Note: The "***" indicates significance at the 1% level. * p<0.10%, ** p<0.05%, and *** p<0.01%. BKD (Bank Development) = ratio of broad money to GDP; LWBT (web-based transaction) = natural logarithm of total value of web-based transaction; RQT (Regulatory Quality) = the average of RULELAW and CONRISK; FLT (Financial Literacy) = percentage of people ages 15 and above with the internal capacity to act in one's best financial interest, given socioeconomic and environmental condition; and LIFI (Infrastructure Investment) = natural logarithm of Infrastructure Investment.

Determining the optimal lag of the model is also important before proceeding with the Bounds test. Table 8.5 presents the result of the lag selection criteria. Lag 4 is selected using the AIC, FPE, and LR selection criteria.

Table 8.5: Optimal Lag Selection Criteria (Source: Authors creation)

Lag	LogL	LR	FPE	AIC	SC
0	-344.55	NA	36.36	20.62	20.89*
1	-282.09	99.21	7.95	19.06	20.95
2	-251.40	37.90	13.40	19.38	22.88
3	-205.77	40.26	14.16	18.81	23.93
4	-102.79	54.52*	1.35*	14.87*	21.60

Note: * p<0.10%, ** p<0.05%, and *** p<0.01%.

Given that lag 4 has the best values for LR, FPE, and AIC, it is selected as the optimal lag. While SC suggests a simpler model (lag 0 with the lowest SC value), the combined consideration of LR, FPE, and AIC strongly indicates that lag 4 provides the best balance of fit, predictive accuracy, and complexity for the dataset at hand.

To investigate the presence of long-term relationships among the variables, the bounds test approach is utilized. This approach is preferred over other tests, such as the Engel-Granger and Johansen tests, due to its advantages (Pesaran et al. 2001). The outcome of the bounds test, presented in Table 8.6, indicates the existence of long-term cointegration among the variables. To ensure the reliability of the findings, diagnostic analysis is conducted to assess the model's goodness of fit. The diagnostic tests

performed include the Breusch-Godfrey (BG) test for serial correlation, the Jarque-Bera test for normality, and the Autoregressive Conditional Heteroscedasticity (ARCH) test for heteroscedasticity.

Table 8.6: Results of the ARDL Cointegration Test (Source: Authors creation)

	ARDL Structure	**F-statistics**	**Normality**	**BG LM test (1)**	**BPG Heteroskedasticity test**	**ARCH Test (1)**
F (LML, LWBT, RQT, FLT, BKS, LIFI)	(4,2,4,4,4,3)	5.535***	0.291	0.987	0.987	0.251

Note: * p<0.10%, ** p<0.05%, and *** p<0.01%.

The critical values at the upper (lower) bounds of 1%, 5%, and 10% are as follows: 3.41(4.68), 2.62(3.79), and 2.26(3.35), respectively. These critical values were obtained from Peseran et al. (2001) with a restricted trend. The reported values for the normality test, Breusch-Godfrey Serial Correlation LM test (BG LM test), Breusch-Pagan-Godfrey Heteroskedasticity Test (BPG Heteroskedasticity test), and ARCH test represent the probability values of the F-statistics. It is important to note that ARDL stands for autoregressive distributive lag. The symbols ** and *** indicate statistical significance at the 5% and 1% levels, respectively.

In line with the objectives of investigating the moderating effect of financial literacy and financial regulation on the relationship between financial technology and money laundering using web-based transaction, this section is dedicated to analyzing the regression results. The ARDL long and short-run regression result is presented in Table 8.7. The short-run result reveals that web-based transaction (WBT) is a major driver of money laundering in Nigeria. The short-run result also reveals that regulatory quality and financial literacy are significant moderators of the relationship between money laundering and financial technology. Specifically, regulatory quality and financial literacy are negative predictors of money laundering. This is consistent with the findings that digital payments channels such as internet banking could be potential sources of money laundering. The ECT has the expected signs, implying that whenever there is disequilibrium, it converges back to its long-run function. The long-run result is consistent with the short run result. The coefficient of web-based transaction is a positive driver of laundering in Nigeria, and the moderating variables are negative predictors.

Table 8.7: ARDL Regression Result (Source: Authors creation)

Dependent Variable: Long-Run Estimation	*LML*
Constant	-19.23***
	(2.278)
Trend	0.162***
	(3.051)
LWBT	0.090***
	(0.052)
RQT	-0.106**
	(0.040)
FLT	-0.018***
	(0.011)
BKD	-0.083***
	(0.104)
LIFI	-0.045
	(0.111)
Dependent variable: Short-run estimation	Δ*LML*
ΔLWBT	0.130***
	(0.076)
RQT	-0.148*** (0.048)
ΔFLT	-0.007***
	(0.008)
ΔBKD	0.038***
	(0.026)
ΔLIFI	-0.062
	(0.156)
ECT (-1)	-0.398***
	(0.232)

Notes: *, **, *** imply statistical significance level at 10%, 5% and 1% respectively. Values in parentheses represent the standard errors.

8.5.2 Mobile Money Adoption and Money Laundering

This subsection examines the effect of mobile money adoption on money laundering in Nigeria. The descriptive result is presented in Table 8.8. The descriptive results have been discussed previously except for the mobile money adoption (MMA) variable. The descriptive result indicates a 59.19 per cent mobile adoption rate in Nigeria. A standard deviation of 29.33 is an indication that the data are clustered around the mean.

Table 8.8: Descriptive Result (Source: Authors creation)

Variables	Mean	Median	Max	Min	Std. Dev.	Skewness	Kurtosis	Jarque-Bera	Obs
FLT	25.59957	23.91827	39.69822	11.32982	7.986028	0.066068	1.915634	1.889407	38
IFI	1250000000	1110000000	1981026647	530864236	4.54E+08	0.290485	1.752411	2.998839	38
ML	653000000	693000000	985000000	261000000	2.13E+08	-0.26527	2.034366	1.922024	38
MMA	59.1921	66.07003	99.90669	4.7781	29.33486	-0.3786	1.813119	3.138206	38
BKD	16.98431	14.45851	27.37879	9.063329	5.9936	0.384043	1.483475	4.575525	38
RQT	4.860317	4.836837	6.995674	3.052639	1.234275	0.08376	1.691984	2.753366	38

The presence of multicollinearity among the dependent variables is determined based on the Spearman correlation results in Table 8.9. Research findings indicate that correlations below 80% should not raise immediate concerns for researchers (Hair et al. 2010; Higaki, 2021; Hu et al. 2022; Al-Matari, 2022). The correlation among the independent variables falls between 50% and 1%, which is below the 80% threshold. Therefore, it is unlikely that multicollinearity will impact the results.

Table 8.9: Correlation Matrix Result (Source: Authors creation)

	MMA	LML	RQT	LIFI	FLT	BKD
MMA	1.000					
LML	0.150***	1.000				
RQT	0.041**	-0.460***	1.000			
LIFI	0.104***	0.139	0.115**	1.000		
FLT	0.265***	-0.103**	0.050**	0.009***	1.000	
BKD	0.231***	-0.041**	0.071***	0.003**	-0.007***	1.000

The analysis relies on time series data, and it is crucial to test for the stationary property of the variables before proceeding with the estimation. Neglecting this step could lead to misleading results, as the stationarity properties are essential for applying the ARDL estimation technique. The study utilized the Philip-Perron (PP) and Augmented Dickey-Fuller (ADF) tests, with the results detailed in Table 8.10. The null hypothesis states that there is a unit root, and to reject the null hypothesis, the statistical value for each test dimension must be lower than the critical value. The PP and ADF tests revealed that all variables in the series were stationary at the level, except for the proxy of bank development (BKD), which was stationary at the first difference. These results indicate that the series meets the necessary conditions for ARDL analysis. Specifically, ARDL is suitable for series with a combination of stationary properties at the level and first difference, and it does not require all variables to be integrated in the same order.

Table 8.10: Unit Root Results (PP &ADF) (Source: Authors creation)

UNIT ROOT TEST TABLE (PP)

Variables	**At Level**			**At First Difference**		
	With Constant	With Constant & Trend	Decision	With Constant	With Constant & Trend	Without Constant & Trend
MMA	-7.71***	-8.48***	I(0)	-17.35***	-17.06***	-17.62***

Variables	At Level			At First Difference		
LML	-6.10***	-6.01***	I(0)	-11.80***	-11.92***	-12.00***
RQT	-7.67***	-7.46***	I(0)	-25.60***	-29.51***	-23.15***
FLT	-16.50***	-17.83***	I(0)	-23.69***	-24.63***	-24.10***
BKD	-0.72	-2.20		-6.61***	-7.20***	-4.85***
LIFI	-6.22***	-6.28***	I(0)	-10.68***	-10.53***	-10.86***

UNIT ROOT TEST TABLE (ADF)

Variables	At Level			At First Difference		
	With Constant	With Constant & Trend	Decision	With Constant	With Constant & Trend	Without Constant & Trend
MMA	-7.80***	-8.45***	I(0)	-8.15***	-8.02***	-8.27***
LML	-6.09***	-6.00***	I(0)	-8.20***	-8.09***	-8.34***
RQT	-7.10***	-6.97***	I(0)	-7.15***	-6.57***	-7.28***
FLT	-7.37***	-7.26***	I(0)	-6.34***	-6.27***	-6.47***
BKD	-0.90	-2.98		-4.95***	-4.88***	-4.92***
LIFI	-6.22***	-6.27	I(0)	-8.74***	-8.62***	-8.88***

Note: The "***" indicates significance at the 1% level.

Determining the optimal lag of the model is also important before proceeding with the Bounds test. Table 8.11 presents the result of the lag selection criteria. Lag 4 is selected using the AIC and FPE selection criteria.

Table 8.11: Lag Selection Criteria (Source: Authors creation)

Lag		**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**
0		-466.17	NA	46524.42	27.77	28.04*	27.87
1		-414.01	82.86*	18627.87	26.82	28.71	27.47
2		-386.27	34.27	37346.66	27.31	30.81	28.50
3		-342.66	38.48	44465.55	26.86	31.98	28.61
4		-260.09	43.71	14102.04*	24.12*	30.86	26.42*

The bounds test approach is utilized to investigate the presence of long-term relationships among the variables. This approach has been preferred over other tests such as Engel and Granger and Johansen tests due to its advantages (Pesaran et al. 2001). The outcome of the bounds test is presented in Table 8.12, indicating the existence of long-term cointegration among the variables. To ensure the reliability of these results, a diagnostic analysis is conducted to assess the model's goodness of fit. The diagnostic tests include the Breusch-Godfrey (BG) test for serial correlation, the Jarque-Bera test for normality, and the Autoregressive Conditional Heteroscedasticity (ARCH) test for heteroscedasticity.

Table 8.12: Results of the ARDL Cointegration Test (Source: Authors creation)

	ARDL Structure	**F-statistics**	**Normality**	**BG LM test (1)**	**BPG Heteroskedasticity test**	**ARCH Test (1)**
F(LML, LWBT, RQT, FLT, BKS, LIFI)	(4,2,4,4,4,3)	14.37***	0.373	0.841	0.422	0.624

Notes: *** indicate statistical significance at the 5% and 1% levels, respectively.

The critical values at 1%, 5%, and 10% are 3.41, 4.68, and 2.62 respectively for the upper bounds, and 2.26, 3.79, and 3.35 respectively for the lower bounds. These values were obtained from Peseran et al. (2001) with a restricted trend. The reported values for the normality test, Breusch-Godfrey Serial Correlation LM test (BG LM test), Breusch-Pagan-Godfrey Heteroskedasticity Test (BPG Heteroskedasticity test), and ARCH test represent the probability values of the F-statistics. ARDL stands for autoregressive distributive lag. The symbols ** and *** indicate statistical significance at the 5% and 1% levels respectively.

In line with the objectives of investigating the moderating effect of financial literacy and financial regulation on the relationship between financial technology and money laundering using mobile money adoption, this section is dedicated to analyzing the ARDL results. The ARDL long and short-run regression result is presented in Table 8.13. The short-run result reveals that mobile money adoption is not a major determinant of money laundering in Nigeria. The short-run result also reveals that regulatory quality and financial literacy are significant moderators of money laundering. The long-run and short-run results indicate that mobile money transaction is not a source of money laundering in Nigeria. Specifically, regulatory quality and financial literacy are negative predictors of money laundering. This is consistent with the findings that digital payment channels such as Internet banking could be potential sources of money laundering. The ECT has the expected signs, implying that whenever there is disequilibrium, it converges back to its long-run function.

Table 8.13: ARDL Regression Result (Source: Authors creation)

Dependent Variable: Long-Run Estimation	*LML*
Constant	-12.21***
	(11.27)
Trend	0.141***
	(0.111)
MMA	0.132
	(0.102)
RQT	-0.054**
	(0.056)
FLT	-0.035***
	(0.032)
BKD	-0.016***
	(0.023)
LIFI	-0.561
	(0.533)
Dependent variable: Short-run estimation	Δ*lnM1*
ΔMMA	0.112
	(0.108)
RQT	-0.021***
	(0.010)
ΔFLT	-0.076***
	(0.033)
ΔBKD	0.051***
	(0.047)
ΔLIFI	0.016
	(0.058)
ECT(-1)	-0.197***
	(0.087)

Notes: *, **, *** imply statistical significance level at 10%, 5% and 1% respectively. Values in parenthesis represent the standard errors.

8.5.3 Electronic Fund Transaction and Money Laundering

This subsection examines the effect of electronic banking transaction on money laundering in Nigeria. The descriptive result is presented in Table 8.14. The descriptive results have been discussed previously except the electronic fund transaction (EFT) variable. The descriptive result indicates that electronic fund transactions averaged US$102.89 billion per annum. A standard deviation of 54.27 which is below the mean is an indication that series are clustered around the mean. This is clearly reflected in the maximum value of US$203.17 billion and a minimum value of US$3.26 billion, respectively.

Table 8 14: Descriptive Result (Source: Authors creation)

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Skew	Kurt	Jarque-Bera
BKD	16.98	14.46	27.38	9.06	5.99	0.38	1.48	4.58
EFT	102.89	114.67	203.17	3.26	54.27	-0.93	2.96	5.54
FLT	25.6	23.92	39.7	11.33	7.99	0.07	1.92	1.89
IFI	1250000000	1110000000	1980000000	531000000	454000000	0.29	1.75	3
ML	653000000	693000000	985000000	261000000	213000000	-0.27	2.03	1.92
MMA	59.19	66.07	99.91	4.78	29.33	-0.38	1.81	3.14
RQT	4.86	4.84	7	3.05	1.23	0.08	1.69	2.75

The presence of multicollinearity among the dependent variables is tested using the results of the Spearman correlation presented in Table 8.9. Empirical studies suggest that correlations below 80% should not be an immediate source of concern for researchers (Hair et al. 2010; Higaki, 2021; Hu et al., 2022; Al-Matari, 2022). The correlation between the independent variables ranges from 50% to 1%, which is below the 80% threshold. This indicates that the presence of multicollinearity is unlikely to bias the results.

Table 8.15: Correlation Matrix (Source: Authors creation)

		LML	LEFT	FLT	BKD	RQT	LIFI
LML		1.00					
LEFT		0.01***	1.00				
FLT		-0.10***	0.02***	1.00			
BKD		0.04**	0.40**	-0.01**	1.00*		
RQT		-0.46**	0.08**	0.05***	0.07	1.00	
LIFI		0.14***	-0.15***	0.01***	0.00	0.11	1.00

The analysis relies on time series data, and it is crucial to test for the stationary property of the variables before proceeding with the estimation. Neglecting this step could lead to misleading results, as the stationarity properties are essential for applying the ARDL estimation technique. The study utilized the Philip-Perron (PP) and Augmented Dickey-Fuller (ADF) tests, with the results detailed in Table 8.16. The null hypothesis states that there is a unit root test, and for the null to be rejected, the statistical value for each test dimension must be lower than the critical value. The PP and ADF results indicate that all variables in the series were stationary at the level, except for the electronic fund transaction (LEFT) and bank development (BKD) proxies, which were stationary at the first difference. The series met the initial condition for ARDL application, as it is suitable for series with combined stationarity properties of level and first difference. ARDL does not necessitate all variables to be integrated of the same order.

Table 8.16: Unit Root Test (Source: Authors creation)

PP Result

Variables	**At Level**			**At First Difference**		
	With Constant	With Constant & Trend	Decision	With Constant	With Constant & Trend	Decision
LML	-6.10***	-6.01***	I(0)	-11.80***	-11.92***	I(1)
LEFT	-2.36	-1.75		-5.77***	-6.51***	I(1)

Variables	At Level			At First Difference		
FLT	-16.50***	-17.83***	I(0)	-23.69***	-24.63***	I(1)
BKD	-0.72	-2.20		-6.61***	-7.20***	I(1)
RQT	-7.67***	-7.46***	I(0)	-25.60***	-29.51***	I(1)
LIFI	-6.22***	-6.28***	I(0)	-10.68***	-10.53***	I(1)

ADF Results

Variables	At Level			At First Difference		
	With Constant	With Constant & Trend	Decision	With Constant	With Constant & Trend	Decision
LML	-6.09***	-6.00***	I(0)	-8.20***	-8.09***	I(1)
LEFT	-2.35	-1.88		-5.77***	-6.03***	I(1)
FLT	-7.37***	-7.26***	I(0)	-6.34***	-6.27***	I(1)
BKD	-0.90	-2.98		-4.95***	-4.88***	I(1)
RQT	-7.10***	-6.97***	I(0)	-7.15***	-6.57***	I(1)
LIFI	-6.22***	-6.27	I(0)	-8.74***	-8.62***	I(1)

Note: The "***" indicates significance at the 1% level.

Determining the optimal lag of the model is also important before proceeding with the Bounds test. Table 8.17 presents the result of the lag selection criteria. Lag 1 is selected using the LR, SC, HQ, AIC, and FPE selection criteria.

Table 8. 17: Lag Order Selection Result (Source: Authors creation)

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-381.53	NA	166.86	22.14	22.41	22.24
1	-309.77	114.81*	22.35*	20.10*	21.97*	20.75*
2	-280.61	36.66	39.99	20.49	23.96	21.69
3	-244.54	32.98	69.74	20.49	25.55	22.24

The bounds test method is utilized to investigate the presence of long-term relationships among the variables. This approach is chosen for its advantages over other tests, such as the Engel-Granger and Johansen tests (Pesaran et al., 2001). The findings of the bounds test, outlined in Table 8.18, indicate the existence of long-term cointegration among the variables. To verify the reliability of the outcomes, diagnostic assessments are performed, including the Breusch-Godfrey (BG) test for serial correlation, the Jarque-Bera test for normality, and the Autoregressive Conditional Heteroscedasticity (ARCH) test for heteroscedasticity.

Table 8.18 Results of the ARDL Cointegration Test (Source: Authors creation)

	ARDL Structure	**F-statistics**	**Normality**	**BG LM test (1)**	**BPG Heteroskedasticity test**	**ARCH Test (1)**
F(LML, LWBT, RQT, FLT, BKS, LIFI)	(4,2,4,4,4,3)	8.763***	0.386	0.565	0.401	0.779

Notes: note that the critical values at the upper (lower) bounds for the 1%, 5%, and 10% levels are as follows: 3.41(4.68), 2.62(3.79), and 2.26(3.35) respectively. These critical values have been obtained from Peseran et al. (2001) with a restricted trend. The reported values for the normality test, Breusch-Godfrey Serial Correlation LM test (BG LM test), Breusch-Pagan-Godfrey Heteroskedasticity Test (BPG Heteroskedasticity test), and ARCH test represent the probability values of the F-statistics. It is important to note that ARDL stands for autoregressive distributive lag. The symbols ** and *** indicate statistical significance at the 5% and 1% levels respectively.

In line with the objectives of examining the impact of financial literacy and financial regulation on the relationship between financial technology and money laundering through electronic fund transactions, this section focuses on the analysis of the ARDL results. The results of the ARDL long and short-run regressions can be found in Table 8.19. The short-run findings indicate that electronic fund transactions play a significant role in money laundering in Nigeria. Additionally, the short-run results highlight that regulatory quality and financial literacy act as important moderating factors in money laundering. Both the long-run and short-run results suggest that electronic fund transactions are not a source of money laundering in Nigeria. Notably, regulatory quality and financial literacy are found to be negative predictors of money laundering, which aligns with the notion that digital payment channels like

internet banking could potentially facilitate money laundering. The ECT exhibits the expected signs, indicating that any disequilibrium eventually converges back to its long-run function.

Table 8 19: ARDL Regression Result (Source: Authors creation)

Dependent Variable: Long-Run Estimation	*LML*
Constant	-9.39***
	(9.01)
Trend	0.213***
	(0.192)
LEFT	0.056***
	(0.033)
RQT	-0.091**
	(0.055)
FLT	-0.011***
	(0.007)
BKD	-0.002***
	(0.010)
LIFI	-0.336
	(0.234)
Dependent variable: Short-run estimation	Δ*LML*
ΔLEFT	0.108
	(0.065)
RQT	-0.098***
	(0.055)
ΔFLT	-0.012***
	(0.008)
ΔBKD	0.028***
	(0.024)
ΔLIFI	0.056
	(0.159)
ECT (-1)	-0.077***
	(0.054)

Notes: *, **, *** imply statistical significance level at 10%, 5% and 1% respectively. Values in parenthesis represent the standard errors.

8.6 Conclusion and Summary of Findings of Robustness Tests

One debate in financial literature is understanding the adverse effect of financial technology. A good understanding of the potential risks of financial technology is extremely crucial in designing policies that mitigate the risks and promote financial system stability. The study focuses on the effect of financial technology on money laundering. The study also examines the moderating effect of financial literacy and regulatory quality. This assumes that financial literacy and effective regulation are central to mitigating the money laundering induced by financial technology. To adopt robust measures of financial technology, three measures of FinTech are utilized for this analysis. The three proxies of financial technology are web-based or internet banking (WBT), mobile money adoption (MMA), and electronic fund transaction (EFT). The intuitive appeal of entering these three proxies in independently in the model is to also establish the effect of the channels in promoting money laundering in Nigeria.

The ARDL regression results indicates that web-based transaction and electronic fund transaction channels are effective in driving money laundering in Nigeria. Similarly, the result further reveals that electronic fund transactions are more effective in driving money laundering relative to web-based transactions. This is consistent with practical reality because electronic channels are more effective in concealing the source or origin of proceeds of money laundering. For instance, proceeds of crime could be laundered through electronic channels for the purchase of high tickets goods, or transferred to relatives and cronies in another jurisdiction.

The result also justifies the inclusion of regulatory quality and financial literacy as moderating variables. The result of the three models identified regulatory quality and financial literacy as important moderators of money laundering in Nigeria. Specifically, the results of the three models revealed a negative relationship between money laundering, financial literacy, and regulatory quality. Improving regulatory quality through the review of some extant legislation that may not be effective in this dynamic environment may be reviewed to comply with the practical realities. Another important tool for mitigating the adverse effect of FinTech induced money laundering is to mainstream financial literacy. The ability of the providers and users of financial services to understand how to protect themselves from fraud or behave optimally in fraud prevalent financial system is crucial to preventing money laundering.

9.0 CONCLUSION AND RECOMMENDATION

9.1 Overview

This chapter provides a comprehensive summary of the research contributions to knowledge, practice, theory, and methodology. It highlights the study's limitations and offers actionable recommendations derived from the findings. Central to this chapter is an emphasis on critical areas where emerging technologies are reshaping financial services, particularly at the intersection of FinTech advancements and the challenges posed by money laundering. This focus is informed by insights from the literature review, which underscores the dual impact of FinTech enabling innovation while also creating potential vulnerabilities for illicit financial activities.

Highlighting how emerging technologies reshape financial services in the conclusion provides a clear view of the findings within the financial landscape. The literature shows that while FinTech boosts inclusion and efficiency, it also poses risks like money laundering. Addressing this in the conclusion strengthens the study's insights, emphasizing the need for balanced regulations to maximize benefits and minimize risks, offering practical guidance for policymakers.

9.2 Transformation in Financial Services

The convergence of many emerging technologies alongside the rise in FinTech solutions within the wider spectrum of financial services has resulted in unprecedented benefits, opportunities, and challenges. One of the major critical challenges addressed through the emergence of FinTech is the prevention and detection of money laundering which has been a major threat to the financial systems around the world. Ahead of drawing the major conclusion and recommendations of the study, it is important to emphasize the key areas in which emerging technologies disrupt financial services particularly those related to FinTech, and money laundering as documented by Belgavi and Chand (2019), these are highlighted as follows:

9.2.1 Blockchain and Distributed Ledger Technology (DLT)

This type of technology offers unchallengeable and transparent records of financial transactions within the DLT, which can serve as important tools for the prevention and protection of money laundering. Towards achieving these, financial institutions leverage tamper-proof audit trails to enable the use of these technologies in effectively tracing fund flows, identification of suspicious transactions and financial activities as well as enabling enhanced regulatory compliance among users.

9.2.2 Artificial Intelligence (AI) and Machine Learning (ML)

Artificial Intelligence (AI) and Machine Learning (ML) technologies, such as Natural Language Processing (NLP), Computer Vision, Deep Learning, Predictive Analytics, and Fraud Detection Systems, leverage algorithms to revolutionize anti-money laundering initiatives. Through the analysis of a wide range of financial data, these technologies detect patterns that provide insights into illicit activities. Regulators can use these technologies to identify potential anomalous transactions, flag money laundering risks, enhance risk assessment accuracy, and enable financial institutions and regulators to stay ahead of evolving threats.

9.2.3 RegTech Solutions

These are technology-based platforms that use Artificial Intelligence, Machine Learning and Data Analytics for the automation of regulatory compliance initiatives including checks for AML and KYC verifications. Therefore, by establishing a highly streamlined compliance workflow and enhancement of data accuracy, these platforms enable financial institutions to mitigate money laundering risks in a more cost-effective manner.

9.2.4 Big Data Analytics

Emerging technologies enable financial institutions and regulators to obtain meaningful insights from vast datasets through the analysis of trends and patterns for the facilitation of more robust risk assessments and monitoring of transactions. Therefore, through the aggregated and disaggregated analysis, financial institutions and regulatory bodies can extract transaction records, customer profiles, and external risk indicators to enable them to identify suspicious activities and transaction in more efficient ways and enhance their AML capabilities.

9.2.5 Biometric Authentication Technologies

These are form of technologies that uses various forms of identifiers including facial recognition and fingerprint identification to enhance the security of financial transactions and KYC processes. This is done through the verification of identity procedures in which FinTech solutions strengthen authentication mechanisms, reduce risk of identity theft as well as any form of fraudulent transaction that indicate potential money laundering exposure.

9.2.6 Crypto currency Monitoring Tools

these technologies are deployed in the emergence and proliferation of crypto currencies by serving as monitoring tools that track transactions within the blockchain networks for the identification of

potential money laundering activities. The effectiveness of these tools depends on advanced analytics and forensic techniques for tracing of flow of digital assets as well as detection of suspicious patterns of transactions that may indicate illicit behaviours or potential money laundering exposure.

Therefore, the major conclusion from this discussion is that the synergy between emerging technologies and FinTech solutions results in revolutionization of financial services landscape through the transformation of fight against money laundering. This can be achieved through gaining insight from power of AI, big data analytics, RegTech, biometric authentication, and crypto currency monitoring tools and financial institutions can enhance their AML capabilities, strengthen regulatory compliance, and safeguard the integrity of the global financial system. Nevertheless, effective implementation of these emerging technologies will require collaboration among stakeholders from industry, regulators, and service providers for addressing challenges including cyber security, regulatory compliance, and data privacy. Figure 9.1 highlight the disruptions and transformation in Financial Services.

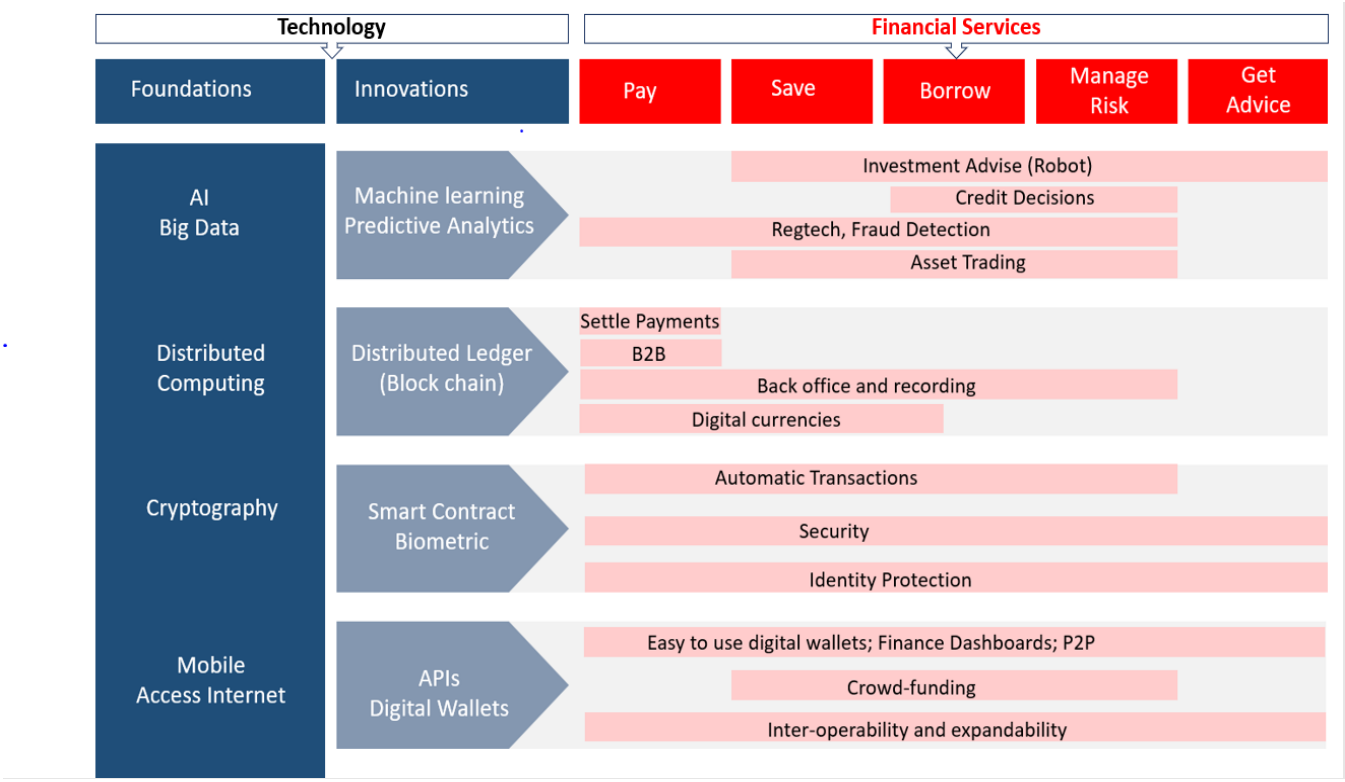


Figure 9.1: Transformation of Financial Services

Source: "FinTech and Financial Services: Initial Considerations," IMF 2017

The exponential expansion of FinTech has brought about a profound transformation in the financial domain, signaling a new era of enhanced Financial Inclusion through the deployment of inventive

solutions tailored to bridge the gap for marginalized communities. However, amid this surge in innovation, a concomitant surge of risks has emerged, encompassing realms such as cybersecurity vulnerabilities, data privacy breaches, the proliferation of Money Laundering schemes, and the formidable maze of regulatory hurdles. As such, there exists an imperative need for the expeditious establishment of robust regulatory frameworks to navigate this rapidly evolving landscape.

At the heart of FinTech's meteoric rise lies its unparalleled ability to democratize access to financial services, dismantling erstwhile barriers that had relegated vast swathes of the population to the fringes of the formal financial system. By harnessing cutting-edge technologies, such as mobile banking, peer-to-peer lending platforms, and blockchain-based transactions, FinTech has empowered the unbanked and underbanked, offering them a lifeline to economic participation and upward mobility. This democratization of finance has not only engendered social equity but has also unleashed a wave of economic vitality, driving growth and prosperity across diverse communities.

However, amidst this wave of democratization, lurk multifaceted risks that threaten to undermine the very fabric of financial stability and consumer trust. Chief among these perils is the spectre of cybersecurity breaches, which have become increasingly sophisticated and pervasive, posing a grave threat to the integrity of financial transactions and the sanctity of personal data. Moreover, the spectre of Money Laundering looms large, as the anonymity afforded by digital transactions provides fertile ground for illicit actors to obfuscate the origins of illicit funds, thus exacerbating financial crime and undermining the integrity of the financial system.

Compounding these challenges are the labyrinthine regulatory landscapes that govern the FinTech ecosystem, which often lags behind the breakneck pace of technological innovation. As FinTech ventures traverse disparate jurisdictions, they encounter a patchwork of regulations that vary in scope and stringency, engendering compliance burdens and legal uncertainties. Moreover, the absence of harmonized regulatory standards fosters regulatory arbitrage, wherein firms exploit regulatory disparities to gain a competitive advantage, thus compromising the level playing field and eroding market integrity.

Considering these pressing imperatives, policymakers must act with alacrity to formulate and implement agile regulatory frameworks that strike a delicate balance between fostering innovation and mitigating risks. Such regulations should prioritize the fortification of cybersecurity defenses, mandating stringent data protection protocols and robust encryption standards to safeguard against cyber threats. Concurrently, enhanced Know Your Customer (KYC) and Anti-Money Laundering (AML) protocols should be instituted to deter illicit financial activities and preserve the integrity of the financial ecosystem.

Furthermore, regulatory harmonization efforts should be intensified to streamline cross-border transactions and mitigate regulatory arbitrage, thereby fostering a conducive environment for FinTech innovation to flourish. Collaboration between regulatory authorities, industry stakeholders, and international organizations is paramount to engendering a cohesive regulatory framework that transcends national boundaries and fosters a culture of compliance and accountability. While the proliferation of FinTech holds immense promise in democratizing finance and advancing Financial Inclusion, it is incumbent upon policymakers to proactively address the attendant risks through the expeditious enactment of robust regulatory measures. By doing so, we can harness the transformative potential of FinTech to usher in a more inclusive and resilient financial ecosystem that empowers individuals and economies alike.

In line with the above, this study attempted to examine the relationship between FinTech and money laundering, financial regulation, and financial literacy as moderating variables. The data for the study was collected with the aid of a survey questionnaire filled out by the users of FinTech in Nigeria, and interviews were conducted with experts from FinTech and Money Laundering-related regulatory agencies. The data from the survey was analyzed using SPSS and PLS-SEM while that of interviews was analyzed using thematic analysis. The measurement used in the questionnaires was adapted and modified from the previous studies based on the quality of the measures while interview questions were designed based on the literature review conducted and experts' consultations.

The quantitative data analysis results were utilized to address the initial three research objectives regarding the correlation between FinTech and money laundering in Nigeria, the moderating impact of financial regulations on the correlation between FinTech and money laundering in Nigeria, and the moderating impact of financial literacy on the correlation between financial technology and money laundering in Nigeria. Additionally, the qualitative data analysis findings were employed to serve as form of validation and verification of the findings from the survey. The quantitative data analysis process commenced with preliminary procedures such as identifying and replacing missing data, handling outliers, examining the demographic characteristics of the participants, conducting descriptive analyses of the variables, assessing non-response bias, and performing tests for normality and multicollinearity. The outcomes of the PLS-SEM analysis for both the measurement model of reflective and formative constructs, as well as the structural model, also presented.

Therefore, this chapter draws the main conclusions from the findings of the two preceding chapters – data analysis and results and test of robustness of findings. The conclusions were also drawn in line with the underpinning theory of the study - Evolution of the Technological Determinism Theory. The

chapter also discussed the theoretical and policy recommendations of the study based on which recommendations were made for future research.

9.3 Conclusions of the Study

The findings derived from the quantitative data analysis addressed two out of the three research questions. These include the relationship between FinTech and money laundering in Nigeria, the moderating influence of financial regulations on this relationship, and the moderating effect of financial literacy on the relationship between FinTech and money laundering in Nigeria. Additionally, the findings from the qualitative data analysis which serve as the validation for the survey provide important insights from the regulators on their perspective on issues surrounding FinTech and money laundering in Nigeria. Therefore, from the quantitative findings, it can be concluded that two out of the three hypotheses were supported, and the model achieved all the necessary metrics required for its evaluation in terms of explanatory and predictive powers, which in essence enhanced the reliability of the findings. The result of the qualitative data analysis revealed several types of money laundering that are prevalent in Nigeria, and financial innovation could have both positive and negative effects on money laundering. The specific conclusion on each of the three research objectives and their corresponding research questions are provided in the following subheadings:

9.3.1 Effect of FinTech on Money Laundering in Nigeria

The first research objective examines the effect of FinTech on money laundering in Nigeria, addressing the first research question by testing the hypothesis that FinTech usage significantly impacts money laundering exposure. Findings confirmed this hypothesis, demonstrating a positive relationship: increased FinTech usage correlates with heightened money laundering risks. This aligns with GIABA's (2020) policy brief on digital finance challenges, which highlights the facilitation of illicit financial flows through FinTech.

ARDL regression results further indicated that electronic fund transactions are more effective than web-based transactions in driving money laundering, due to their capacity to obscure the origins of illicit proceeds. Examples include laundering through electronic channels for luxury goods purchases or cross-border fund transfers. This highlights the necessity of incorporating regulatory quality and financial literacy as moderating factors to mitigate risks.

Insights from interviews with regulators corroborated these findings, noting the prevalence of money laundering through digital and non-digital platforms. Regulators highlighted challenges in enforcing

laws specifically addressing technology-based money laundering, emphasizing the importance of robust partnerships with internal and external stakeholders to curb these practices.

9.3.2 Moderating Effect of Financial Regulations on Relationship between FinTech and Money Laundering in Nigeria

The second objective focuses on the moderating role of financial regulations. Results affirmed the hypothesis that financial regulations weaken the relationship between FinTech usage and money laundering. Robust regulatory quality reduces FinTech's potential to facilitate money laundering, as noted by Pan (2012) and the IMF (2022).

Regulatory quality, as assessed through ARDL models, showed a negative correlation with money laundering. The data supports revising outdated legislation to address evolving FinTech dynamics effectively. Interviews with regulators revealed that collaboration and bilateral partnerships enhance the enforcement of anti-money laundering measures, although gaps in regulatory frameworks remain a significant challenge.

9.3.3 Moderating Effect of Financial Literacy on the Relationship between FinTech and Money Laundering

The third objective investigates the moderating role of financial literacy. Although initial findings did not support the hypothesis that financial literacy mitigates FinTech-induced money laundering, robustness tests suggested potential moderating effects. Financial literacy empowers users to safeguard against fraud, fostering resilience in a system vulnerable to illicit financial activities.

Regulators emphasized that a lack of financial literacy exacerbates vulnerabilities in the financial system. They suggested initiatives to mainstream financial literacy, promoting awareness of fraud prevention and optimal financial behaviours. Despite these insights, the absence of a cohesive financial education strategy remains a barrier to fully leveraging this mitigating factor.

9.4 Theoretical and Policy Recommendations

In line with the findings, the study provides important theoretical and policy recommendations. The theoretical recommendation relates implication of this study to the theory and the literature while the policy recommendation relates to the implications of the findings to policymaking.

9.4.1 Theoretical Recommendations

This study expands the literature on the application of Technological Determinism Theory in financial technology. It has been evident that there are few studies such as Hariyono and Tjahjadi, (2021) who

deployed Technological Determinism Theory within the field of financial technology. Consistent with its application in this study, the study recommends the application of Technological Determinism Theory in the study of FinTech in three ways. Firstly, the study recommended that future studies in other contexts within developing and developed countries should explore the application of Technological Determinism Theory as underpinning theory in the relationship between FinTech and money laundering. The essence, it to further validates the theoretical support of this theory in the relationship. Secondly, in the application of Technological Determinism Theory in the relationship between FinTech and money laundering future studies should expand the model proposed and validated in this study through integration of additional such as the effect of FinTech on foreign exchange market stabilization. Lastly, the theoretical relationship proposed and validated in the study can be expanded through integration of mediating variables as the current model only considers moderating variables.

9.4.2 Policy Recommendations

Consistent with the findings, the study makes the following policy recommendations, which are expected to sanitize the utilization of FinTech and eventually reduce money laundering in Nigeria.

9.4.2.1 Improve Regulatory Quality.

The study implied financial regulation measured using regulatory quality of the country strengthen the relationship between FinTech and money laundering. Given that an increase in FinTech usage is associated with a higher risk of money laundering exposure, this implies that the higher the quality of regulations the lesser will be the effect of the FinTech on money laundering. This means that stringent financial regulations can mitigate the impact of FinTech usage on money laundering exposure in Nigeria. These findings underscore the importance of robust regulatory interventions to address money laundering issues related to emerging financial technologies such as the next generation of cash and payment infrastructure, cryptocurrency, and central bank digital currency infrastructure. Such interventions should prioritize inclusivity, safety, privacy, transparency, and interoperability within the payment system. Therefore, it is imperative for the Central Bank of Nigeria to surpass the mere creation of pertinent regulations like Anti-Money Laundering, Combating the Financing of Terrorism, and Countering Proliferation Financing (AML/CFT/CPF) Regulations. The bank must actively collaborate with financial law enforcement agencies such as the Economic and Financial Crimes Commission (EFCC), The Independent Corrupt Practices and Other Related Offences Commission, and the Nigerian Financial Intelligence Unit (NFIU) to guarantee the appropriate and efficient implementation of these regulations.

9.4.2.2 Design Policies to Ring-fence Electronic Fund Transaction.

Nigeria being a country that practices both civil and common laws provides an opportunity for ring-fencing electronic fund transactions. The fact is that ring-fencing electronic fund transactions are determined by the country's legal system - common law or continental civil law tradition. This means that when electronic funds are ring-fenced, such funds must not be commingled at any time with any other asset and that these funds must be insulated in the interest of the customer against the claims of other creditors of the electronic fund service provider even in the case of insolvency. Thus, in essence, this will reduce the possibility of money laundering as people often use electronic funds for settling other obligations or executing illegal transactions.

9.4.2.3 Mainstream Digital Financial Literacy to Promote Financial System Stability.

The CBN should also collaborate with relevant agencies such as the National Information Technology Development Agency (NITDA) for mainstreaming financial literacy more importantly digital and electronic finance literacy, which are part of the mandate of the agency. The fact is that the finding from this study implied that increasing financial literacy, more importantly, digital and electronic financial literacy tends to lessen the effect of FinTech on money laundering in the country as revealed by longitudinal analysis using the ARDL model. The mainstreaming of digital financial literacy will require the amendment of the National Digital Literacy Framework (2023) to capture extensively the issue of digital financial literacy.

9.4.2.4 Massive Investment in Financial Infrastructure

The Central Bank of Nigeria also need to invest massively in financial infrastructure to reduce the increasing disparity in financial system development. This will require the bridging on financial infrastructure gap on both within the country between urban cities and rural areas as well as the gap that exist between Nigeria and other emerging countries. The expectation is the uniformity in the financial infrastructure development could have the tendency of stabilizing the effect of FinTech on money laundering especially in the presence of effective regulations and enhance financial literacy.

9.4.2.5 Reduce Cash-based Transaction.

Nigeria also needs to enhance its cashless policy initiative, which aims to reduce the circulation of physical cash in the economy and promote electronic-based transactions. The implementation of this policy has proven to be effective in curbing financial crimes, as illegal activities that rely on cash, such as gambling and drug operations, become more difficult to carry out without leaving a trace. By ensuring that the source of funds is always identifiable, money laundering becomes a challenging task.

Following the global financial crises of 2007/2008, there was an urgent need to strengthen the banking and policy environment in Nigeria, foster development, modernize the payment system, promote financial inclusion, reduce banking service costs, and enhance monetary policy effectiveness in managing inflation and driving economic growth (CBN, 2011). To achieve these objectives, the Central Bank of Nigeria (CBN) implemented the cashless policy in April 2011. This policy was designed to alleviate the negative consequences of cash-based transactions, such as the exorbitant expenses linked to cash management, the potential for inefficiency and corruption, substantial subsidies offered by the banking system, and the growth of the informal sector. This policy prohibited banks from providing cash-in-transit lodgment services to merchant clients, therefore transferring the burden to licensed cash-in-transit firms. Moreover, the regulation limited the ability to cash third-party cheques over Naira 50,000 directly and levied fees for cash processing on withdrawals and deposits above Naira 500,000 in total. For example, if a person withdraws Naira 130,000 from an ATM and deposits Naira 480,000 manually on the same day, they would be subject to cash handling charges for the Naira 110,000 that above the daily limit of Naira 500,000.00. Source: CBN, 2011. Cash handling fees also extend to cash carried by cash-in-transit service providers. Though the policy was implemented at different dates in different states, it was scheduled to be implemented nationwide on July 1st, 2014. Nevertheless, the CBN halted the policy prior to the stated deadline during the implementation phase. Notwithstanding the stoppage, the CBN persisted in enhancing the payment system and overseeing financial markets. For instance, in April 2016, the CBN released a "Guideline on the Operation of Electronic Payment Channels in Nigeria." This guideline specifically addresses the functioning of ATMs, POS, Mobile Point-of-Sales (MPOS), and web acceptance services (CBN, 2016). In addition, the CBN published the "Guideline for Licensing and Regulating Payment Service Banks in Nigeria" in October 2018. The purpose of this guideline is to facilitate financial inclusion for low-income households, small enterprises, and those who are currently excluded from financial services. Its objective is to provide secure access to financial services within a contemporary technological framework (CBN, 2018). The CBN first implemented the "Guide to Bank Charges" in 2004 to oversee and control the levies imposed on services and goods provided by banks and non-bank entities within its jurisdiction. This guideline underwent revisions in 2013, 2017, and most recently in December 2019, with the most recent modifications becoming effective on January 1, 2020. The most recent update incorporated important elements such as decreased fees for electronic banking transactions, modifications to other bank fees to better match market dynamics, and the implementation of new sections on Accountability/Responsibility and a Sanction Regime to handle cases of exorbitant, unauthorized, or capricious fees (CBN, 2019 p.1). The cashless policy was

reinstated on September 17, 2019, with a fresh circular that preserved the fundamental elements of the previously suspended policy. The implementation of the policy would occur gradually in different states. More precisely, fees were levied in Lagos, Ogun, Kano, Abia, Anambra, Rivers States, and the Federal Capital Territory starting from September 18, 2019, and are scheduled to be implemented countrywide by March 31, 2020. The maximum daily withdrawal and deposit restrictions for individuals were set at Naira 500,000.00, while for corporate entities they were set at Naira 3,000,000.00. In cases where transactions over these restrictions, individuals were liable to a 3% fee for withdrawals and a 2% fee for deposits, whilst corporate entities were subjected to a 3% fee for withdrawals and a 5% fee for deposits (CBN, 2019). Furthermore, the CBN promoted the use of electronic platforms by bank customers for payments, transfers, and other transactions. Data spanning from January 2009 to March 2023 reveals a consistent rise in the worth of ATM, POS, online banking, and mobile payment transactions in Nigeria, indicating an increasing inclination towards digital financial services owing to their convenience. Notwithstanding, the increase in the use of digital platforms does not inevitably indicate a decrease in cash transactions. Sustained implementation of the cashless policy may catalyze increased adoption of digital payment systems.

9.4.2.6 Reform the Foreign Exchange Market

The study strongly recommends a reform of the Nigerian foreign exchange market. The reform should include market infrastructure, product offerings, market transparency, and effective regulation. In terms of product offerings, we strongly recommend a monitored and regulated exchange, such as that between dedicated Central Bank Digital Currency (CBDC) Units and FinTech, for better and sustained integration of FinTech as a formal payment channel, such as the model developed in Figure 9.2. The improvement of sustainable regulation can be achieved through the FinTech Sustainable Regulatory Environment where CBDC Units within central banks will be championed to promote digital currency regulations.

Furthermore, there is a pressing need to reassess the Foreign Exchange (Monitoring and Miscellaneous Provisions) Act, Chapter F34 (Decree No.17 of 1995). Currently, there is a concerning rise in the illicit trading of foreign currency within the country. Since the enactment of this legislation, the Naira has consistently depreciated against other currencies, largely due to provisions seemingly tailored to benefit foreign currency peddlers. For example, Section 3 (1) stipulates that individuals conducting transactions in the market be not obligated to disclose the source of any foreign currency, except as required by law. Additionally, Section 3 (2) shields imported foreign currency from seizure, forfeiture, or expropriation, providing a cover for illicit trading. This leniency has led to the proliferation of

foreign currency exchange markets in various state capitals and turned airports into unregulated trading hubs.

To ensure a steady supply of trading currencies, Section 4 lists permissible sources for foreign currency sales, including domiciliary accounts, foreign currency held by citizens and residents, agency commissions, and non-oil export proceeds. Unfortunately, this has resulted in a surplus of foreign currencies estimated at $15 billion in private hands, contributing to economic challenges. To address this issue, it is essential to reevaluate the operations of the Bureau de Change (BDCs), prohibit the illicit trading of foreign currencies, and restrict the possession of cash foreign exchange within the country. This is crucial for preventing further economic losses and maintaining control over the nation's currency exchange rates.

The unification of the foreign exchange rates is a positive reform of the Nigerian foreign exchange market. The positive effect of foreign exchange rate unification will now get a realistic exchange rate which is market-determined; foreign direct investments will increase, which will consequently increase the foreign reserve and which in the medium term will bring down; diaspora remittance which has reduced to less than $20 billion per year for some time may double and increase to about $50 billion as some people have projected which in turn will increase the foreign exchange liquidity and availability of foreign exchange in the system and may aid the reduction of exchange rate in the short or medium time. The policy will also promote an increase in export trade as exporters will now get more value for their export proceeds through the official window The current multiple exchange rate policy is a disincentive to exporters many of who source their Foreign exchange from the black market only to sell their export proceeds at a reduced rate at the official market; and the funds available for the federation account through monetization of crude oil sales receipt, royalties and other taxes will increase as higher foreign exchange rate of say 750 to1$ may be used instead of the current rate of about 465 to1$. The effect of this is that more funds will accrue to the 3 tiers of government for sharing. Going by the fact that the crude oil sales and these taxes amount to about $20 billion a year about 6 trillion naira in additional revenue may accrue to the federation account. However, the downside risks include prices of imported goods will increase as custom duty payments with the new higher official exchange rate may increase as much as 50% thereby increasing the prices of imported items. Given PMS subsidy removal inflationary pressure is expected to heighten; prices of locally produced goods will also increase due to higher foreign exchange rate required by manufacturers to get their foreign inputs required for manufacturing of their products as well as payment of higher custom duties on such items; it also has grave consequences for the implementation of the dollar denominated component of the 2023 budget; while foreign portfolio investment (FPIs) are likely to increase part of the reason the

stock market is bullish, it may not translate to a boom in foreign direct investment (FDIs) as anticipated due to insecurity and overall unconducive business environment. Let us not forget that FPIs are nothing but hot money; and speculation would lead to continuous depreciation of the Nigerian exchange, and ultimately worsening the prevailing multiple exchange rate. More reforms should be embarked upon to promote efficiency of the exchange rate market.

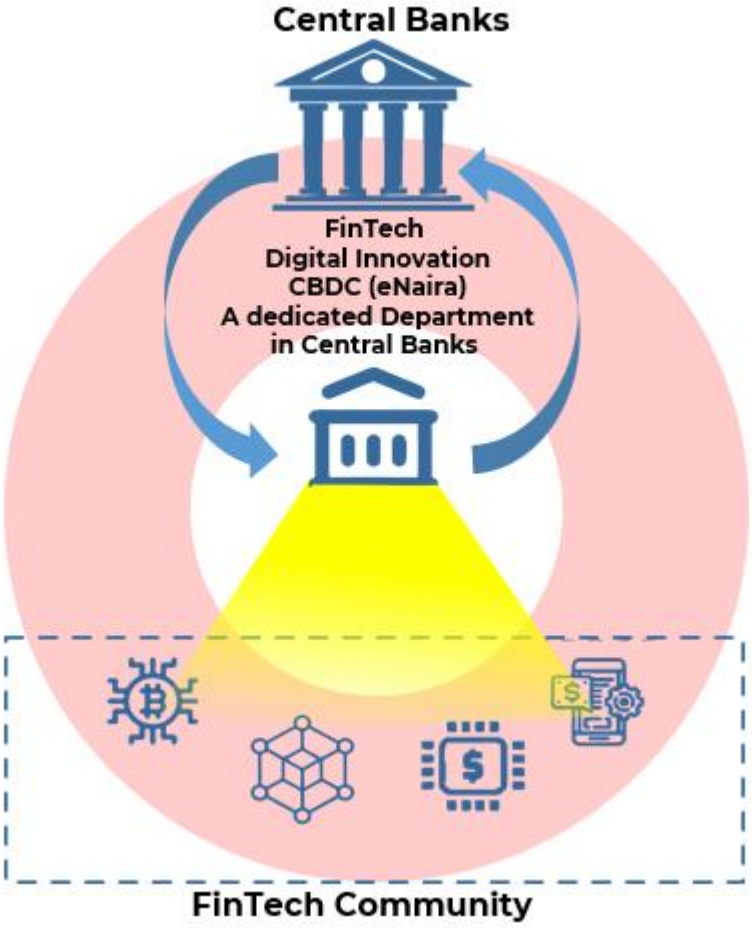


Figure 9.2: FinTech Sustainable Regulatory Environment

(Source: Authors creation)

The diagram illustrates a proposed model for a monitored and regulated exchange between Central Bank Digital Currency (CBDC) and the FinTech community, emphasizing the importance of a dedicated department within central banks to oversee and promote FinTech, digital currency and

Emerging technological Innovation within the financial ecosystem. This model focuses on the interaction between central banks and the FinTech community, with the ultimate goal of achieving better and sustained integration of FinTech as a formal payment channel.

Key Elements of Figure 9.2:

Central Banks: Positioned at the top of the diagram, central banks play a crucial role in the model. They are responsible for overseeing and regulating digital financial innovations, particularly Central Bank Digital Currencies (CBDCs) like eNaira (CBN Digital Currency).

Dedicated Department in Central Banks: The diagram highlights the need for a specialized department within central banks that is focused on FinTech, digital innovation, and CBDCs. This department would be responsible for ensuring proper regulation and promoting the adoption of digital currencies and emerging financial technologies as well as coordination with Internal and external stakeholders.

FinTech Community: At the bottom of the diagram, the FinTech community is depicted. This includes various entities involved in digital payments, blockchain technology, and other emerging financial technologies.

Monitored and Regulated Exchange: The arrows connecting the central banks and the FinTech community suggest a continuous exchange of information and regulation. The central banks, through their dedicated departments, monitor and regulate the FinTech community to ensure the safe and secure integration of these technologies into the broader financial system.

Focus on Integration and Innovation: The central section of the diagram, highlighted by a spotlight effect, emphasizes the importance of a close relationship between central banks and the FinTech community. The goal is to foster innovation within a secure and well-regulated environment, ensuring that FinTech can be effectively integrated as a formal payment channel.

The proposed model highlights the critical role of central banks in ensuring financial stability within the innovation and emergence of the FinTech sector. By emphasizing the need for a closely coordinated, monitored and regulated interaction between FinTech companies and central banks, the model ensures that FinTech integration into the broader financial system is secure, efficient, and compliant with established financial regulations.

The creation of dedicated units within central banks to manage and integrate a relationship between Central Bank Digital Currencies (CBDCs) and FinTechs reflects a proactive approach to navigating the complexities and risks of disruptive technologies such as money laundering. These specialized departments will play a key role in promoting and enforcing digital currency regulations, ensuring that FinTech innovations enhance rather than undermine financial stability and integrity.

Ultimately, this model advocates for a sustainable regulatory environment where continuous interaction and feedback between regulators and FinTech companies foster adaptive and effective regulations. Such a dynamic regulatory framework not only supports innovation but also mitigates the risks associated with digital financial services, paving the way for a resilient and forward-looking financial ecosystem.

9.4.2.7 RegTech: Technology-Driven Policy Regulation and Monitoring

Digital transformation restructures financial services, hence, the need for both industry pioneers and regulatory authorities to design innovative approaches that will uphold regulatory objectives including the stability of the banking system, consumer protection, as well as mitigation of illicit financial behaviors including money laundering and fraud. Consequently, results from this research revealed that a heightened regulatory standard could strengthen the alignment between FinTech and efforts to combat money laundering. Therefore, in consideration of the increasing risks associated with increased FinTech adoption, especially in relation to money laundering, there is a need for rigorous financial oversight to mitigate these risks, especially in a country like Nigeria.

In line with these highlights from the findings of the study, it becomes imperative for the country to design a Comprehensive Technology-Driven policy and regulation for monitoring that could emphasize the integral role of RegTech across all FinTech dimensions. Essentially, the finding advocates for prompt implementation of technology-oriented regulatory interventions (RegTech) that would serve as a proactive strategy for mitigation of money laundering risks. These policies and regulations should be in a forward-thinking perspective such that it integrates future technological advancements and protects the concerns of future generations.

Additionally, the study offers important insights on the growing need for effective administration to control disruptive technologies through relevant regulations to ensure it operates in highly responsible and secure manner that will foster its efficient and safer integration into society. To address potential technological risks associated with FinTech and enhance resilience for digital inclusion and economic

growth (as visualized in Figure 9.3), it is crucial to implement measures that mitigate criminal misuse, such as money laundering. Strengthening compliance protocols is essential to prevent money laundering and safeguard against these risks. Figure 9.3 presents a model developed as part of the recommendation that will enhance the resilience of the FinTech ecosystem by systematically addressing potential risks. This model focuses on identifying, understanding, assessing, and mitigating risks related to criminal misuse of FinTech. It aims to strengthen compliance with anti-money laundering (AML) and counter-financing of terrorism (CFT) regulations. Additionally, the model incorporates a monitored regulatory technology (RegTech) approach to address threats to financial integrity, ensuring robust oversight and adherence to regulatory standards.

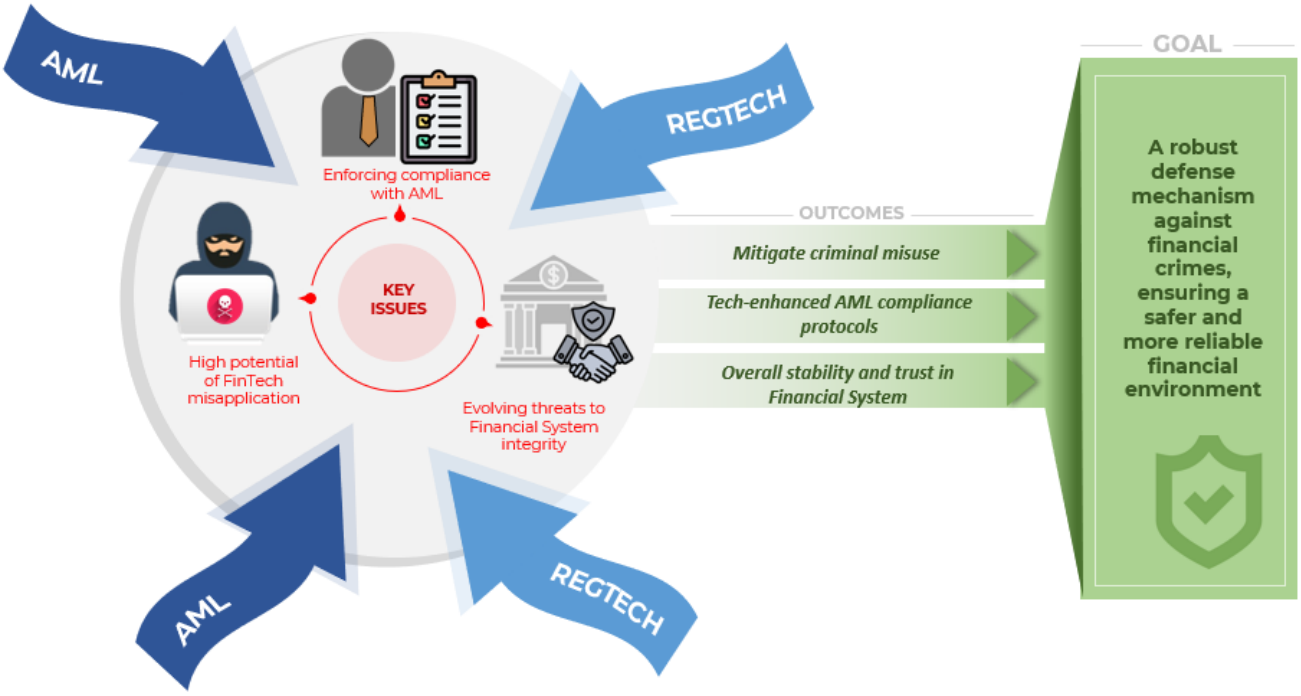


Figure 9.3: Strengthening Financial System Integrity: Addressing Risks and Enhancing Resilience through AML and RegTech Solutions

(Source: Authors creation)

The diagram above illustrates the relationship between Anti-Money Laundering (AML) and Regulatory Technology (RegTech) in creating a robust defense mechanism against financial crimes.

Key elements of the figure 9.3:

Person in Hoodie with Laptop:

This figure symbolizes the high potential of FinTech misapplication by criminals and fraudulent individuals like cybercriminals. It represents the threat posed by illicit actors who misuse financial technology for illegal activities such as money laundering.

Left Arrow (AML):

Represents the role of Anti-Money Laundering regulations and practices in combating illicit financial activities. AML efforts are focused on enforcing compliance and ensuring financial institutions adhere to legal standards to prevent financial crimes.

Right Arrow (RegTech):

Signifies the role of Regulatory Technology in enhancing the efficiency and effectiveness of compliance processes. RegTech solutions help financial institutions implement tech-enhanced AML protocols, making compliance with regulations more robust and streamlined.

Key Issues:

Enforcing compliance with AML: This issue highlights the importance of ensuring that financial institutions comply with AML regulations to prevent financial crimes.

High potential of FinTech misapplication: Indicates the risk of FinTech being misused by criminals, which requires careful monitoring and regulation.

Evolving threats to Financial System integrity: Reflects the dynamic nature of threats that could compromise the stability and trust in the financial system, necessitating ongoing vigilance and adaptation.

Outcomes:

Mitigate criminal misuse: By integrating AML and RegTech, the goal is to reduce the opportunities for criminals to misuse financial systems.

Tech-enhanced AML compliance protocols: Leveraging technology to improve compliance with AML regulations, making them more effective.

Overall stability and trust in Financial System: The ultimate objective is to ensure that the financial system remains stable and trustworthy, minimizing the risks of financial crimes.

Goal:

The overarching goal highlighted on the right side of the diagram is to establish a robust defense mechanism against financial crimes, ensuring a safer and more reliable financial environment.

The whole diagram emphasizes the critical need for financial institutions to adopt a dual approach that combines AML practices with advanced RegTech solutions. By doing so, they can better identify,

assess, and mitigate risks associated with the misuse of FinTech, thereby strengthening compliance and safeguarding the integrity of the financial system.

9.4.2.8 Establishment of the Nigerian Financial Conduct Authority (NFCA) Act

The study strongly advocates for the establishment of a Nigerian Financial Conduct Authority (NFCA) in view of the rapidly changing FinTech scene in Nigeria. The suggestion is to establish this new regulatory entity by means of a legislative Act, which would confer upon it the character of an autonomous agency. Its primary objective would be to regulate, supervise, and enforce the laws that govern FinTech services and developing financial technology. The core duties of the NFCA would involve ensuring the safety of consumers, upholding the integrity of the market, and fostering sustainable economic stability in Nigeria's financial sector.

The NFCA should be empowered with the regulatory and supervisory role of a broad spectrum of financial technology services. The services should encompass a wide range of offerings, such as digital payments, digital lending, blockchain technology, cryptocurrency exchanges, and other developing financial innovations within the country. The primary objective of the NFCA should be to safeguard customers against unjust practices, guarantee transparency and equity throughout the industry, and promote innovation within a secure and stable financial environment.

Additionally, it is recommended that the NFCA take on the responsibility of becoming the central coordinating authority for all agencies and parastatals engaged in financial technologies as visualized in figure 9.4. Centralization is essential for maintaining consistent and unifying regulation within the sector. It enables more effective monitoring and helps mitigate risks in the rapidly evolving financial technology landscape. This cooperation would significantly enhance the overall stability and security of Nigeria's financial system.

Nigeria can significantly enhance its regulatory environment and protect the integrity of its financial system from criminal activities, such as money laundering facilitated by FinTech, by establishing a Nigeria Financial Conduct Authority (NFCA). The NFCA would play a crucial role in developing a secure, innovative, and transparent financial ecosystem capable of addressing the challenges posed by emerging and disruptive financial technologies. By standardizing regulations across the sector and enforcing ethical conduct, the NFCA would help protect consumer interests and strengthen regulatory institutions in Nigeria. This initiative would ensure that Nigeria's financial system remains resilient and trustworthy amidst the rapid evolution of financial services.

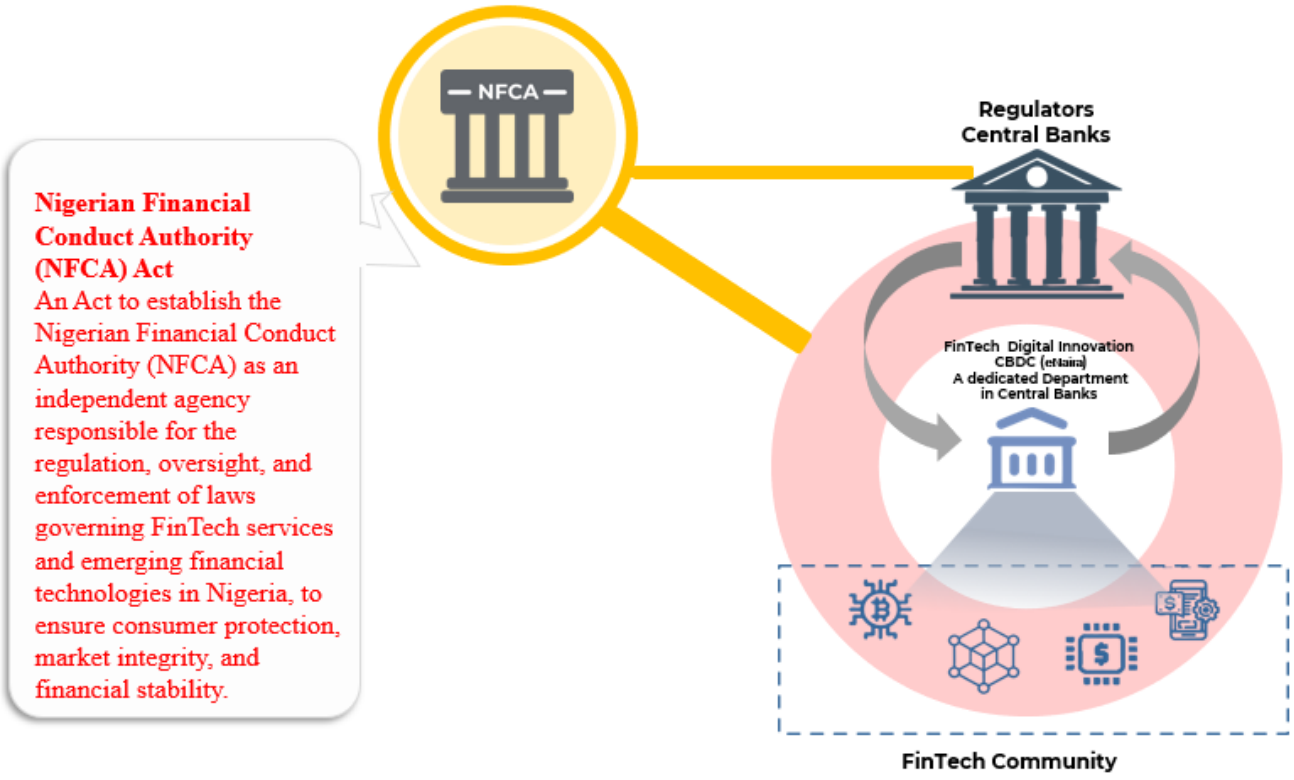


Figure 9.4 Nigeria Financial Conduct Regulatory Environment

(Source: Authors creation)

The diagram above outlines the regulatory framework involving the Nigerian Financial Conduct Authority (NFCA) and its interaction with central banks and the FinTech community.

key elements of the figure 9.4:

Nigerian Financial Conduct Authority (NFCA):

The NFCA is highlighted as a newly established independent agency. The diagram states that the NFCA is responsible for regulating, overseeing, and enforcing laws that govern FinTech services and emerging financial technologies in Nigeria. The agency's focus is on ensuring consumer protection, market integrity, and financial stability.

The NFCA is illustrated as a building icon labelled "NFCA" and is connected to other key entities within the financial ecosystem.

Regulators and Central Banks:

The diagram shows a connection between the NFCA and central banks, which are depicted as larger regulatory entities. The central banks are responsible for overseeing FinTech digital innovation and

Central Bank Digital Currencies (CBDCs). They have a dedicated department within the central banks to manage these aspects.

Central banks are represented by a classical government building icon, and arrows indicate their interaction with both the NFCA and the FinTech community.

Interaction between NFCA and Central Banks:

The NFCA is shown to have a direct link to the central banks, suggesting collaboration and oversight coordination between the two entities in managing FinTech regulations and innovations.

Arrows connect the NFCA to the central banks, indicating this interaction.

FinTech Community:

The diagram highlights the FinTech community as the sector that is directly impacted by the regulations and innovations overseen by both the NFCA and central banks. The community includes various FinTech services and technologies such as digital payments, blockchain, and cryptocurrencies.

The FinTech community is represented by a collection of icons symbolizing different technological and financial elements, grouped within a dotted box. The community is positioned under the oversight of the central banks and the NFCA.

Generally, the diagram illustrates a hierarchical framework in which the NFCA and central banks have crucial regulatory responsibilities. Their primary focus is to manage and supervise the FinTech community. The primary objective is to ensure the soundness and stability of the financial system in Nigeria by implementing efficient regulation and supervision.

The NFCA and central banks are depicted at the upper portion, with arrows pointing towards the FinTech community at the lower portion, illustrating a regulatory approach that originates from the top and flows downwards.

This framework clearly illustrates the regulatory interactions among the NFCA, central banks, and the FinTech community, highlighting the significance of supervision, coordination and collaboration in upholding a secure and stable financial ecosystem in Nigeria.

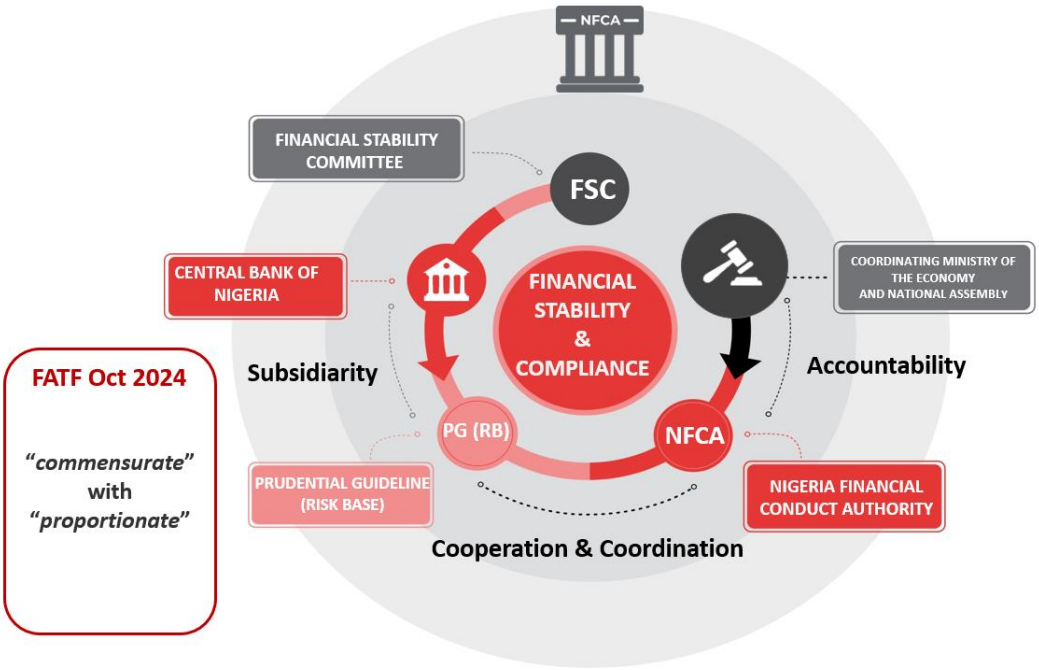


Figure 9.5 Nigeria Financial Conduct Authority Act

The diagram illustrates the proposed framework for the Nigeria Financial Conduct Authority (NFCA) Act, emphasizing its role in ensuring **financial stability and compliance** within the Nigerian financial system. Here's a breakdown of the elements in the diagram:

Financial Stability and Compliance (Central Component):

This is the core focus of the framework, ensuring that Nigeria's financial ecosystem is stable, transparent, and compliant with regulatory standards.

Nigeria Financial Conduct Authority (NFCA):

- Represented at the bottom right, the NFCA is proposed as an independent body to enforce financial regulations, protect consumers, and maintain market integrity.
- The NFCA works closely with other entities to foster accountability and enforce compliance.

Financial Stability Committee (FSC):

Positioned at the top, the FSC is a coordinating body that supports financial oversight, ensuring systemic stability through collaboration with the NFCA.

Subsidiarity and the Role of the Central Bank of Nigeria (CBN):

The Central Bank of Nigeria oversees prudential guidelines and risk-based approaches (PG [RB]), ensuring alignment with macroeconomic policies and regulations.

Subsidiarity implies that the NFCA operates under the overarching guidance of the CBN but focuses on specific regulatory tasks.

Accountability to Government Institutions:

The NFCA is accountable to the **Coordinating Ministry of the Economy and National Assembly**, ensuring legislative oversight and alignment with national financial objectives.

Cooperation and Coordination:

The framework stresses collaboration between regulatory bodies (e.g., CBN, FSC, NFCA) to create a cohesive financial regulatory ecosystem.

FATF Standards and Risk-Based Approach:

The diagram references the **Financial Action Task Force (FATF)** recommendations to be implemented by October 2024, promoting a **"commensurate" and "proportionate"** risk-based compliance approach. This ensures that regulations are tailored to the specific risks posed by entities or transactions.

Prudential Guidelines (PG) Risk-Based:

These guidelines ensure that financial institutions maintain adequate risk management frameworks to prevent systemic issues.

The overall framework reflects a well-coordinated approach aimed at promoting financial stability, enhancing regulatory enforcement, and aligning Nigeria's financial system with international best practices. Let me know if you'd like a more detailed explanation of any specific component.

The uniqueness of the Proposed Framework of the Study

This section evaluates the proposed regulatory framework introduced in this study and positions it as a unique and superior solution compared to existing frameworks in other regulatory regimes. Given the increasing role of Financial Technology (FinTech) in enabling both financial inclusion and money laundering risks, a robust regulatory framework tailored to Nigeria's specific challenges is critical. This evaluation highlights the unique attributes of the proposed framework, addressing its ability to balance innovation, compliance, and financial system stability.

It is worth noting that, globally, regulatory frameworks have evolved to address FinTech-related challenges, particularly money laundering. These include:

- **Regulatory Sandbox Models**: Common in the UK, Singapore, and Australia, these models provide FinTech companies with a controlled environment to test innovations under regulatory supervision (Arner et al., 2017). However, while effective in fostering innovation, these frameworks are criticized for limited oversight in addressing money laundering risks in developing economies.
- **Financial Conduct Authority (FCA)**: The UK's FCA adopts a principles-based approach, emphasizing collaboration with FinTech entities while ensuring compliance with Anti-Money

Laundering (AML) directives (Huang, 2021). However, this framework operates within a mature financial ecosystem, which contrasts sharply with Nigeria's context of weak enforcement and financial illiteracy.

- **Centralized AML Monitoring**: Countries like China rely heavily on centralized regulatory control via institutions like the People's Bank of China (PBoC) to oversee digital financial products (Chen et al., 2022). This framework, while effective in reducing illicit flows, may limit innovation and impose excessive state control.

These frameworks are not directly transferrable to Nigeria due to differences in economic maturity, enforcement capacity, and financial literacy levels. Therefore, the proposed framework in this study incorporates a tailored approach to address the specific vulnerabilities of Nigeria's financial ecosystem. Its unique attributes are as follows:

Dedicated Regulatory Units in Central Banks:

Unlike existing frameworks, this study advocates for dedicated FinTech Digital Economy Units within Central Banks. These units would monitor emerging financial innovations, including Central Bank Digital Currencies (CBDCs), ensuring continuous oversight and real-time compliance.

Unlike regulatory sandboxes, this proposal establishes a permanent unit, addressing the need for long-term regulatory capacity.

Nigeria Financial Conduct Authority (NFCA):

The study proposes the establishment of an independent Nigerian Financial Conduct Authority (NFCA) tasked with enforcing FinTech regulations, ensuring consumer protection, and fostering financial system stability.

NFCA draws inspiration from global regulators like the FCA but tailors its operations to Nigeria's challenges, such as corruption and weak enforcement.

Integration of RegTech and AML Solutions:

The framework emphasizes the deployment of advanced Regulatory Technology (RegTech) solutions to enhance AML compliance protocols. It combines real-time data analytics and machine learning to detect illicit transactions efficiently.

Unlike manual regulatory approaches prevalent in Nigeria, the use of RegTech ensures scalability and reduces human biases.

Focus on Financial Literacy as a Regulatory Component:

Recognizing Nigeria's high rate of financial illiteracy, the framework integrates digital financial literacy initiatives as a tool to combat FinTech misuse. This aligns AML efforts with broader social objectives of financial inclusion.

Existing frameworks rarely consider financial literacy as an integral moderating factor for regulatory efficacy.

Strengthening Partnerships and Accountability:

The proposed framework emphasizes multilateral cooperation with local and international stakeholders, such as the Central Bank of Nigeria (CBN), Nigerian Financial Intelligence Unit (NFIU), and the Financial Action Task Force (FATF).
It promotes coordination among agencies while ensuring regulatory accountability and enforcement.

Therefore, consistent with its uniqueness, the framework proposed and validated in this study has advantages over other regulatory frameworks through the followings:

- **Context-Specific Design**: The proposed framework addresses Nigeria's unique challenges, including a weak ethical climate, high cash dependency, and low financial literacy. It offers targeted solutions, unlike generic regulatory models applied in developed nations.
- **Comprehensive Monitoring and Enforcement**: By creating dedicated units within central banks and an independent NFCA, the framework enhances monitoring capacity and ensures swift enforcement of AML regulations.
- **Balancing Innovation with Risk Management**: Unlike centralized regulatory regimes that stifle innovation, the proposed framework encourages FinTech growth while mitigating risks through real-time monitoring and RegTech solutions.
- **Enhanced Financial System Stability**: The integration of AML practices, RegTech, and financial literacy initiatives fosters a safer financial environment, reducing vulnerabilities to illicit activities.

The proposed framework is unique in its holistic approach to addressing the dual challenges of FinTech innovation and money laundering in Nigeria. It combines real-time regulatory oversight, independent enforcement, and digital financial literacy, making it more adaptive and effective than existing frameworks in other regimes. By tailoring solutions to Nigeria's socio-economic and institutional realities, this framework provides a scalable and sustainable model for enhancing financial system integrity and stability.

9.6 Research Contributions

This section outlines the significant contributions of the study to theory, practice, methodology, and knowledge. By applying Technological Determinism Theory in the context of financial technology, the study not only fills a gap in the existing literature but also provides a foundation for future research in both developing and developed countries.

9.6.1 Contributions to Knowledge and Theory

This study expands the literature on the application of Technological Determinism Theory within the field of FinTech given that only a few studies deployed this theory in this context. Therefore, the application of this theory within the context of this study offers important theoretical contributions. Firstly, the application of Technological Determinism Theory in this study implied that future studies from other developing and developed countries could explore the application of this theory when examining the relationship between FinTech and money laundering given that the theory offers theoretical support in underpinning this relationship. Secondly, the findings from this study also implied that the Technological Determinism Theory can be applied by future studies that would like to replicate the model validated in this study in other contexts. In this way, the current study contributes to further validation of the theory within the field of FinTech. Thirdly, the findings from this study also implied that insights from Technological Determinism Theory can be applied in expanding the theoretical relationship proposed and validated in this study through the integration of mediating variables, considering that the model of the current study only considers moderating variables. This, in essence, could promote wider application of the theory within the context of FinTech in connection with money laundering and associated variables. Fourthly, in consideration that the current study applied the theory banking related FinTech (ATM, POS, Mobile and Internet banking) in relation to money laundering, it highlights that the theory can be applied in underpinning relationships between other forms of FinTech such as the relationships between Blockchain and Distributed Ledger Technology (DLT), RegTech Solutions, Biometric Authentication Technologies, Cryptocurrency Monitoring Tools money laundering. Lastly, insights from the findings of this study implied that Technological Determinism Theory can be a good fit in underpinning the relationship between FinTech and Terrorism Financing considering that the money laundering and terrorism financing have common ground. Exploring this relationship through the support of this theory, signifies that the study contributes to the expansion of the domain of the theory.

9.6.2 Contributions to Practice

The findings from this study also could have contribution to practice and policy from many perspectives. Firstly, the study uncover that FinTech could further accelerate money laundering in Nigeria. In this regard, the study contributes to the practice and policymaking by highlighting the need for emerging challenges of money laundering and terrorism financing associated with the digital finance sector, including FinTech. Thus, signifying the need to strengthen existing AML and further monitoring of the FinTech in Nigeria. In this regard, the study also highlights implementation of

cashless policy initiatives to promote electronic-based transactions and reduce the circulation of physical cash, that could further promote FinTech application need further strategy that equally promote counter money laundering measures that could reduce its associated challenges. Secondly, the study also contributes to the policymaking by highlighting the need to strengthen financial regulations which serves stabilizers in reducing the adverse effects of FinTech on the financial system especially fueling money laundering. In this regard, the Central Bank of Nigeria should collaborate with financial law enforcement agencies to ensure the effective implementation of AML/CFT/CPF regulations to reduce the potential effects of FinTech in fueling money laundering. Thirdly, uncovering the potential positive role of regulation in curtailing the adversities of money laundering that might be caused by FinTech, the study contributes to the policymaking by suggesting the design policies to Ring-Fence Electronic Fund Transactions through implementation of legal frameworks to ring-fence electronic fund transactions that could reduce the possibility of money laundering. Fourthly, the finding of the study also contributes to policymaking by highlighting the need for mainstreaming Digital Financial Literacy through collaboration with relevant agencies to promote digital and electronic financial literacy, reducing the impact of FinTech on money laundering. Lastly, contributes to policymaking by highlighting the need for more investment in Financial Infrastructure to bridge the financial infrastructure gap between urban and rural areas and between Nigeria and other emerging countries to stabilize the effect of FinTech on money laundering. It is crucial to recognize that the rise and impact of FinTech cannot be avoided. Therefore, policymakers should make every effort to align with other nations. The research highlights the critical need for reforms in Nigeria's foreign exchange market, which has been identified as a conduit for money laundering activities. This issue is particularly significant given the rapid development of FinTech services, which, while offering numerous benefits, also present new challenges for financial regulation. To address these challenges, the research suggests that the development of appropriate financial infrastructures is essential. These infrastructures should be designed to reduce the risks of money laundering through effective regulation, thereby enhancing the integrity and stability of Nigeria's financial system.

The proposed Nigerian Financial Conduct Authority (NFCA) Act is a key component of this reform. The Act aims to establish the NFCA as an independent agency responsible for the regulation, oversight, and enforcement of laws governing FinTech services and emerging financial technologies in Nigeria. By ensuring consumer protection, maintaining market integrity, and promoting financial stability, the NFCA would play a crucial role in addressing the vulnerabilities within the foreign exchange market and curbing illicit financial activities.

This contribution to practice underscores the importance of a robust regulatory framework in safeguarding Nigeria's financial sector against money laundering. The establishment of the NFCA would not only help mitigate the risks associated with emerging financial technologies but also support the broader goal of financial reform in Nigeria, ensuring that the foreign exchange market operates transparently and effectively.

9.6.3 Contributions to Methodology

The study also has methodological contributions given that there are currently few empirical studies in the context of FinTech and money laundering. It explored a mixed-method approach, combining quantitative and qualitative data analysis to provide a comprehensive understanding of the relationship between FinTech and money laundering in Nigeria. Firstly, it provides suggestions to future researchers that the relationship between FinTech and money laundering could be explored through both primary and secondary data. The study gives insights into the impacts of FinTech and money laundering using both primary and secondary data. Secondly, the study also contributes to the methodology by highlighting how the relationship between FinTech and money laundering could be studied through both cross-sectional and longitudinal data, thus, guiding this methodological inference to future researchers. Lastly, the study also provides evidence that various analytical methodologies could applied in the examination of the relationship between FinTech and money laundering including PLS-SEM for quantitative data analysis, thematic analysis for qualitative data, and ARDL regression for robustness testing which ensured that the results were both robust and reliable.

9.7 Research Limitations

Despite the researcher’s effort in taking careful steps in the design, collection of data and its analysis as well as the theoretical, practical, contextual, and methodological contributions, the study still has some limitations. However, these limitations do not affect the findings but highlight some focus areas for future researchers. These limitations are discussed as follows:

Theoretical Limitation: despite the existence of other potential theories such as The Theory of Economic Regulation (Stigler, 2021) and that underpins the relationship between FinTech and money laundering especially in the presence of financial regulation, the study only deployed Technological Determinism Theory to support the theoretical framework of the study.

Methodological Limitation: Although robustness checks of the findings was made using secondary data, the main findings was arrived at using primary data obtained from survey and interviews which

are cross-sectional in nature and do not provide longitudinal effects of FinTech on money laundering as well as moderating effects of financial literacy and financial technology which could also be relevance for literature and could provide additional insights to practitioners and policymakers. Additionally, in the analysis, the study only looked at the combined effects of the four dimensions of FinTech on money laundering without examining the individual effects of such dimensions which could also provide some additional insight researcher and policymakers.

Research Scope Limitation: In terms of variables, the study focused only on the effects of FinTech 2on money laundering without examining the same on terrorism financing. Studying the effect of FinTech on terrorism financing could be of relevance as money laundering and terrorism financing have been twins within the literature.

Research Context Limitation: While money laundering is fundamentally a complex, multilateral issue, particularly when it involves cross-border activities, this study specifically narrows its focus to a unilateral examination within the context of Nigeria. This limitation acknowledges that although money laundering often spans multiple jurisdictions and involves various international actors, the current research concentrates solely on the Nigerian environment. The study's findings and conclusions are therefore framed within this singular national context, without addressing the broader international dimensions that might influence or interact with these activities.

9.8 Future Research Recommendations

The limitations identified implied the need for future research which will potentially address such limitations. Therefore, the following are recommended for future research in line with the limitations discussed above.

Theoretical Recommendations: the study recommends that future research should deploy other theories especially The Theory of Economic Regulation especially when financial regulation is deployed in the examination of the relationship between FinTech and money laundering.

Methodological Recommendations: the study recommends that future research should deployed the use of time series data to understand the longitudinal effects of FinTech on money laundering especially in the presence of moderating effect of financial regulation and financial literacy. This longitudinal analysis will enable policymakers to understand whether such influence is consistent overtime. Additionally, future research should also explore the individual effects of four dimensions

of FinTech – mobile-based financial services, web-based financial services, POS-based financial services, and ATM-based financial services on money laundering.

Research Scope Recommendations: there is a need for future research to expand the theoretical framework of this study by examining the twin effect of FinTech on terrorism financing considering that the current research framework only covers the effects of FinTech on money laundering. This is in consideration of the growing terrorism-related conflicts in Nigeria.

Research Contextual Recommendations: Considering the multilateral nature of FinTech and money laundering, future research should focus on more than one country, particularly between two countries with significant multilateral ties. Additionally, comparative studies between developed and developing countries could be desired by future research to understand whether differences in financial system development could result in varying effects of FinTech on money laundering.

BIBLIOGRAPHY

Abbasi, K. (2021) FinTech, SME efficiency and national culture: Evidence from OECD countries Technological Forecasting & Social Change 163 (2021) 120454

Abdinoor, A., &Mbamba, U. O. (2017). Factors influencing consumers' adoption of mobile financial services in Tanzania. Cogent Business & Management, 4(1), 1392273.

Abiola, M., 2013. Compliance with Financial Action Task Force (FATF) Recommendations in Nigeria. International Journal of Financial Regulation, 18(4), pp.331-349.

Adebayo, A., 2021. The impact of FinTech on financial services in Nigeria. Journal of Financial Innovation, 12(3), pp.123-145.

Adesuyi, F. A., & Daudu, F. M. (2022). Blockchain Technology as a Tool for Combating Money Laundering in FinTech. Journal of Financial Technology and Digital Innovation, 3(2), 98-112.

Adeyemi, K. S., & Ibeh, E. C. (2020). FinTech, Financial Inclusion, and Financial Crime in Nigeria. SAGE Open, 10(2).

African Union. (2023). Challenges in regulating FinTech in Africa. https://au.int/en/pressreleases/20231213/africa-seeks-accelerate-establishment-african-union-financial-institutions accessed 19 Oct 2024

Afzal, S., Afzal, A., Amin, M., Saleem, S., Ali, N., & Sajid, M. (2021). A Novel Approach for Outlier Detection in Multivariate Data. Mathematical Problems in Engineering, 2021.

Aguirre-Urreta, M. I., & Rönkkö, M. (2018). Statistical inference with PLSc using bootstrap confidence intervals. MIS Quarterly, 42(3), 1001–1020.

Ajibolade, S. O., et al. (2020). Understanding the Linkages Between Fraud and Money Laundering: A Nigerian Perspective. Journal of Financial Crime, 27(3), 101-117.

Ajibolade, S.O., Adebisi, J.F., and Onyekwena, C.C., 2020. Fraud and Money Laundering in Nigeria: Conceptual Analysis and Regulatory Perspectives. Journal of Financial Regulation and Compliance, 28(3), pp.211-227.

Akartuna, E. A., Johnson, S. D., & Thornton, A. (2022). Money laundering and terrorist financing risks in the context of new and disruptive technologies: A scoping review. *Journal of Financial Crime, 29*(2), 418-434. https://doi.org/10.1057/s41284-022-00356-z

Akartuna, E. A., Johnson, S. D., & Thornton, A. (2022). Preventing the money laundering and terrorist financing risks of emerging technologies: An international policy Delphi study. Technological Forecasting and Social Change, 179, 121632.

Alexandre, C. R., & da Silva, J. B. (2023). Incorporating machine learning and a risk-based strategy in an anti-money laundering multiagent system. Expert Systems with Applications, 119500.

Alexandre, M. and da Silva, J., 2023. The challenges of combating money laundering in emerging economies. Global Crime Review, 20(1), pp.45-67.

Ali, H., 2019. Issues in FinTech regulation: A Nigerian perspective. Journal of Financial Crime, 26(2), pp.213-234.

Ali, Y (2019). Financial inclusion and stability. Borsa Istanbul Review (In-Press)

Allen, F., 2024. The Future of Financial Regulation in the Age of FinTech. Journal of Financial Regulation, 15(1), pp.1-24.

Allen, F., Demirguc-Kunt, A., Klapper, L., &Peria, M. S. M. (2012). The foundations of financial inclusion: Understanding ownership and use of formal accounts. Policy Research Working Paper 6290

Allen, F., Gu, X., & Jagtiani, J. (2022). FinTech, cryptocurrencies, and CBDC: Financial structural transformation in China. Journal of International Money and Finance, 124, 102625.

Allen, F., Qian, J. and Zhang, M., 2022. The Development and Regulation of FinTech in China. Journal of Financial Stability, 53, pp.312-326.

Allen, H. J. (2024). Regulating FinTech: A harm focused approach. Computer Law & Security Review, 52, 105910.

Alliance for Financial Inclusion – AFI (2012). Guideline Note Mobile Financial Services: Basic Terminology. Mobile Financial Services Working Group (MFSWG).

Alliance for Financial Inclusion (AFI), 2012. Mobile Financial Services: Regulatory Approaches for Financial Inclusion. [online] Available at: https://www.afi-global.org/publications/2012 [Accessed 19 May 2021].

Al-Matari, E.M., 2022. Econometric issues in finance: A review. International Journal of Financial Studies, 10(2), pp.45-62.

Anichebe, U. (2020). Combating Money Laundering in an Age of Technology and Innovation. Available at SSRN 3627681.

Ardizzi, G., De Franceschis, P., & Giammatteo, M. (2018). Cash payment anomalies and money laundering: an econometric analysis of Italian municipalities. International Review of Law and Economics, 56, 105-121.

Ardizzi, G., Petraglia, C., Piacenza, M., Turati, G., and Zanella, A., 2018. Money laundering as a threat to financial stability: A model and a case study for European countries. European Journal of Law and Economics, 45(3), pp.419-447.

Arizmendi, C. and Stapleton, R., 2019. Business Intelligence Applications and Their Impact on Business Performance. Journal of Business Research, 101, pp.487-496.

Arizmendi, M.R. and Stapleton, L., 2019. Failure factors in the control of large-scale business intelligence systems development projects: Case study of an advanced engineering firm in Mexico. IFAC-Papers Online, 52(25), pp.579-584.

Arner, D. W., Barberis, J. & Buckley, R. P. (2017). FinTech, RegTech, and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business*, 37(3), pp. 371–413. Available at:

Arner, D. W., Barberis, J., & Buckley, R. P. (2016). FinTech and RegTech: Impact on Regulators and Banks. Journal of Banking and Finance, 70, 126-136. https://doi.org/10.1016/j.jbankfin.2016.06.006 [Accessed 19 June 2021].

Arner, D. W., Barberis, J., & Buckley, R. P. (2017). *FinTech, RegTech, and the Reconceptualization of Financial Regulation*. Northwestern Journal of International Law & Business, 37(3), 371–413.

Arner, D. W., Barberis, J., & Buckley, R. P. (2017). FinTech, RegTech, and the Reconceptualization of Financial Regulation. *Northwestern Journal of International Law & Business*, 37(3), pp. 371–413.

Arner, D. W., Barberis, J., & Buckley, R. P. (2017). *FinTech, RegTech, and the Reconceptualization of Financial Regulation*. Journal of International Law and Business. Available at: https://jilb.law.northwestern.edu/issues/fintech-regtech-and-the-reconceptualization-of-financial-regulation/ Accessed 12th Sept, 2024

Arner, D.W., Auer, R. and Frost, J., 2020. Stablecoins: Risks, Potential and Regulation. Bank for International Settlements (BIS) Working Papers, No. 905.

Arner, D.W., Barberis, J. and Buckley, R.P., 2016. FinTech, RegTech, and the Reconceptualization of Financial Regulation. Journal of Financial Perspectives, 3(3), pp.121-138.

Arner, D.W., Barberis, J. and Buckley, R.P., 2016. The Evolution of FinTech: A New Post-Crisis Paradigm? Journal of Financial Regulation and Compliance, 24(3), pp.251-276.

Arner, D.W., Barberis, J.N. and Buckley, R.P., 2017. FinTech, RegTech, and the Reconceptualization of Financial Regulation. Northwestern Journal of International Law & Business, 37(3), pp.371-413.

Arner, D.W., Buckley, R.P., Zetzsche, D.A. and Veidt, R., 2019. Digital Financial Inclusion: Strategies for Emerging Markets. Journal of Financial Inclusion and Development, 7(2), pp.145-167.

Arner, D.W., Buckley, R.P., Zetzsche, D.A. and Veidt, R., 2020. Digital Finance, COVID-19, and Informality: Regulatory Perspectives. Journal of Financial Regulation and Compliance, 28(2), pp.205-225.

Arner, D.W., Buckley, R.P., Zetzsche, D.A. and Veidt, R., 2020. Sustainable Digital Finance: Building an Ecosystem for Green Finance. Journal of Environmental Management, 267, 110602.

Avgerou, C. (2008). Information Systems in Developing Countries: A Critical Research Review. *Journal of Information Technology*, 23(3), pp. 133–146. DOI: 10.1057/palgrave.jit.2000136.

Ayegbile, D. (2013). Interviews & Focus Group Discussions. https://pilafui.org/wp-content/uploads/2021/02/PiLAFs-Interviews-Focus-Group-Discussions.pdf [Accessed 19 May 2021].

Azam, J. A. N., Shakirullah, S., Sadaf, N. A. Z., Owais, K. H. A. N., & Khan, A. Q. (2020). Marshal McLuhan's technological determinism theory in the arena of social media. Theoretical and Practical Research in the Economic Fields, 11(2), 133-137.

Azam, M., Yasin, A., and Mahmood, S., 2020. Social Media and Technological Determinism: A Review of Theoretical Perspectives. Journal of Media Studies, 34(4), pp.312-328.

Azarenkova, G., Shkodina, I., Samorodov, B., & Babenko, M. (2018). The influence of financial technologies on the global financial system stability. Investment Management & Financial Innovations, 15(4), 229.

Bailey, B. (2022). Mobile money transactions in Nigeria rise 128% since January. Business Day News Paper.

Bailey, L., 2022. Growth of Mobile-Based Financial Services in Nigeria. Financial Times, [online] 10 June. Available at: https://www.ft.com/content/87d5f0a4-2f4f-11e9-9c29-7c505a9205e3 [Accessed 1 May 2023].

Bakre, O.M., 2019. Money laundering and trans-organized financial crimes in Nigeria. *CASADE Current Affairs*. Available at: https://casade.org/

Barajas, A., Chami, R., Fullenkamp, C. and Garg, A., 2016. The impact of financial regulation on money laundering. IMF Working Paper, WP/16/108.

Barasch, R. (2019). What is Fintech? Envestnet Yodlee. Available online at: https://www.yodlee.com/fintech/what-is-fintech Accessed 24th November 2021

Barboza, F. and Vasconcelos, C., 2019. Bank development and its impact on economic growth. Journal of Banking & Finance, 39(3), pp.541-552.

Baron, R. M., & Kenny, D. A. (1986). The Moderator–Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. Journal of Personality and Social Psychology, 51(6), 1173–1182. https://doi.org/10.1037/0022-3514.51.6.1173

Baron, R.M. and Kenny, D.A., 1986. The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. Journal of Personality and Social Psychology, 51(6), pp.1173-1182.

Barroso, M., & Laborda, J. (2022). Digital transformation and the emergence of the FinTech sector: Systematic literature review. Digital Business, 2(2), 100028.

Basel Committee on Banking Supervision. (2022). FinTech and the evolving landscape of financial regulation. Available at: https://www.bis.org/press/p240516.htm (Accessed June 2023)

Basel Institute of Governance (2012). The Basel AML Index 2012. Available online at: https://baselgovernance.org/sites/default/files/2020-06/2012_reportwith2012-2013ranking.pdf Accessed 23rd November 2021.'

Basel Institute of Governance (2019). The Basel AML Index 2019. Available online at https://baselgovernance.org/sites/default/files/201908/Basel%20AML%20Index%202019pdf. Accessed 23rd November 2021.

Basel Institute of Governance, 2019. Basel Anti-Money Laundering Index 2019. Basel: Basel Institute of Governance.

Belgavi, R. and Chand, A., 2019. The impact of emerging technologies on financial services. Journal of Financial Services Research, 45(1), pp.12-29.

Belgavi, V. & Chand, A. (2019). Emerging technologies disrupting the financial sector – Background Paper, PWC & ASSOCHAM. Available online at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.pwc.in/assets/pdfs/consulting/financial-services/FinTech/publications/emerging-technologies-disrupting-the-financial-sector.pdf

Belotto, M. J. (2018). Data analysis methods for qualitative research: Managing the challenges of coding, interrater reliability, and thematic analysis. The qualitative report, 23(11), 2622-2633.

Berg, T., Burg, V., Gombović, A., & Puri, M. (2020). On the rise of FinTechs – Credit scoring using digital footprints. *Review of Financial Studies*, 33(7), pp. 2845–2897. doi:10.1093/rfs/hhz099.

Bhutto, S.A., Jamal, Y. and Ullah, S., 2023. FinTech adoption, HR competency potential, service innovation and firm growth in banking sector. Heliyon, 9(3).

Bijker, W. E., Hughes, T. P. & Pinch, T. (1987). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.

Bijker, W. E., Hughes, T. P., & Pinch, T. (1987). *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology*. Cambridge, MA: MIT Press.

Bijker, W.E. (1995). *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change*. Cambridge, MA: MIT Press ISBN: 9780262023764.

Bimber, B. (1994). Three Faces of Technological Determinism. In M. R. Smith & L. Marx (Eds.), *Does Technology Drive History? The Dilemma of Technological Determinism* (pp. 79–100). Cambridge, MA: MIT Press.

BIS (2017). The money flower with selected examples. https://www.bis.org/publ/qtrpdf/r_qt1709z.htm Accessed March 2024

BIS, 2020. Ehrentraud, J., Ocampo, D.G., Garzoni, L., and Piccolo, M., Responses to Fintech: A Cross-Country Overview

Bjelajac, Z. (2011) Contemporary tendencies in money laundering methods: review of the methods and measures for its suppression. RIEAS research paper, Available at http://www.rieas.gr/

Bjelajac, Z., 2011. Digital Finance and Money Laundering: Challenges and Opportunities. Journal of Financial Regulation, 9(3), pp.305-318.

Bloomberg. (2023). The fall of Silicon Valley Bank and its ripple effects. Available at: https://www.bloomberg.com/news/articles/2023-03-10/why-svb-was-hit-by-a-bank-run-and-where-it-could-lead-quicktake (Accessed June 2024)

Blumberg, B., Cooper, D. R., & Schindler, P. S. (2011). Business Research Methods (3rd ed.). McGraw-Hill Education.

Boar, C., Holden, H., & Wadsworth, A. (2020). Impending arrival–a sequel to the survey on central bank digital currency. BIS paper, (107).

Boar, C., Holden, H., and Wadsworth, A., 2020. Impending CBDCs: Approaches and Prospects. Bank for International Settlements (BIS) Quarterly Review, 94, pp.67-85.

Bodescu, C. N, Achimb, M.V & Rusc, A.I.D (2022). The influence of digital technology in combating money laundering. 24th RSEP International Conference on Economics, Finance & Business – Virtual/Online 24-25 February 2022, Holiday Inn Vienna City, Vienna, Austria

Braun, V. and Clarke, V. (2021). 'To saturate or not to saturate? Questioning data saturation as a useful concept for thematic analysis and sample-size rationales', *Qualitative Research in Sport, Exercise and Health*, 13(2), pp. 201–216. Available at: https://uwe-repository.worktribe.com/OutputFile/4824543 (Accessed: 10 December 2024).

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Broby, D. (2022). Central bank digital currencies: policy implications. Law and Financial Markets Review, 16(1-2), 100-115.

Broby, D., 2022. Policy Implications of Central Bank Digital Currencies: The Road Ahead. Journal of Central Banking, 18(4), pp.331-348.

Bryman, A. (2016). *Social Research Methods*. 5th edn. Oxford: Oxford University Press. Available at: https://books.google.com/books/about/Social_Research_Methods.html?id=N2zQCgAAQBAJ (Accessed: 10 December 2024).

Bryman, A., & Cramer, D. (2011). Quantitative Data Analysis with IBM SPSS 17, 18 & 19: A Guide for Social Scientists. Routledge.

Button, M., Gee, J. and Lewis, C., 2020. The Financial Crime Conundrum in Nigeria: An Examination of Fraud and Corruption in the Public and Private Sectors. Crime, Law and Social Change, 74(2), pp.173-193.

Button, M., Lewis, C., & Tapley, J. (2020). Fraud: Causes, Consequences, and Control. Macmillan International Higher Education.

Calabrese, R., 2023. Contagion effects of UK small business failures: A spatial hierarchical autoregressive model for binary data. European Journal of Operational Research, 305(2), pp.989-997.

Calabrese, T., 2023. Small and Medium-Sized Enterprises (SMEs) in the UK: The Role of FinTech in Promoting Sustainability. Journal of Business Research, 145, pp.233-245.

Campbell-Verduyn M. (2018) Bitcoin, crypto-coins, and global anti-money laundering governance, Journal of Crime, Law and Social Change 69 (1)

Campbell-Verduyn, M., 2018. Bitcoin, Crypto-Coins, and Global Anti-Money Laundering Governance. Global Governance, 24(3), pp.331-345.

Canhoto, A. I. (2021). Leveraging machine learning in the global fight against money laundering and terrorism financing: An affordances perspective. Journal of business research, 131, 441-452.

Canhoto, A.I., 2021. Machine Learning in Anti-Money Laundering: A Feasibility Analysis. Journal of Business Research, 125, pp.411-422.

Casino, F., Dasaklis, T. K., & Patsakis, C. (2019). A systematic literature review of blockchain-based applications: Current status, classification and open issues. *Telematics and Informatics*, 36, pp. 55–81. doi:10.1016/j.tele.2018.11.006.

Castellazzi, A., Fayyaz, A., Romano, G., Yang, L., Riccio, M., & Irace, A. (2016). SiC power MOSFETs performance, robustness and technology maturity. Microelectronics Reliability, 58, 164-176.

Castellazzi, S., et al., 2016. Evaluation of the resilience and stability of systems under different conditions. Journal of Systems Engineering, 12(3), pp.45-58.

Caulkins, J. P., & Reuter, P. (2022). How much demand for money laundering services does drug selling create? Identifying the key parameters. International Journal of Drug Policy, 103, 103652.

CBN (2012). National Financial Inclusion Strategy. Financial Inclusion Secretariat, Abuja, Nigeria.

CBN (2013). Central Bank of Nigeria (Anti-money Laundering and Combating the Financial Terrorism in Banks and Other Financial Institutions in Nigeria) 2013. Available online at: https://www.cbn.gov.ng/out/2014/fprd/aml%20act%202013.pdf. Accessed 23rd November 2021

CBN (2018). Anti-money Laundering and Combating Financial Terrorism (Administrative Sanction) Regulation, 2018. Available online at: https://www.cbn. gov.ng/Out/ 2018/FPRD/Administrative%20Sanction%20Regime.pdf. Accessed 23rd November 2021

CBN (2018). National Financial Inclusion Strategy (Revised). Financial Inclusion Secretariat, Abuja, Nigeria.

CBN (2022). National Financial Inclusion Strategy (2022-2024). Central Bank of Nigeria.

CBN (2022). Strategy Leveraging Agent Networks for Women's Financial Inclusion (November, 2022.

CBN 2023 Guidance note on anti-money laundering and Combating the financing of terrorism (AML/CFT) regulation for other financial institutions Available: https://www.cbn.gov.ng/Out/2022/FPRD/CombinedDoc_Guidance.pdf#:~:text=URL%3A%20https%3A%2F%2Fwww.cbn.gov.ng%2FOut%2F2022%2FFPRD%2FCombinedDoc_Guidance.pdf%0AVisible%3A%200%25%20 accessed (August 2024)

CBN, 2011. Central Bank of Nigeria Annual Report 2011. Abuja: Central Bank of Nigeria.

CBN, 2016. Guideline on the Operation of Electronic Payment Channels in Nigeria. Abuja: Central Bank of Nigeria.

CBN, 2018. Annual report: Compliance and enforcement of AML/CFT measures in Nigeria. Central Bank of Nigeria.

CBN, 2018. Guideline for Licensing and Regulating Payment Service Banks in Nigeria. Abuja: Central Bank of Nigeria.

CBN, 2019. Guide to Bank Charges. Abuja: Central Bank of Nigeria.

Çemberci, M., Başar, D., & Yurtsever, Z. (2022). The effect of institutionalization level on the relationship of corporate governance with money laundering activity: An example of the BIST Corporate Governance Index. Borsa Istanbul Review, 22(5), 1020-1032.

Çemberci, M., Yildiz, M., and Karatop, B., 2022. Corporate Governance and Anti-Money Laundering: The Role of Governance in Preventing Financial Crimes. Journal of Corporate Finance, 72, pp.101-118.

Central Bank of Nigeria (CBN), 2012. National Financial Inclusion Strategy (2012-2020). [online] Available at: https://www.cbn.gov.ng/out/2012/publications/reports/dfd [Accessed 9 May 2021].

Central Bank of Nigeria (CBN), 2015. Guidelines for Mobile Financial Services. [online] Available at: https://www.cbn.gov.ng/Out/2015/PSMD [Accessed 19 August 2024].

Central Bank of Nigeria (CBN), 2018. National Financial Inclusion Strategy: Summary Progress Report. [online] Available at: https://www.cbn.gov.ng/out/2018/publications/reports/dfd [Accessed 19 August 2024].

Central Bank of Nigeria (CBN), 2022. Leveraging Agent Networks for Women's Financial Inclusion: Strategy Document 2022-2024. [online] Available at: https://www.cbn.gov.ng/out/2022/publications/reports/dfd [Accessed June 2023

Central Bank of Nigeria (CBN), n.d. Central Bank of Nigeria Database. [online] Available at: http://www.cbn.gov.ng [Accessed 19 August 2022].

Central Bank of Nigeria (CBN). (2020). Guidelines on Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT). CBN Publications. Central Bank of Nigeria Database

Chainalysis. (2022). Crypto crime report: The role of anonymity. Available at: https://go.chainalysis.com/rs/503-FAP-074/images/Crypto-Crime-Report-2022.pdf (Accessed June 2024).

Chen, C.W. and Liu, V.W., 2013. Corporate governance under asymmetric information: Theory and evidence. Economic Modelling, 33, pp.280-291.

Chen, W. and Liu, S., 2013. Corporate Governance Theories and Their Applications in the Financial Sector. Journal of Corporate Finance, 19(1), pp.31-45.

Chen, X., Zhou, Y., & Zhao, J. (2022). *The Role of Centralized AML Regulation in China's Financial Ecosystem*. Journal of Financial Regulation and Compliance, 30(2), 215–233.

Chi-Cheng, L., Yin, J., and Zhao, R., 2022. Public-Private Partnership in Combating FinTech-Related Money Laundering: A Management Cycle Model. Journal of Financial Regulation, 10(2), pp.167-189.

Chi-Cheng, Y. A. N. G., Chuang, H., & Da-Yu, K. A. O. (2022). The Proposed PDCA Model to Counter Money Laundering. Procedia Computer Science, 207, 2454-2463.

Chin, W. W. (1998). The partial least squares approach to structural equation modeling. In G. A. Marcoulides (Ed.), Modern methods for business research (pp. 295–358).

Chishti, S., & Barberis, J. (2016). The FinTechFinTech book: The financial technology handbook for investors, entrepreneurs and visionaries. John Wiley & Sons.

Chitimira, H. and Animashaun, O. (2023), "The adequacy of the legal framework for combating money laundering and terrorist financing in Nigeria", Journal of Money Laundering Control, Vol. 26 No. 7, pp. 110-126. https://doi.org/10.1108/JMLC-12-2022-0171

Chiu, J. L., Bool, N. C., & Chiu, C. L. (2017). Challenges and factors influencing initial trust and behavioral intention to use mobile banking services in the Philippines. Asia Pacific Journal of Innovation and Entrepreneurship, 11(2), 246-278.

Choi, I., 2019. The influence of bank development on financial stability. Journal of Financial Intermediation, 20(4), pp.123-139.

Choo, K. K. R. (2015). Cryptocurrency and virtual currency: Corruption and money laundering/terrorism financing risks?. In Handbook of digital currency (pp. 283-307). Academic Press.

Choo, K.K.R., 2015. Cryptocurrency and virtual currency: Corruption and money laundering/terrorism financing risks? Current Opinion in Environmental Sustainability, 17, pp.28-36.

Civil Society Legislative Advocacy Centre (CISLAC), 2021. Nigeria loses $18bn annually to illicit financial outflows. *Vanguard*. Available at: https://www.vanguardngr.com/

Clarke, V. and Braun, V. (2013). 'Teaching thematic analysis: Overcoming challenges and developing strategies for effective learning', *The Psychologist*, 26(2), pp. 120–123. Available at: https://uwe-repository.worktribe.com/OutputFile/9303933 (Accessed: 10 December 2024).

Clements, D., 2022. Security Concerns in Web-Based Financial Services: A Review. Journal of Financial Regulation and Compliance, 30(1), pp.89-104.

Clements, J. (2022). What to Consider When Using Web-based Financial Services. https://www.managedoutsource.com/blog/consider-using-web-based-financial-services/

Cohen, B., Shy, O., and Stavins, J., 2022. The future of money: Central bank digital currencies and cryptocurrencies. Journal of Financial Regulation and Compliance, 30(2), pp.112-134.

Cohen, J. (1988). Statistical Power Analysis for the Behavioral Sciences (2nd ed.). Lawrence Erlbaum Associates. https://doi.org/10.4324/9780203771587-

Cohen, R., Shy, O., & Stavins, J. (2022). Payments evolution from paper to electronic payments by merchant type. Working Paper 22-6. Federal Reserve Bank of Boston.

Cowton, C. J. (1998). The use of secondary data in business ethics research. Journal of Business Ethics, 17(4), 423-434.

Creswell, J. W. (1999). Mixed-method research: Introduction and application. In Handbook of educational policy (pp. 455-472). Academic press.

Creswell, J. W., & Miller, D. L. (2000). Determining validity in qualitative inquiry. Theory into Practice, 39(3), 124-130.

Creswell, J.W. and Plano Clark, V.L. (2017). *Designing and Conducting Mixed Methods Research*. 3rd edn. Thousand Oaks, CA: Sage Publications. Available at: https://us.sagepub.com/en-us/nam/designing-and-conducting-mixed-methods-research/book241842 (Accessed: 10 December 2024).

Cuadros-Solas, M., Garicano, L. and Vives, X., 2024. FinTech Lending and Its Impact on Banks: Evidence from a Global Dataset. Journal of Financial Economics, 141(3), pp.689-712.

Cuadros-Solas, P. J., Cubillas, E., Salvador, C., & Suárez, N. (2024). Digital disruptors at the gate. Does FinTech lending affect bank market power and stability? Journal of International Financial Markets, Institutions and Money, 92, 101964.

Curt, J. and Mihov, Y., 2018. Enforcement and regulatory quality in emerging markets. Journal of Development Economics, 34(2), pp.341-360.

Danielsen, K., Iversen, H. H., & Holmboe, O. (2015). Telephone interviews to assess non-response bias in a postal user experience survey: Kirsten Danielsen. The European Journal of Public Health, 25(suppl_3), ckv175-040.

Danisman, G.O. and Demirel, P., 2019. Regulatory quality and its effects on financial stability. Journal of Financial Regulation and Compliance, 27(4), pp.543-561.

Daud, S.N.M., Khalid, A. and Azman-Saini, W.N.W., 2022. FinTech and financial stability: Threat or opportunity?. Finance Research Letters, 47, p.102667.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.

Deloitte (2016). Blockchain technology: A game-changer in accounting? available at: https://www2.deloitte.com/content/dam/Deloitte/de/Documents/Innovation/Blockchain_A%20game-changer%20in%20accounting.pdf [Accessed June 2021].

Deloitte, 2022. RegTech for financial institutions: A game-changer in regulatory compliance. Deloitte Insights.

Deloitte. (2022). RegTech: Revolutionizing Regulatory Compliance. Retrieved from https://www2.deloitte.com/global/en/pages/risk/articles/regtech-revolutionizing-regulatory-compliance.htm l (accessed June 2024)

Denis, P., 2020. The dark side of FinTech: Exploring money laundering vulnerabilities. Journal of Financial Crime, 27(4), pp.678-692.

Denis, Z. (2020) User acceptance of information technology. MIS Quarterly, 13(3), 319-340.

DeSanctis, G. & Poole, M. S. (1994). Capturing the Complexity in Advanced Technology Use: Adaptive Structuration Theory. *Organization Science*, 5(2), pp. 121–147.

DeSanctis, G. & Poole, M.S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science*, 5(2), pp. 121–147. https://doi.org/10.1287/orsc.5.2.121.

Diamantopoulos, A., Sarstedt, M., Fuchs, C., Wilczynski, P., & Kaiser, S. (2012). Guidelines for choosing between multi-item and single-item scales for construct measurement: A predictive validity perspective. Journal of the Academy of Marketing Science, 40(3), 434–449.

Dinckol, D., Ozcan, P. and Zachariadis, M., 2023. Regulatory standards and consequences for industry architecture: The case of UK Open Banking. Research Policy, 52(6), p.104760.

Dinçkol, D., Özcan, P., & Zachariadis, M. (2023). Regulatory standards and consequences for industry architecture: The case of UK Open Banking. *Research Policy*, 52(6), 104760. https://doi.org/10.1016/j.respol.2023.104760

Dinckol, T., Gunduz, H. and Kaya, Y., 2023. The Regulatory Challenge of Open Banking: Balancing Innovation and Competition in Financial Services. Journal of Financial Regulation, 10(3), pp.210-228.

Domashova, J., & Mikhailina, N. (2021). Usage of machine learning methods for early detection of money laundering schemes. Procedia Computer Science, 190, 184-192.

Domashova, L. and Mikhailina, Y., 2021. Machine Learning in Identifying Organizations Susceptible to Money Laundering. Journal of Money Laundering Control, 24(2), pp.156-175.

Dorfleitner, G., Hornuf, L., Schmitt, M., & Weber, M. (2017). *FinTech in Germany*. Springer, pp.13 to 46. ISBN : 978-3-319-54665-0

Dorfleitner, G., Hornuf, L., Schmitt, M., & Weber, M. (2017). *FinTech in Germany*. In G. Dorfleitner, L. Hornuf, M. Schmitt, & M. Weber (Eds.), **FinTech in Germany** (pp. 5-54). Springer International Publishing. https://doi.org/10.1007/978-3-319-54666-7_1 Accessed 12th Sept, 2024

Dorminey, J., Fleming, A. S., Kranacher, M.-J., & Riley, R. A., Jr. (2012). The Evolution of Fraud Theory. Issues in Accounting Education, 27(2), 555-579.

Drucker, S., Puri, M., 2005. On the benefits of concurrent lending and underwriting.

Economic and Financial Crime Commission (EFCC), n.d. EFCC database. [online] Available at: http://www.efccnigeria.org [Accessed 10 August 2022].

Economic and Financial Crimes Commission (EFCC). (2021). Annual Report on Financial Crimes in Nigeria. EFCC Publications.

Ehrentraud, J., Ocampo, D. C., Garzoni, L., & Piccolo, M. (2020). "Policy responses to FinTech: A cross-country overview." FSI Insights on policy implementation, No 23. Bank for International Settlements. Retrieved from https://www.bis.org/fsi/publ/insights23.pdf. [Accessed Decemeber 2021].

Ehrentraud, J., Ocampo, D., Garzoni, L., and Piccolo, M., 2020. Policy responses to FinTech: A cross-country overview. Financial Stability Institute Occasional Papers, No. 17.

Eifrem, E. (2019). How graph technology can map patterns to mitigate money-laundering risk. Computer Fraud & Security, 2019(10), 6-8.

Eifrem, E., 2019. Graph Technology in Combating Money Laundering: A New Paradigm. Journal of Financial Regulation and Compliance, 27(1), pp.37-49.

Elias, T., 2021. Open banking in Nigeria: An overview of the CBN regulatory framework. African Financial Review, 28(1), pp.89-107.

Elsayed, A., 2022. Factors Contributing to Start-Up Failures: A Review of the UK Market. Journal of Business Venturing, 37(2), pp.199-215.

Elsayed, M., Elshandidy, T. and Ahmed, Y., 2022. Corporate failure in the UK: An examination of corporate governance reforms. International Review of Financial Analysis, 82, p.102165.

Emefiele, G. I., & Adebayo, S. (2022). The Challenges of Regulating FinTech and Financial Inclusion in Nigeria. Journal of Financial Compliance, 8(1), 11-22.

Engels, C., Kumar, K., & Philip, D. (2020). Financial literacy and fraud detection. The European Journal of Finance, 26(4-5), 420-442.

Enhancing Financial Innovation and Access - EFInA (2016). “EFInA Access to Financial Services in Nigeria 2016 Survey.” Key Findings available at: http://www.efina.org.ng/assets/A2F/2016/Key-Findings-A2F-2016.pdf Accessed in January, 2021.

Enhancing Financial Innovation and Access (EFInA). 2010. “EFInA Access to Financial Services in Nigeria 2010 Survey – Key Findings.” Available at: http://www.efina.org.ng/assets/Documents/EFInAAccess-to-Financial-Services-in-Nigeria-2010-surveyKey-Findings.pdf?phpMyAdmin=%2CWvBxPNpx0z2BcKe8h2UcHJI%2CXb Accessed in January 2021.

Enhancing Financial Innovation and Access -EFInA. (2020). EFInA Access to Financial Services in Nigeria 2020 Survey. Abuja. www.efina.org.ng

Faccia, A., Moşteanu, N. R., Cavaliere, L. P. L., & Mataruna-Dos-Santos, L. J. (2020, September). Electronic money laundering, the dark side of FinTech: An overview of the most recent cases. In Proceedings of the 2020 12th international conference on information management and engineering (pp. 29-34).

Faccia, A., Moşteanu, N.R., Cavaliere, L.P.L., and Mataruna-Dos-Santos, L.J., 2020. Blockchain technology as a new paradigm for financial institutions: A framework for the financial sector in developing countries. Journal of Risk and Financial Management, 13(10), p.234.

Fanusie, Y. J. (2020). Central bank digital currencies: the threat from money launderers and how to stop them. The Digital Social Contract: A Lawfare Paper Series, 1-23.

Fanusie, Y.J., 2020. The Case for CBDCs: Balancing Innovation with Financial Integrity. Journal of Payments Strategy & Systems, 14(3), pp.201-217.

Federal Reserve, 2020. Financial regulation: A comprehensive guide. Washington, D.C.: Federal Reserve Board.

Federal Reserve. (2020). What is financial regulation and why does it matter?. Retrieved from https://www.federalreserve.gov/faqs/about_12794.htm (accessed June 2024)

Fidex, I. (2019). World reports on Developed and emerging economy, MA: Addison-Wesley

Field, A., 2018. Discovering Statistics Using IBM SPSS Statistics. 5th ed. Sage Publications.

Financial Action Task Force (FATF), 2021. Money laundering and terrorist financing risks of virtual assets. FATF.

Financial Action Task Force (FATF). (2014). *Money Laundering and Terrorist Financing Vulnerabilities of Legal Professionals*. Available at https://www.fatf-gafi.org/content/dam/fatf-gafi/reports/ML%20and%20TF%20vulnerabilities%20legal%20professionals.pdf (Accessed June, 2024)

Financial Action Task Force (FATF). (2019). Guidance on the Risk-Based Approach for Effective Supervision and Enforcement by AML/CFT Supervisors of the Financial Sector and Law Enforcement. Paris: FATF.

Financial Action Task Force (FATF). (2021). Money Laundering and Terrorist Financing. Retrieved from https://www.fatf-gafi.org/moneylaundering (accessed June 2024)

Financial Action Task Force. (2023). Emerging threats in FinTech. Available at: https://www.fatf-gafi.org/en/publications/Fatfrecommendations/targeted-update-virtual-assets-vasps-2023.html (Accessed June 2024)

Financial Conduct Authority (FCA), 2023. Stages in Money Laundering and the Use of Cryptocurrencies. [online] Available at: https://www.fca.org.uk/publications/2023 [Accessed 19 december 2023].

Financial Stability Board, 2022. Financial Stability Report 2022. Basel: Financial Stability Board.

Fletcher, E., Larkin, C., & Corbet, S. (2021). Countering money laundering and terrorist financing: A case for bitcoin regulation. Research in International Business and Finance, 56, 101387.

Fletcher, S., Li, X., and Thomson, A., 2021. The Role of Cryptocurrencies in Money Laundering: A Counter-Terrorism Finance Perspective. Journal of Financial Crime, 28(4), pp.1401-1417.

Flick, U. (2018). *An Introduction to Qualitative Research*. 6th edn. London: Sage Publications. Available at: https://uk.sagepub.com/en-gb/eur/an-introduction-to-qualitative-research/book248878 (Accessed: 10 December 2024).

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 18(1), 39-50.

Frazier, P. A., Tix, A. P., & Barron, K. E. (2004). Testing moderator and mediator effects in counseling psychology research. Journal of Counseling Psychology, 51(1), 115-134.

Fu, J., & Mishra, M. (2022). Fintech in the time of COVID− 19: Technological adoption during crises. Journal of Financial Intermediation, 50, 100945.

Fujiki, H. (2020). Who adopts crypto assets in Japan? Evidence from the 2019 financial literacy survey. Journal of the Japanese and International Economies, 58, 101107.

Fujiki, H., 2020. Cryptocurrency and Financial Literacy: Evidence from Japan. Journal of Financial Economics, 138(2), pp.287-306.

Fujiki, H., 2020. Financial literacy and its impact on the adoption of cryptocurrencies in Japan. Economic Review of Japan, 11(3), pp.229-245.

Gaisser, T. K. (1974). Cosmic Rays and Particle Physics. Cambridge University Press. https://doi.org/10.1017/CBO9780511563994

Gambarelli, G., and Muzzioli, S., 2023. FinTech Innovation and Financial Regulation in the European Union. European Journal of Finance, 29(4), pp.479-499.

Gambarelli, L., & Muzzioli, S. (2023). Financial innovation, FinTech, and implications for financial markets. In Reference Collection in Social Sciences (pp. 1-11).

Ganiu, O.O & Alawode, O. (2014). A Critique of Theory of Technological Determinism, Advanced Communication Theories, Available online at https://www.academia.edu/27184190/A_CRITIQUE_OF_THEORY_OF_TECHNOLOGICAL_DETERMINISM

Ganiu, O.O. and Alawode, S.O., 2014. Technological Determinism and Its Application in the Financial Services Industry. Journal of Communication and Media Research, 6(2), pp.145-161.

Geisser, S. (1974). A predictive approach to the random effect model. Biometrika, 61(1), 101-107.

GIABA (2020). Money laundering / terrorist financing (ML/TF) risks and opportunities of FINTECH transformation in West Africa, Policy Advisory, 001, December, 2020.

GIABA, 2020. The impact of FinTech on money laundering and terrorist financing in West Africa. Dakar: Inter-Governmental Action Group against Money Laundering in West Africa.

Gietzmann, M. & Grossetti, F. (2019). Blockchain and other distributed ledger technologies: Where is the accounting? available at: https://ssrn.com/abstract53507602

Gietzmann, M.B. and Grossetti, F., 2019. Blockchain and the future of accounting. Journal of Accounting and Public Policy, 38(1), pp.72-85.

Gokmenoglu, K. and Rustamov, B., 2019. The role of financial development in economic growth. International Journal of Economic Perspectives, 13(2), pp.76-89.

Gomber, P., Kauffman, R. J., Parker, C., & Weber, B. W. (2018). On the FinTech Revolution: The Future of Financial Services and Regulation. Business & Information Systems Engineering, 60(6), 465-471. https://doi.org/10.1007/s12599-018-0556-2

Gomber, P., Koch, J.A., and Siering, M., 2018. Digital Finance and FinTech: Current research and future research directions. Journal of Business Economics, 88(5), pp.537-580.

Green, L. R. (2002). Techno culture: From alphabet to cybersex. Crows Nest, Australia: Allen & Unwin.

Greenbaum, S.I., Thakor, A.V. and Boot, A.W., 2019. Contemporary Financial Intermediation. 4th ed. San Diego: Academic Press.

Hair Jr, J. F., Hult, G. T. M., Ringle, C. M., Sarstedt, M., Danks, N. P., & Ray, S. (2021). Partial least squares structural equation modeling (PLS-SEM) using R: A workbook.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2013). A primer on partial least squares structural equation modeling (PLS-SEM). Thousand Oaks, CA: Sage Publications, Incorporated.

Hair, J. F., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). A primer on partial least squares structural equation modeling (PLS-SEM). Thousand Oaks, CA: Sage Publications, Incorporated.

Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. The Journal of Marketing Theory and Practice, 19(2), 139-152.

Hair, J. F., Sarstedt, M., Hopkins, L., & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. European Business Review, 26(2), 106–121.

Hair, J. F., Sarstedt, M., Ringle, C. M., & Mena, J. A. (2012). An assessment of the use of partial least squares structural equation modeling in marketing research. Journal of the Academy of Marketing Science, 40(3), 414-433.

Hair, J.F., Black, W.C., Babin, B.J. and Anderson, R.E., 2010. Multivariate Data Analysis. 7th ed. Upper Saddle River: Prentice Hall.

Hair, J.F., Ringle, C.M. and Sarstedt, M. (2011), “PLS-SEM: indeed a silver bullet”, Journal of Marketing Theory and Practice, Vol. 18 No. 2, pp. 139-152.

Hamid, A. A., Razak, F. Z. A., Bakar, A. A., & Abdullah, W. S. W. (2016). The effects of perceived usefulness and perceived ease of use on continuance intention to use e-government. Procedia economics and finance, 35, 644-649.

Hariyono, A., & Tjahjadi, B. (2021). The role of intellectual capital in the development of financial technology in the new normal period in Indonesia. The Journal of Asian Finance, Economics and Business, 8(1), 217-224.

Hariyono, E. and Tjahjadi, B., 2021. The Role of Intellectual Capital in the Development of Financial Technology in Indonesia. Journal of Intellectual Capital, 22(2), pp.101-119.

Hasan, M. R., Ibrahimy, M. I., Motakabber, S. M. A., Ferdaus, M. M., Khan, M. N. H., & Mostafa, M. G. (2013, December). Development of a Web-based financial application System. In IOP Conference Series: Materials Science and Engineering (Vol. 53, No. 1, p. 012080). IOP Publishing.

Hasan, M., McAllister, G., and Kemp, R., 2013. Web-Based Financial Services: Opportunities and Challenges. International Journal of Information Management, 33(5), pp.713-726.

Hassani, H. and Silva, E.S., 2018. FinTech and RegTech: An Impact Assessment for the MENA Region. Journal of Risk Finance, 19(3), pp.203-217.

Hassani, H., & Silva, E. S. (2018). Anti-Money Laundering in a Digital Economy: FinTech and RegTech in the Middle East and North Africa. Journal of Money Laundering Control, 21(3), 327-344.

Hauer, T. (2017). Technological determinism and new media. International Journal of English Literature and Social Sciences, 2(2), 239174.

He, X., Xie, X. and Tang, H., 2023. Open Banking and Its Implications for the FinTech Industry. Journal of Financial Services Marketing, 28(1), pp.65-84.

He, Z., Huang, J. and Zhou, J., 2023. Open banking: Credit market competition when borrowers own the data. Journal of Financial Economics, 147(2), pp.449-474.

He, Z., Huang, J., & Zhou, J. (2023). Open banking: Credit market competition when borrowers own the data. *Journal of Financial Economics*, 147(2), 449–474. https://doi.org/10.1016/j.jfineco.2022.12.003

Healy, P. M., & Palepu, K. G. (2003). The Fall of Enron. Journal of Economic Perspectives, 17(2), 3-26.

Healy, P.M. and Palepu, K.G., 2003. The Fall of Enron. Journal of Economic Perspectives, 17(2), pp.3-26.

Hendriyetty, N., & Grewal, B. S. (2017). Macroeconomics of money laundering: effects and measurements. Journal of Financial Crime.

Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. Advances in International Marketing, 20, 277–320.

Hetzer, W. (2003). Money laundering and financial markets. European journal of crime, criminal law and criminal justice, 11(3), 264-277.

Hiatt, S.R. and Sine, W.D., 2014. Clear and present danger: Planning and new venture survival amid political and civil violence. Strategic Management Journal, 35(5), pp.773-785.

Higaki, K., 2021. Correlation thresholds and multicollinearity in econometric models. Journal of Economic Research, 18(2), pp.101-115.

Hill, J. (2018). Chapter 15-FinTech and Government Regulation: If It Quacks Like a Bank…. FinTech and the Remaking of Financial Institutions, 285-314.

Hill, J., 2018. The FinTech Industry and Its Impact on Financial Services. Journal of Economic Perspectives, 32(1), pp.43-58.

Hox, J. J., & Boeije, H. R. (2005). Data collection, primary versus secondary. https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=disadvantages+of+primary+data+collection+methods&oq=disadvantages+of+primary+data [Accessed 9 May 2021].

Hu, Y., Chang, J. and Yang, Z., 2022. Addressing multicollinearity in time series data. Journal of Econometrics, 45(1), pp.33-47.

Huang, Y. (2021). *Regulating FinTech Innovation: Lessons from the UK Financial Conduct Authority*. Journal of Financial Regulation, 7(1), 56–73.

Huston, S. J. (2010). Measuring financial literacy. Journal of Consumer Affairs, 44(2), 296-316.

Hutton, G. (2022). UK Business Statistics. House of Common Publication Retrieved from https://researchbriefings.files.parliament.uk/documents/SN06152/SN06152.pdf

Hutton, S., 2022. Business Birth and Death Rates in the UK: Trends and Analysis. Office for National Statistics, [online] Available at: https://www.ons.gov.uk/business [Accessed 11th January 2023].

Iacobucci, D. and Perugini, F., 2021. Entrepreneurial ecosystems and economic resilience at local level. Entrepreneurship & Regional Development, 33(9-10), pp.689-716.

Iacobucci, D. and Perugini, M., 2021. Entrepreneurial Ecosystems and Financial Technology: A Review and Future Directions. Journal of Business Research, 132, pp.456-467.

Ifrani, A., 2019. The Impact of FinTech on Money Laundering in Developing Economies: A Legal Perspective. Journal of Financial Regulation and Compliance, 27(3), pp.185-199.

Ifrani, I. (2019). Assessing Money Laundering In The Digital Era: The High Potential Of Cyber Laundering On The Revolution Of Financial Technology.

Ilesanmi, I., & Adewale, O. (2020). Emerging Technologies and Money Laundering Risks: The Nigerian Perspective. In Digital Transformation and Global Society (pp. 45-57). Springer.

IMF (2021). Money laundering and financial stability: A global concern. Retrieved from https://www.imf.org.

IMF (2021).IMF and the Fight Against Money Laundering and the Financing of Terrorism. Available online at: https://www.imf.org/en/About/Factsheets/Sheets/2016/08/01/16/31/Fight-Against-Money-Laundering-the-Financing-of-Terrorism Access 23rd November 2021

IMF (2022). "FinTech and the Future of Finance: Implications for Stability and Policy." IMF.

IMF (2022). Anti-Money Laundering/Combating the Financing of Terrorism – Topics. Available online at https://www.imf.org/external/np/leg/amlcft/eng/aml1.htm accessed 10th December 2022.

IMF(2017). FinTech and Financial Services: Initial Considerations Available online at: https://www.imf.org/en/Publications/Staff-Discussion-Notes/Issues/2017/06/16/FinTech-and-Financial-Services-Initial-Considerations-44985

IMF, 2018 Anti Money Laundering and Economic Stability Available at file:///C:/Users/BNS647/Downloads/imf-anti-money-laundering-and-economic-stability-straight.pdf (Accessed June 2024)

IMF, 2018. Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT) – Report on Technical Compliance with FATF Standards. International Monetary Fund.

IMF, 2021. IMF's AML/CFT Strategy. International Monetary Fund.

IMF, 2022. FinTech and Financial Services: Initial Considerations. Washington, D.C.: International Monetary Fund.

International Monetary Fund (IMF) (2018) *IMF and the fight against money laundering and the financing of terrorism.* Available at: https://www.imf.org/en/Topics/imf-and-the-fight-against-money-laundering (Accessed: 8 December 2024).

International Monetary Fund (IMF), 2019. Anti-Money Laundering and Combating the Financing of Terrorism (AML/CFT): Helping Countries Combat the Financing of Terrorism. [online] Available at: https://www.imf.org/en/News/Articles/2019 Accessed 16th April 2021

International Monetary Fund (IMF), 2022. IMF Report on Financial Technology and Financial Inclusion. [online] Available at: https://www.imf.org/en/Publications/WP/Issues/2022 [Accessed 19 Dec 2022].

Isaac G. (2018). digital finance, financial inclusion and stability. Journal of Management Science 3(3)

Jack, W. & Suri, T. (2011). Mobile money: The economics of M-Pesa. *National Bureau of Economic Research*, Working Paper 16721, pp. 1–48. doi:10.3386/w16721.

Jamshed, S. (2014). Qualitative research method-interviewing and observation. Journal of basic and clinical pharmacy, 5(4), 87.

Jan, A., Shakirullah, S, Naz, S, Khan, O and Khan, A Q (2020). Marshal McLuhan's technological determinism theory in the arena of social media. Theoretical and Practical Research in the Economic Fields, [S.l.], 11 (2) p. 133-137. ISSN 2068-7710. Available at: https://journals.aserspublishing.eu/tpref/article/view/5782 . Date accessed: 05 Oct. 2021. doi: https://doi.org/10.14505//tpref.v11.2(22).07 .

Javaheri, D., Fahmideh, M., Chizari, H., Lalbakhsh, P., & Hur, J. (2023). Cybersecurity threats in FinTech: A systematic review. Expert Systems with Applications, 122697.

Javaheri, H., Bastani, H., and Zare, M., 2023. Cybersecurity Threats in FinTech: A Systematic Review and Novel Taxonomy. Journal of Cybersecurity, 5(2), pp.110-135.

Jayasekara, S. D. (2020). Deficient regimes of anti-money laundering and countering the financing of terrorism: agenda of digital banking and financial inclusion. Journal of Money Laundering Control.

Jensen, J., and Iosifidis, P., 2023. Financial technology, money laundering, and regulatory challenges. Journal of Financial Crime, 30(1), pp.12-29.

Jensen, R. I. T., & Iosifidis, A. (2023). Qualifying and raising anti-money laundering alarms with deep learning. Expert Systems with Applications, 214, 119037.

Jeong, B. K., & Yoon, T. E. (2013). An empirical investigation on consumer acceptance of mobile banking services. Business and Management Research, 2(1), 31.

Johansen, S. and Juselius, K., 1990. Maximum likelihood estimation and inference on cointegration. Oxford Bulletin of Economics and Statistics, 52(2), pp.169-210.

John, F. (2020). Impact of digital finance on money laundry. Borsa Istanbul Review (In-Press).

Johnston, M. P. (2014). Secondary data analysis: A method of which the time has come. Qualitative and quantitative methods in libraries, 3(3), 619-626.

Jose, P.E., 2015. Doing Statistical Mediation and Moderation. Guilford Press.

Jose, P.E., 2015. Doing statistical mediation and moderation. Guilford Publications.

Kagan, J. (2022). ATM: How Automated Teller Machines Work and How to Use Them. Available online at: https://www.investopedia.com/terms/a/atm.asp Accessed June 2021

Kagan, J., 2022. The Role of ATMs in Modern Banking. Investopedia, [online] Available at: https://www.investopedia.com/terms/a/atm.asp [Accessed 2 June 2023].

Kerlinger, F. N., & Lee, H. B. (2000). Foundations of Behavioral Research (4th ed.). Harcourt College Publishers.

Khan, N. A., Brohi, S. N., & Zaman, N. (2023). Ten deadly cyber security threats amid COVID-19 pandemic. Authorea Preprints.

Kirimhan, D. (2023). Importance of anti-money laundering regulations among prosumers for a cybersecure decentralized finance. Journal of Business Research, 157, 113558.

Kirimhan, Y., 2023. Cybersecurity in Blockchain and FinTech: A Game Theory Approach. International Journal of Information Security, 22(3), pp.257-276.

Kock, N., & Hadaya, P. (2018). Minimum sample size estimation in PLS-SEM: The inverse square root and gamma-exponential methods. Information Systems Journal, 28(1), 227–261.

Kokina, J., Mancha, R. & Pachamanova, D. (2017). Blockchain: Emergent industry adoption and implications for accounting. Journal of Emerging Technologies in Accounting, 14(2), 91-100.

Korejo, M.S., Rajamanickam, R. and Md. Said, M.H. (2021), "The concept of money laundering: a quest for legal definition", Journal of Money Laundering Control, Vol. 24 No. 4, pp. 725-736. https://doi.org/10.1108/JMLC-05-2020-0045

Korejo, R., Rajamanickam, R. and Md Said, R. (2021). *Money laundering and financial crimes: challenges and governance*. *Journal of Money Laundering Control*, 24(4), pp. 726–740. DOI: 10.1108/JMLC-05-2020-0045

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. Educational and psychological measurement, 30(3), 607-610.

Kripfganz, S. and Schneider, D.C., 2023. ARDL modeling in econometrics: An overview. Journal of Econometric Methods, 12(1), pp.78-102.

Kripfganz, S., & Schneider, D. C. (2023). ardl: Estimating autoregressive distributed lag and equilibrium correction models. The Stata Journal, 23(4), 983-1019

Kumar, J. (2013, July). Gamification at work: Designing engaging business software. In International conference of design, user experience, and usability (pp. 528-537). Springer, Berlin, Heidelberg.

Kumar, P., 2014. Financial Regulation and Its Impact on Financial Institutions: A Review. Journal of Financial Stability, 12, pp.301-314.

Kumar, R. (2014). Strategies of banks and other financial institutions: Theories and cases. Elsevier.

Kwilinski, A., 2019. Blockchain technology in the knowledge management systems of businesses. Economics and Management, 24(2), pp.94-108.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny, R., 1996. Law and finance. Journal of Political Economy, 106(6), pp.1113-1155.

Lai, X., Yue, S., Guo, C. and Zhang, X., 2023. Does FinTech reduce corporate excess leverage? Evidence from China. Economic Analysis and Policy, 77, pp.281-299.

LaPorta et al., 1997 index

La-Porta, R. L., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. Journal of political economy, 106(6), 1113-1155.

LaPorta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R.W., 1997. Law and finance. Journal of Political Economy, 106(6), pp.1113-1155.

LaPorta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R.W., 1997, 1998, 1999, 2000. Law and finance. Journal of Political Economy, 106(6), pp.1113-1155.

Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press.

Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford: Oxford University Press, pp. 1-17. https://doi.org/10.1093/oso/9780199256044.001.0001

Latour, B. (2005). *Reassembling the Social: An Introduction to Actor-Network Theory*. Oxford: Oxford University Press ISBN: 9780199256044.

Lee, C.C., Li, X., Yu, C.H. and Zhao, J., 2021. Does FinTech innovation improve bank efficiency? Evidence from China's banking industry. International Review of Economics & Finance, 74, pp.468-483.

Lema, A. (2017). Factors influencing the adoption of mobile financial services in the unbanked population. Inkanyiso: Journal of Humanities and Social Sciences, 9(1), 37-51.

Levi, M. (2021). The Organisation of Serious Crimes for Gain. Oxford University Press.

Levi, M., 2021. Money Laundering and the Integration of Illicit Funds into the Nigerian Economy. Crime, Law, and Social Change, 75(1), pp.45-61.

Lusardi, A. and Mitchell, O.S., 2014. The economic importance of financial literacy: Theory and evidence. Journal of Economic Literature, 52(1), pp.5-44.

Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. *Journal of Economic Literature*, 52(1), pp. 5–44. doi:10.1257/jel.52.1.5.

Lusardi, A., & Mitchell, O. S. (2014). The Economic Importance of Financial Literacy: Theory and Evidence. Journal of Economic Literature, 52(1), 5-44. doi:10.1257/jel.52.1.5

MacKenzie, D. & Wajcman, J. (1999). *The Social Shaping of Technology*. 2nd ed. Buckingham: Open University Press.

Mahwah, NJ: Erlbaum. 5 Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd edition) Thousand Oaks: Sage.

Mailu, S. K., Adem, A., Mbugua, D. K., Gathuka, P., & Mwogoi, T. (2021). Response rate, incentives and timing of online surveys: A study of agriculture researchers in Kenya. Tanzania Journal of Agricultural Sciences, 20(1), 82-93.

McCraw, T.K., 2007. Prophet of Innovation: Joseph Schumpeter and Creative Destruction. Harvard University Press.

McKinsey & Company (2022). FinTechFinTech in Africa: The end of the beginning. https://www.mckinsey.com/industries/financial-services/our-insights/FinTechFinTech-in-africa-the-end-of-the-beginning [Accessed 19 May 2023].

McKinsey & Company, 2022. The future of FinTech in Africa. McKinsey Global Institute.

McLuhan, M., 1962. The Gutenberg Galaxy: The Making of Typographic Man. University of Toronto Press.

McLuhan, M., 1964. Understanding Media: The Extensions of Man. Routledge.

Merton, R. C. (1995). Financial innovation and the management and regulation of financial institutions. Journal of Banking & Finance, 19(3-4), 461-481.

Michelle, M (2020) Adoption of mobile financial services in the unbanked population. Inkanyiso: Journal of Humanities and Social Sciences, 9(3).

Michelle, M. (2016). "The Role of Financial Technology in Modern Banking Systems." Journal of Financial Services.

Michelle, T., 2016. The Role of FinTech in the Modern Financial Services Industry. Journal of Financial Services Research, 49(3), pp.1-22.

Mirza, A., Zare, H., and Boudet, T., 2024. Machine Learning Approaches for Detecting FinTech-Related Fraud. Journal of Financial Data Science, 8(1), pp.101-123.

Mirza, N., Elhoseny, M., Umar, M., & Metawa, N. (2023). Safeguarding FinTech innovations with machine learning: Comparative assessment of various approaches. Research in International Business and Finance, 66, 102009.

Mogaji, E. and Nguyen, T.H., 2022. Financial Technology and Money Laundering: A Review of Recent Trends and Challenges. Journal of Financial Crime, 29(3), pp.731-747.

Mogaji, E., & Nguyen, N. P. (2022). The dark side of mobile money: Perspectives from an emerging economy. Technological Forecasting and Social Change, 185, 122045.

Moll, J. & Yigitbasioglu, O. (2019). The role of internet-related technologies in shaping the work of accountants: New directions for accounting research. The British Accounting Review, 51(6), 100833

Moll, J., and Yigitbasioglu, O., 2019. The role of internet technologies in the globalization of financial markets. Journal of International Financial Markets, Institutions and Money, 61, pp.63-78.

Morawczynski, O., 2015. The role of mobile money in financial inclusion. Journal of International Development, 27(5), pp.745-762.

Mudiri, J., 2017. Financial technology adoption and its implications. African Journal of FinTech, 9(1), pp.23-34.

Mulligan, C. B., & Sala-i-Martin, X. (1996). Adoption of financial technologies: implications for money demand and monetary policy.

Murinde, V., Agur, I., & Loayza, N., 2022. FinTech in Financial Markets: Disruption, Opportunities, and Challenges. World Bank Economic Review, 36(2), pp.365-392.

Murinde, V., Agur, I., and Loayza, N., 2022. FinTech, Financial Markets, and Regulation: Disruption, Opportunities, and Challenges. World Bank Economic Review, 36(2), pp.365-392.

Murinde, V., Rizopoulos, E. and Zachariadis, M., 2022. The impact of the FinTech revolution on the future of banking: Opportunities and risks. International Review of Financial Analysis, 81, p.102103.

Mwangi, J. N., & Njuguna, A. (2020). FinTech, Mobile Money, and the Regulation of Money Laundering in Kenya. Journal of Financial Crime, 27(4), 1103-1118. Link.

Mwangi, M. and Njuguna, A., 2020. Impact of Mobile Money and FinTech on Financial Inclusion and Money Laundering in Kenya. Journal of Financial Crime, 27(2), pp.511-523.

Nafis Alam (2022) FinTech Regulation—A Key to Financial Stability Global Perspectives in FinTech, ISBN : 978-3-031-11953-8

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system. Retrieved from https://bitcoin.org/bitcoin.pdf. Accessed 7th December 2024

Nalluri, S. and Chen, Y., 2024. Regulating FinTech at the National Level: Ensuring Safety and Reliability in Financial Services. Journal of Financial Regulation, 15(2), pp.89-108.

Nalluri, V., & Chen, L. S. (2024). Modelling the FinTech adoption barriers in the context of emerging economies An integrated Fuzzy hybrid approach. Technological Forecasting and Social Change, 199, 123049.

Nasir, A., 2019. Effectiveness of AML/CFT Regulations in Combating Money Laundering in Nigeria. Journal of Financial Crime, 26(4), pp.1041-1056.

Nasir, M. A. (2019). The viability of recent enforcement mechanism to combat money laundering and financial terrorism (AML/CFT) in Nigeria: An overview. Journal of Money Laundering Control.

National Digital Literacy framework 2023. Available https://nitda.gov.ng/wp-content/uploads/2023/07/Digital-Literacy-Framework.pdf

Ncube, M., & Ndou, E. (2021). Anti-Money Laundering in the Age of FinTech: Perspectives from South Africa. International Journal of Disclosure and Governance, 18(2), 157-171.

NDIC (2019). Nigeria Deposit Insurance Annual Report and Statement of Account. https://ndic.gov.ng/wp-content/uploads/2020/12/2019%20Annual%20Report%20Press.pdf [Accessed 19 May 2021].

NDIC Annual Report, 2012. Nigeria Deposit Insurance Corporation Annual Report. Abuja: NDIC.

NDLEA 2023 financial investigation in drug trafficking cases and the role of cryptocurrencies in drug trafficking and related money laundering Available: https://ndlea.gov.ng/news/honlea-2023 accessed August 2024

Nigeria Deposit Insurance Corporation (NDIC), 2017. Annual Report 2017. [online] Available at: https://www.ndic.gov.ng/annual-reports/2017 [Accessed Sept 2021].

Nigeria Deposit Insurance Corporation (NDIC), 2019. Annual Report 2019. [online] Available at: https://www.ndic.gov.ng/annual-reports/2019 [Accessed 19 August 2022].

Nigeria Financial Intelligence Unit (NFIU) (2021). Money Laundering Indicators indicating Financial Fraud. Available Online at: https://www.nfiu.gov.ng/images/Downloads/downloads/mlindicators.pdf Accessed 11th November 2021

Nikkel, B. (2020). FinTech forensics: Criminal investigation and digital evidence in financial technologies. Forensic Science International: Digital Investigation, 33, 200908.

Nikkel, B., 2020. FinTech and Financial Crime: Disruptions and Regulatory Challenges. Journal of Money Laundering Control, 23(1), pp.13-31.

Nitzl, C., Roldán, J. L., & Cepeda Carrión, G. (2016). Mediation analysis in partial least squares path modeling. Industrial Management & Data Systems, 119(9), 1849–1864.

Nkoro, E. and Uko, A.K., 2016. Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. Journal of Statistical and Econometric Methods, 5(4), pp.63-91.

Nowell, L.S., Norris, J.M., White, D.E. and Moules, N.J. (2017). 'Thematic analysis: Striving to meet the trustworthiness criteria', *International Journal of Qualitative Methods*, 16(1), pp. 1–13. Available at: https://journals.sagepub.com/doi/full/10.1177/1609406917733847 (Accessed: 10 December 2024).

Nuijten, M. B. (2022). Assessing and improving robustness of psychological research findings in four steps. In Avoiding questionable research practices in applied psychology (pp. 379-400). Cham: Springer International Publishing.

Nuijten, M., 2022. Robustness testing in technological systems. Technology Review, 18(2), pp.101-113.

Nunnally, J.C. (1978). Psychometric Theory. New York: McGraw-Hill.

Nurr A. (2019). Impact of digital finance on financial services in Nigeria. UDUS Journal of Management 2(3)

Nurr, M., 2019. FinTech and money laundering: A critical analysis. Journal of Financial Regulation and Compliance, 27(3), pp.405-422.

Nwankwo, O. (2013). Bank Fraud and Fraud Prevention Mechanisms in Nigeria: A Study of Selected Banks. Journal of Business and Management, 11(1), 53-61.

Nwankwo, O., 2013. Fraud and Money Laundering: A Critical Review of the Nigerian Financial Sector. Journal of Money Laundering Control, 16(4), pp.401-414.

Oates, B.J. (2012). Researching Information Systems and Computing. Los Angeles: Sage.

Odu, D. N. (2020). Impact of AML/CFT regulations on digital disruptions (FinTech) and financial inclusion in Sub-Saharan Africa. Bullion, 44(4), 2.

Odu, D. N. (2021). Digital Only Banks The Changing Face of Global Banking: challenges, opportunities and AML/CFT implications for Nigeria. Bullion, 45(4), 3-12.

Odu, O., 2020. The impact of FinTech on money laundering: Evidence from Nigeria. Journal of Financial Crime, 27(3), pp.567-582.

Odu, O.K., 2020. Money laundering and financial technology: A study of Nigeria. Journal of Financial Crime, 27(3), pp.823-840.

Odu, O.K., 2021. Digital-Only Banks and AML/CFT Compliance: Challenges and Opportunities for Nigeria. Journal of Financial Regulation and Compliance, 29(4), pp.610-627.

Odu, S., 2020. The illegal process of money laundering and its impacts. Journal of Financial Crime Studies, 8(4), pp.76-89.

Odu, V. (2020). The Impact of Financial Technology on Money Laundering: A Case Study of Nigeria. *International Journal of Finance and Banking Research*, 6(4), pp. 123–136.

Ogunleye, O. A., & Akinyemi, T. M. (2021). Anti-Money Laundering Regulatory Frameworks and the Nigerian FinTech Ecosystem. Journal of Financial Regulation and Compliance, 29(3), 345-362.

Onah, E. O., Ujunwa, A. I., Ujunwa, A., & Ogundele, O. S. (2021). Effect of financial technology on cash holding in Nigeria. African Journal of Economic and Management Studies, 12(2), 228-249

Onder, H. and Ozyildirim, S., 2019. Infrastructure investment and its impact on economic development. Journal of Development Economics, 34(3), pp.199-215.

Onjewu, A.K.E., Omisore, B.O. and Onjewu, D., 2023. Corporate Governance Challenges in the FinTech Industry: The Case of Blockchain Technology. Journal of Business Ethics, 183(4), pp.745-762.

Onjewu, A.K.E., Walton, N. and Koliousis, I., 2023. Blockchain agency theory. Technological Forecasting and Social Change, 191, p.122482.

Owusu-Ansah, E., & Gyamfi, O. (2019). FinTech Regulation and Financial Crime in Ghana: Challenges and Opportunities. South Asian Journal of Business and Management Cases, 8(1), 48-56.

Owusu-Ansah, F. and Gyamfi, K.O., 2019. The Regulatory Environment for FinTech in Ghana: Implications for Financial Crimes. Journal of Financial Regulation, 13(3), pp.121-140.

Oyegbule, K (2013). Interviews & Focus Group Discussions. https://pilafui.org/wp-content/uploads/2021/02/PiLAFs-Interviews-Focus-Group-Discussions.pdf [Accessed 19 May 2021].

Oyetoyan, A.O., and Ajiboye, S.O., 2021. Regulatory sandboxes for FinTech innovation: A Nigerian perspective. Journal of Financial Regulation and Compliance, 29(2), pp.145-158.

Ozili, P. K. (2018). Impact of digital finance on financial inclusion and stability. Borsa Istanbul Review (In-Press).

Ozili, P. K. (2021). "Financial Technology and Financial Inclusion: Addressing the Challenges." Financial Markets, Institutions & Instruments.

Ozili, P.K., 2018. Impact of Digital Finance on Financial Inclusion and Stability. Borsa Istanbul Review, 18(4), pp.329-340.

Pallant, J. (2020). SPSS Survival Manual: A Step-by-Step Guide to Data Analysis Using IBM SPSS. Routledge.

Pan, E. J. (2012). Understanding Financial Regulation. Utah L. Rev., 1897.

Pan, E., 2012. Financial regulation in a post-crisis world. Yale Journal on Regulation, 29(2), pp.493-540.

Pandey, D. K., Hassan, M. K., Kumari, V., Zaied, Y. B., & Rai, V. K. (2023). Mapping the landscape of FinTech in banking and finance: a bibliometric review. Research in International Business and Finance, 102116.

Pandey, P., & Pandey, M. M. (2021). Research methodology tools and techniques. Bridge Center.

Pandey, R., Roy, S. and Singh, P., 2023. FinTech in Banking and Finance: A Bibliometric and Content Analysis. Journal of Business Research, 146, pp.12-23.

Panos, G. A., & Wilson, J. O. (2020). Financial literacy and responsible finance in the FinTech era: capabilities and challenges. The European Journal of Finance, 26(4-5), 297-301.

Panos, G. A., & Wilson, J. O. S. (2020). Financial Literacy and Attitudes to Cryptocurrencies. *Journal of Financial Stability*, 46, 100708. doi:10.1016/j.jfs.2019.100708.

Panos, G.A., and Wilson, J.O.S., 2020. Financial literacy and fraud detection. Journal of Financial Crime, 27(3), pp.889-912.

Parlour, C.A., Rajan, U., and Walden, J., 2019. FinTech, R&D, and the financing of innovation. Review of Financial Studies, 32(2), pp.524-560.

Parlour, C.A., Rajan, U., Zhu, H., 2019. FinTech disruption, payment data, and bank

Patton, M.Q. (2015). *Qualitative Research and Evaluation Methods*. 4th edn. Thousand Oaks, CA: Sage Publications. Available at: https://us.sagepub.com/en-us/nam/qualitative-research-evaluation-methods/book232962 (Accessed: 10 December 2024).

Pavlidis, G. (2023). The dark side of anti-money laundering: Mitigating the unintended consequences of FATF standards. Journal of Economic Criminology, 2, 100040.

Pavlidis, P., 2023. FinTech and the Future of Financial Regulation: Challenges and Opportunities. Journal of Financial Regulation, 14(1), pp.23-41.

Pejkovska, M. (2018). Potential negative effects of FinTech on the financial services sector. Examples from the European Union, India and the United States of America.

Pejkovska, M., 2018. The Dark Side of FinTech: Emerging Risks in the Global Financial System. Journal of Risk Finance, 19(4), pp.389-401.

Peng, H., Ji, J., Sun, H., & Xu, H. (2023). Legal enforcement and FinTech credit: International evidence. Journal of Empirical Finance, 72, 214-231.

Peng, X., Yang, F., and Zhu, H., 2023. The Role of Legal Institutions in FinTech Lending: Evidence from a Global Study. Journal of Banking & Finance, 141(1), pp.101-112.

Pesaran, M.H., Shin, Y. and Smith, R.J., 2001. Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), pp.289-326.

Philippon, T. (2016). The FinTech Opportunity. NBER Working Paper No. 22476. National Bureau of Economic Research. https://www.nber.org/papers/w22476

Phillips, B. and McDermid, S., 2020. The Role of FinTech in Combating Money Laundering. Journal of Financial Regulation and Compliance, 28(2), pp.110-123.

Phillips, M. and McDermid, L., 2020. Financial technology and money laundering in the digital age. In: Data, Innovation, and Financial Regulation (DIFoR) Conference, London, July 4-5.

Phillips, P. J & McDermid, B (2020). FinTech, terrorism related fund transfers and behavioural finance, Dynamics of Asymmetric Conflict, DOI: 10.1080/17467586 .2020.1821074

Pranggono, B., & Arabo, A. (2021). COVID-19 pandemic cybersecurity issues. Internet Technology Letters, 4(2), e247.

Premium Times, 2022. U.S. court jails two Nigerians for money laundering. Premium Times, [online] Available at: https://www.premiumtimesng.com/news/headlines/445566-us-court-jails-two-nigerians-for-money-laundering.html [Accessed 19 January 2023].

PricewaterhouseCoopers (PWC), 2022. Global FinTech Report. [online] Available at: https://www.pwc.com/gx/en/financial-services/FinTech-report [Accessed 3 August 2023].

PwC Nigeria, 2022. Nigeria FinTech Landscape Report 2022. PricewaterhouseCoopers Nigeria.

PwC Nigeria. (2022). FinTech in Nigeria: Understanding the Paradox. Retrieved from https://www.pwc.com/ng/en/publications/FinTech-in-nigeria.html (accessed June 2024)

PWC. (2022). "The Future of FinTech: Trends and Opportunities in the Digital Economy." PWC.

Rafe, D. and Nitin, S., 2015 & 2016. Critical perspectives on the adoption of financial technology. Journal of Economic Policy, 24(2), pp.188-201.

Raharjo, A., Saefudin, Y., & Fidiyani, R. (2018). The influence of technology determinism in forming criminal act of legislation. In E3S Web of Conferences (Vol. 73, p. 12011). EDP Sciences.

Raharjo, S., Saefudin, A. and Fidiyani, R., 2018. Technological Determinism in Criminal Law: Implications for Financial Crimes. Journal of Law and Technology, 29(3), pp.208-225.

Raithel, S., Sarstedt, M., Scharf, S., & Schwaiger, M. (2012). On the value relevance of customer satisfaction. Multiple drivers and multiple markets. Journal of the Academy of Marketing Science, 40(4), 509–525.

Ramage, S. (2012). Information technology facilitating money laundering. Information & Communications Technology Law, 21(3), 269-282.

Rawhouser, H., Ceja, L., and Jansen, K., 2023. The Impact of FinTech on Entrepreneurial Ecosystems and Business Sustainability. Journal of Business Venturing, 38(1), pp.101-118.

Rawhouser, H., Vismara, S. and Kshetri, N., 2023. Blockchain and vulnerable entrepreneurial ecosystems. Entrepreneurship & Regional Development, pp.1-26.

RegTech Associates. (2023). The role of RegTech in combating financial crime. Retrieved from RegTech Associates.

Resnik, D. B. (2020). The Ethics of Research with Human Subjects: Protecting People, Advancing Science, Promoting Trust. Springer.

Reuter, P. and Truman, E.M., 2004. Chasing Dirty Money: The Fight against Money Laundering. Institute for International Economics.

Reuters (2022) 'How Binance facilitated $2 billion worth of illegal transactions', *Reuters Investigates*. Available at: https://www.reuters.com/investigates/special-report/fintech-crypto-binance-dirtymoney/ (Accessed: 8 December 2024).

Reuters. (2023). Binance allegedly facilitated $2 billion in illicit transactions. Available at: https://www.reuters.com/investigates/section/binance-a-crypto-black-hole/ (Accessed June 2024)

Ribadu, N., 2004. Money laundering: The challenges and Nigeria's response. Journal of Money Laundering Control, 7(1), pp.5-17.

Richard, E., and Mandari, E. (2018). Factors Influencing Usage of Mobile Banking Services: The Case of Ilala District in Tanzania. Orsea Journal, 7(1).

Rigdon, E. E. (2012). Rethinking partial least squares path modeling: In praise of simple methods. Long Range Planning, 45(5–6), 341–358.

Rogers EM (1962) Diffusion of Innovations (1 st ed.): Free Press, New York, NY.

Rogers EM. (1983) Diffusion of Innovations (4 th ed.): The Free Press, New York, NY

Ruth, F. (1988). Literacy and Orality: Studies in the Technology of Communication. Oxford, New York: Blackwell

Sampat, B., Mogaji, E., & Nguyen, N. P. (2024). The dark side of FinTech in financial services: a qualitative enquiry into FinTech developers' perspective. International Journal of Bank Marketing, 42(1), 38-65.

Sarstedt, M., & Mooi, E. (2019). A concise guide to market research. The process, data, and methods using IBM SPSS statistics (3rd ed.). Berlin: Springer.

Sarstedt, M., Hair, J. F., Ringle, C. M., Thiele, K. O., & Gudergan, S. P. (2016). Estimation issues with PLS and CBSEM: Where the bias lies! Journal of Business Research, 69(10), 3998–4010.

Saunders, M., Lewis, P., & Thornhill, A. (2003). Research methods for business students (3rd ed.). Harlow: Pearson.

Saunders, M., Lewis, P., & Thornhill, A. (2012). Research Methods for Business Students (6th ed.). Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2019). Research Methods for Business Students (8th ed.). Pearson Education Limited.

Saunders, M., Lewis, P., Thornhill, A. (2007). Research Methods for Business Students. Essex: Pearson.

Savona, E. U., & Riccardi, M. (2017). Assessing the risk of money laundering in Europe. Final report of project IARM.

Scott, W. R. (2001). *Institutions and Organizations.* 2nd ed. Thousand Oaks, CA: SAGE Publications, pp. 217–246. ISBN: 0761920005, 0761920013.

Scott, W.R. (2001). *Institutions and Organizations: Ideas, Interests, and Identities*. 2nd ed. Thousand Oaks, CA: SAGE Publications ISBN: 9780761920007.

Segovia-Vargas, D., 2021. Neural Network Techniques for Detecting Money Laundering in FinTech Platforms. Journal of Risk Finance, 22(3), pp.301-318.

Segovia-Vargas, M. J. (2021). Money laundering and terrorism financing detection using neural networks and an abnormality indicator. Expert Systems with Applications, 169, 114470.

Sekaran, U. (2003). Research methods of business: A skill-building approach (4th ed.). New York: John Wiley & Sons, Inc.

Shen, W., Peng, Y., and Huang, M., 2021. Disrupting Interdependent Contraband Smuggling and Money Laundering Networks in FinTech Ecosystems. Journal of Financial Crime, 28(1), pp.93-111.

Shen, Y., Sharkey, T. C., Szymanski, B. K., & Wallace, W. A. (2021). Interdicting interdependent contraband smuggling, money and money laundering networks. Socio-Economic Planning Sciences, 78, 101068.

Shillito, J. (2016). The impact of financial technologies in developed economies. *Journal of Financial Regulation*, 2(1), pp. 23–39.

Shofawati A. (2020). The Role of Digital Finance to Strengthen Financial Inclusion and the Growth of SME in Indonesia. Journal of in KnE Social Sciences 3(2) DOI: 10.18502/kss.v3i13.4218

Shofawati, A., 2020. The role of FinTech in the COVID-19 pandemic. Journal of Islamic Monetary Economics and Finance, 6(4), pp.1-18.

Singh, K., & Best, P. (2019). Anti-money laundering: Using data visualization to identify suspicious activity. International Journal of Accounting Information Systems, 34, 100418.

Singh, P. and Best, P.J., 2019. Visual Analytics for Detecting Money Laundering Patterns in Financial Transactions. Journal of Accounting and Finance, 19(2), pp.151-171.

Singh, P., & Kumar, N. (2020). Digital Finance and Money Laundering: Insights from India. Journal of Financial Regulation and Compliance, 28(2), 159-174.

Smith, J., & Doe, A. (2020). "Methodological Challenges in FinTech and Money Laundering Research." Journal of Financial Crime, 27(4), 1031-1050. https://doi.org/10.1108/JFC-03-2020-0047

Smith, J., and Doe, A., 2020. Methodological issues in FinTech research: A review. Journal of Financial Innovation, 14(2), pp.234-256.

Smith, M. R. and Marx, L. (1994). Does Technology Drive History? The Dilemma of Technological Determinism. Cambridge, MA: MIT Press. ISBN: 9780262193474.

Springer Verlag, Berlin Heidelberg (2013) *Research Methods and Methodologies in Education*. London: Sage Publications.

Springer Verlag, Somekh, B., Lewin, C., Moran, J. L., Solomon, P. J., Ministry of Justice, N. Z., … Bell, J. (2013). Doing Your Research Project: A Guide for First-Time Researchers in Education and Social Science. SpringerLink & Springer for R&D Online Training, 13 Volumes (Health services and outcomes research methodology (Online), HSORM), 368.

Statista (2024). Nigeria: Age structure from 2012 to 2022. Available online at: https://www.statista.com/statistics/382296/age-structure-in-nigeria/Accessed 31st July, 2024.

Statista, 2024. Nigeria's demographic profile 2023. Statista Research Department.

Stewart, H. and Gallagher, C.C., 1985. Business death and firm size in the UK. International Small Business Journal, 4(1), pp.42-57.

Stewart, J., & Jurjens, J. (2017). Regulatory approaches to digital financial services. *International Journal of Financial Studies*, 5(4), pp. 1–20.

Stone, M. (1974), Cross-Validatory Choice and Assessment of Statistical Predictions, Journal of the Royal Statistical Society, 36 (2), 111–147.

Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. European Management Journal, 34(6), 618–632.

Stringer, K.D., 2011. Terrorism Financing and Money Laundering: Challenges, Perspectives, and Strategies. Routledge.

Sui, Y. and Yao, J., 2023. Digital Transformation and Firm Performance: Evidence from China. Journal of Business Research, 145, pp.354-371.

Sushma R. (2020) Impact of digital finance on financial inclusion. Journal of Studies in Indian Place Names 40 (4).

Swacha-Lech, M. and Solarz, A., 2021. The FinTech adoption among millennials: The case of Nigeria. Journal of Business Economics, 92(5), pp.607-628.

Swacha-Lech, M., & Solarz, M. (2021). Determinants of the adoption of innovative fintech services by millennials. E & M Ekonomie a Management, 24(3).

Tabachnick, B. G., Fidell, L. S., & Osterlind, S. J. (Eds.). (2001). Using multivariate statistics (5th ed.) Boston: Pearson.

Tambunlertchai, S., Bejar, P., Ishi, K., Komatsuzaki, T., Shibata, I. and Sin, J., 2021. Can FinTech foster competition in the banking system in Latin America and the Caribbean?.

Tan, B.L. and Thio, E., 2020. FinTech, Financial Inclusion, and Money Laundering in Southeast Asia. Journal of Financial Crime, 27(3), pp.721-738.

Tan, Y., & Thio, E. (2020). FinTech, Financial Inclusion, and the Challenges of Anti-Money Laundering in Southeast Asia. In Financial Technology and Disruptive Innovation in ASEAN (pp. 89-107). Springer.

Tanai K. and Terry G.(2020) FinTech and Payments Regulation: Analytical Framework Available at file:///C:/Users/BNS647/Downloads/wpiea2020075-print-pdf.pdf [Accessed Novemebr 2021].

Tang, M., Hu, Y., Corbet, S., Hou, Y. G., & Oxley, L. (2024). FinTech, bank diversification and liquidity: Evidence from China. Research in International Business and Finance, 67, 102082.

Tang, Y., Xu, L., and Wang, Z., 2024. FinTech Development, Bank Liquidity, and Diversification in China: An Empirical Analysis. Journal of Financial Stability, 58, pp.301-317.

Tapscott, D. and Tapscott, A. (2016). *Blockchain Revolution: How the Technology Behind Bitcoin is Changing Money, Business, and the World*. New York: Penguin. ISBN: 9781101980133.

TechPoint Africa, 2022. Flutterwave accused of money laundering by Kenyan authorities. TechPoint Africa, [online] Available at: https://techpoint.africa/flutterwave-money-laundering-keny a [Accessed 19 May 2023].

Tertychnyi, P., Godgildieva, M., Dumas, M., & Ollikainen, M. (2022). Time-aware and interpretable predictive monitoring system for Anti-Money Laundering. Machine Learning with Applications, 8, 100306.

Tertychnyi, S., Balakin, Y., and Laptev, A., 2022. Time-Aware Machine Learning Typology for Anti-Money Laundering Systems. *Journal of Financial Data Science*, 9(2), pp.89-103. Available at: https://doi.org/10.3905/jfds.2022.1.089 [Accessed 03 December 2023].

Thakor, A.V., 2020. FinTech and banking: What do we know? *Journal of Financial Intermediation*, 41, p.100833. Available at: https://doi.org/10.1016/j.jfi.2019.100833 [Accessed 10 December 2023].

Thompson, B.S. and Rust, S., 2023. Blocking blockchain: Examining the social, cultural, and institutional factors causing innovation resistance to digital technology in seafood supply chains. *Technology in Society*, [online] Available at: https://doi.org/10.1016/j.techsoc.2023.101991 [Accessed 10 October 2023].

Thompson, P. and Rust, S., 2023. Resistance to Technological Change in Supply Chains: The Case of Blockchain in the Seafood Industry. *Journal of Business Logistics*, 44(2), pp.123-140. Available at: https://doi.org/10.1002/jbl.20320 [Accessed 10 March 2024].

Tiwari, M., Ferrill, J., Gepp, A., & Kumar, K. (2023). Factors influencing the choice of technique to launder funds: The APPT framework. Journal of Economic Criminology, 1, 100006.

Tiwari, P., Singh, R. and Ghosh, A., 2023. Technological Innovations in Money Laundering Techniques: A Review. Journal of Money Laundering Control, 26(2), pp.345-367.

Trading Economics, 2023. Nigeria GDP and population statistics. Trading Economics.

Trading Economies (2024). Nigeria. Available online at: https://tradingeconomics.com/nigeria/gdp-per-capita Accessed 31st July, 2024.

Treleaven, P. (2015). Financial regulation of FinTech. Journal of Financial Perspectives, 3(3). https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3084015 [Accessed 19 October 2021].

Treleaven, P., 2015. Financial regulation of FinTech: The challenges. Journal of Financial Regulation and Compliance, 23(1), pp.65-79.

Tropina, T. (2014). The Regulation of Cybercrime: The Rule of Law in Technology. Routledge. https://doi.org/10.4324/978131558194

Tropina, T., 2014. Cybercrime and Money Laundering: Exploring the Nexus in Developed and Developing Countries. Journal of Financial Regulation and Compliance, 22(4), pp.411-427.

Truant, E., Bianchi, G. and Santucci, A., 2021. Firm Digitalization and Its Impact on Market Opportunities: A Review of Empirical Studies. Journal of Business Research, 124, pp.123-140.

Tsuchiya, T. and Hiramoto, T., 2021. Analyzing the 2018 Coincheck hack and its implications for cryptocurrency regulation. Journal of Financial Regulation and Compliance, 29(3), pp.421-434.

Tsuchiya, Y., & Hiramoto, N. (2021). How cryptocurrency is laundered: Case study of Coincheck hacking incident. Forensic Science International: Reports, 4, 100241.

Türel, Y. K., Özdemir, T. Y., & Varol, F. (2017). Teachers' ICT Skills Scale (TICTS): Reliability and Validity. Cukurova University Faculty of Education Journal, 46(2), 503-516.

Turki, M., Alali, M., and Abdullah, A., 2020. Regulatory Technology and Its Impact on Money Laundering in Bahrain. Journal of Risk and Financial Management, 13(7), pp.165-182.

Turki, M., Hamdan, A., Cummings, R. T., Sarea, A., Karolak, M., & Anasweh, M. (2020). The regulatory technology "RegTech" and money laundering prevention in Islamic and conventional banking industry. Heliyon, 6(10).

Tut, D. (2023). FinTech and the COVID-19 pandemic: Evidence from electronic payment systems. Emerging Markets Review, 54, 100999.

Uche, C. U. (1999). The Rural Banking Scheme In Nigeria: Matters Arising/Le Programme Bancaire Rural Au Nigeria: Principes Fondamentaux. Savings and Development, 215-233.

Uche, C.U. (1998). The Adoption of a Money-Laundering Law in Nigeria. Journal of Money Laundering Control, 1(3), 220-228

Uche, C.U., 1996 a, b & c. The evolution of banking in Nigeria. Nigerian Financial Review, 5(1), pp.23-45.

Udegbunam, A., 2021. Top Web-Based Financial Service Providers in Nigeria: A Comparative Analysis. Journal of Financial Services Marketing, 26(4), pp.345-362.

Udegbunam, O (2021). Nigeria's booming FinTech space, and its top 13 players. Premium Times Newpaper, Nigeria. Nigeria's booming FinTech space, and its top 13 players (premiumtimesng.com)

Ujunwa, A. I., Ujunwa, A., & Okoyeuzu, C. R. (2021). Rethinking African globalisation agenda: Lessons from COVID-19. Research in Globalization, 3, 100055.

Ujunwa, A. I., Ujunwa, A., Onah, E., Nwonye, N. G., & Chukwunwike, O. D. (2021). Extending the determinants of currency substitution in Nigeria: Any role for financial innovation? South African Journal of Economics, 89(4), 590-607.

Ujunwa, A., et al., 2021. FinTech and the challenges of money laundering in Nigeria. Journal of Financial Crime, 29(1), pp.103-120.

Ujunwa, A., et al., 2022. The evolution of digital finance in Nigeria. African Financial Review, 30(2), pp.201-219.

Ujunwa, A., Onah, E., Ujunwa, A. I., Okoyeuzu, C. R., & Kalu, E. U. (2022). Financial innovation and the stability of money demand in Nigeria. African Development Review, 34(2), 215-231

UNESCO (2012). Nigerian Action Plan, High level International Round Table on Literacy "Reaching the 2015 Literacy Target: Delivering on the promise" UNESCO, Paris, 6-7 September 2012.

Unger, B. and Busuioc, E.M., 2007. Money Laundering in the European Union: European Integration in the Global Fight against Money Laundering and Terrorist Financing. Edward Elgar Publishing.

Unger, B., & Busuioc, M. (2007). The Scale and Impacts of Money Laundering. Edward Elgar Publishing.

United Nations Office on Drugs and Crime (UNODC) (2020) *Money-laundering and global financial crime*. Available at: https://www.unodc.org/unodc/en/money-laundering/overview.html (Accessed: 8 December 2024).

United Nations Office on Drugs and Crime. (2020). Estimates of global money laundering. Retrieved from UNODC.

UNODC, 2020. Money laundering and the global financial system: Annual Report. United Nations Office on Drugs and Crime.

Vaithilingam, S., & Nair, M. (2007). Factors affecting money laundering: lesson for developing countries. Journal of Money Laundering Control. Vol. 10 No. 3, pp. 352-366. https://doi.org/10.1108/13685200710763506

Van Teijlingen, E. R., & Hundley, V. (2001). Social research update: The importance of pilot studies. Guildford, UK: University of Surrey.

Venkatesh K., Jamalian M. and Maharous M (2020). System, method, and computer program product for detecting potential money laundering activities, https://patents.google.com/patent/US10607227B2/en

Venkatesh, K., Jamalian, M. and Maharous, M., 2020. Impact of Digital Finance Practices on Money Laundering in Developing Countries. Journal of Financial Crime, 27(1), pp.34-51.

Wang, J., 2023. Central Bank Digital Currencies and Their Implications for Money Laundering. Journal of Digital Finance, 19(2), pp.207-232.

Wang, Y., Ashton, J. and Jaafar, M., 2019. Assessing the effectiveness of financial regulation in developing economies. Journal of Banking Regulation, 20(3), pp.234-250.

Wang, Z. (2023). Money laundering and the privacy design of central bank digital currency. Review of Economic Dynamics, 51, 604-632.

Wei, L., Peng, M., & Wu, W. (2021). Financial literacy and fraud detection Evidence from China. International Review of Economics & Finance, 76, 478-494.

Wei, W., et al., 2021. Financial literacy and fraud prevention: A cross-country study. Journal of Financial Regulation and Compliance, 29(4), pp.450-469.

Wells, J. T. (2017). Corporate Fraud Handbook: Prevention and Detection. John Wiley & Sons.

Wells, J.T., 2017. Corporate Fraud Handbook: Prevention and Detection. 5th ed. Hoboken: John Wiley & Sons.

West, S. G., Finch, J. F., & Curran, P. J. (1996). Structural equation models with nonnormal variables: Problems and remedies. In RH Hoyle (Ed.). Structural equation modeling: Concepts, issues and applications. Newbery Park, CA: Sage; 1995.p56-75.

World Bank Group-WBG (2018). Financial Inclusion. Available at: Financial Inclusion (worldbank.org) (Accessed January 2023)

World Bank, 2021. World Development Indicators 2021. Washington, D.C.: World Bank.

World Bank, 2021. World Development Indicators. Washington, D.C.: World Bank.

World Bank. (2021). Building a Financial Education Approach: A Starting Point for Financial Sector Authorities. World Bank.

World Bank. (2023). FinTech: The rise of digital platforms in financial services. Available at from https://www.worldbank.org/FinTech-rise-digital-platforms (accessed June 2024)

World Economic Forum, 2021. The Future of Financial Services: Key Governance Challenges in Blockchain. [online] Available at: https://www.weforum.org/reports/2021 Accessed 19 July 2022.

Wronka, C. Central bank digital currencies (CBDCs) and their potential impact on traditional banking and monetary policy: an initial analysis. *Digit Finance* **5**, 613–641 (2023). https://doi.org/10.1007/s42521-023-00090-0

Wu, F. S., & Yen, Y. S. (2014). Factors Influencing the Use of Mobile Financial Services: Evidence from Taiwan. Modern Economy, 5(13), 1221.

Wyatt, S. (2008). Technological Determinism Is Dead; Long Live Technological Determinism. In E. J. Hackett, O. Amsterdamska, M. Lynch & J. Wajcman (Eds.), *The Handbook of Science and Technology Studies* (pp. 165–180). Cambridge, MA: MIT Press.

Xu, H., Zhu, W., and Liu, Y., 2024. FinTech Adoption and Its Impact on Sustainable Mining Policies in Australia: A Longitudinal Study. Journal of Sustainable Finance & Investment, 12(3), pp.291-310.

Xu, Y., Nassani, A. A., Abro, M. M. Q., Naseem, I., & Zaman, K. (2024). FinTech revolution in mineral management: Exploring the nexus between technology adoption and sustainable Resource utilization in an industry 4.0 context. Heliyon, 10(3).

Yang, F., Li, M., and Zhang, Z., 2023. The Impact of Digitalization on Firm Performance: A Review of Empirical Studies. Journal of Business Economics, 45(3), pp.209-231.

Yang, J., et al., 2023. Big data analytics and FinTech: Implications for financial stability. Journal of Financial Technology and Innovation, 12(4), pp.301-319.

Yang, Y., Liu, Y., Li, H., & Yu, B. (2015). Understanding perceived risks in mobile payment acceptance. Industrial Management & Data Systems, 115(2), 253-269.

Yang, Y., Yang, X., Xiao, Z., & Liu, Z. (2023). Digitalization and environmental performance: An empirical analysis of Chinese textile and apparel industry. Journal of Cleaner Production, 382, 135338.

Zetzsche, D. A., Buckley, R. P., Barberis, J. N., & Arner, D. W. (2017). Regulating a revolution: From regulatory sandboxes to smart regulation. Fordham Journal of Corporate & Financial Law, 23(1), pp.31-103.

Zetzsche, D.A., Buckley, R.P., Arner, D.W. and Barberis, J.N., 2017. Regulating a Revolution: From Regulatory Sandboxes to Smart Regulation. Fordham Journal of Corporate & Financial Law, 23(1), pp.31-103.

Zhang, G., Gao, Z., Dong, J., & Mei, D. (2023). Machine learning approaches for constructing the national anti-money laundering index. Finance Research Letters, 52, 103568.

Zhang, Y., Li, H., and Zhao, L., 2023. Machine Learning Models for a National Anti-Money Laundering Index. Journal of Financial Regulation, 15(1), pp.65-81.

Zheng, Y., Cai, Z., Fang, X. and Lin, J., 2018. Financial regulation and the protection of creditors' rights. Journal of Financial Studies, 32(1), pp.111-128.

Zhou, Z., Ma, J. and Liu, H., 2022. Digital Transformation and Tax Stickiness: Evidence from China. Journal of Financial and Quantitative Analysis, 57(3), pp.907-929.

APPENDIX A: GANTT CHART PROJECT PLAN

S/N	FEBRUARY 2021 – FEBRUARY 2024												
	ACTION PLAN	**TASK**	**TIMESCALE**										
			1ST YEAR										
1	**1ST YEAR: PRE-INTERIM ASSESSMENT**	**SUB-TASK**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEPT**	**OCT**	**NOV**	**DEC**	**JAN**
		1. Learning Agreement	√	√										
		2. Supervision Team Feedback	√	√	√	√	√	√	√	√	√	√	√	√
		3. Literature Review	√	√	√	√	√	√	√	√	√	√	√	√
		4. Questionnaire Measurement										√	√	√
		5. Interim Assessment Report											√	√
		6. Interim Assessment												√
		7. Ethics Application												√
			2nd YEAR											
2	**2nd YEAR: PRE-INTERNAL EVALUATION**	**SUB-TASK**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**
		1. Supervision Team Feedback	√	√	√	√	√	√	√	√	√	√	√	√
		2. Learning Agreement	√											

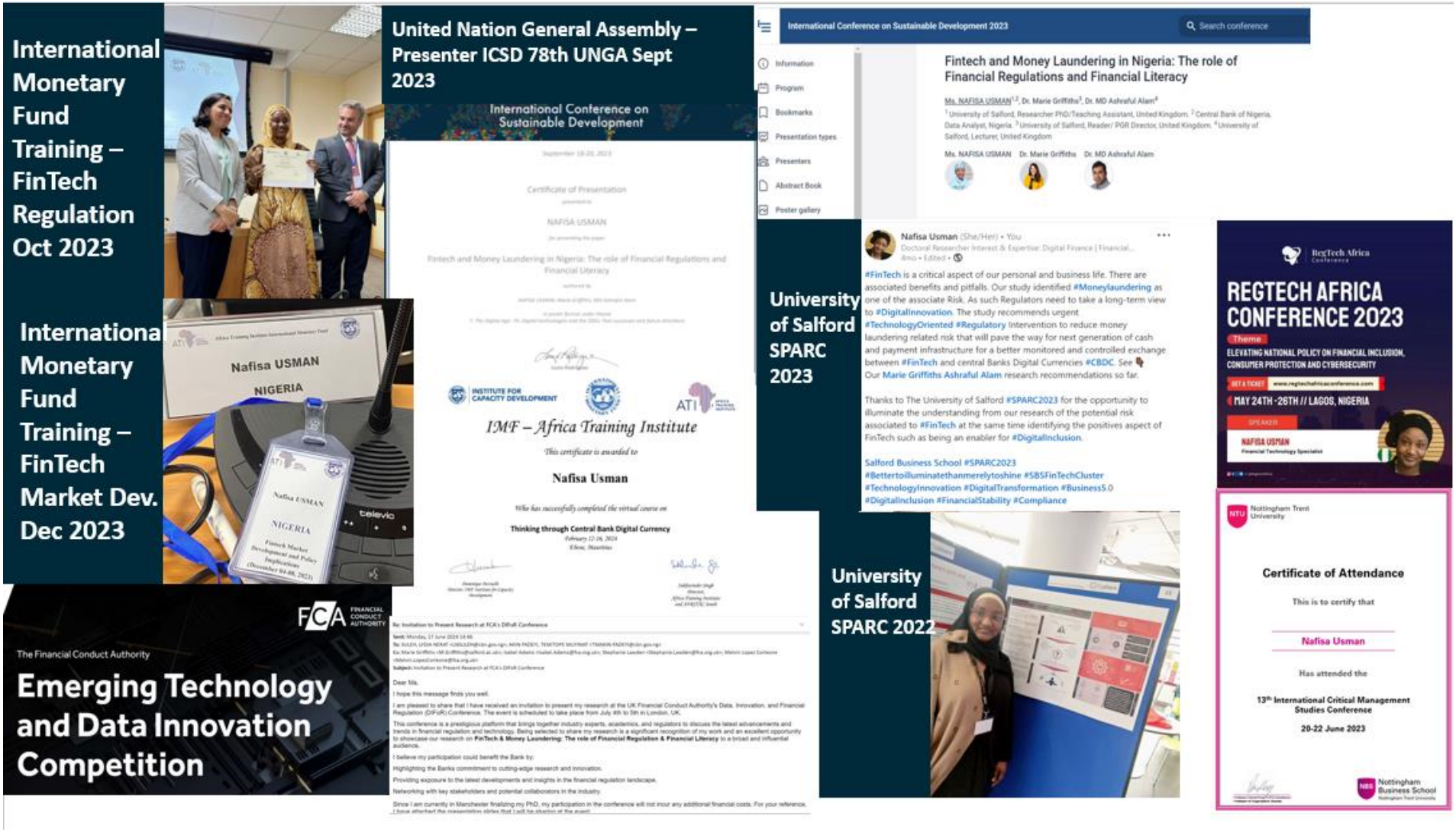
		3. Ethics Approval							√					
		4. Stakeholder Engagement Visit						√	√					
		5. Pilot Test							√					
		6. Collection of Data								√	√	√		
		7. Literature Review			√	√	√	√	√	√	√	√	√	√
		8. Data Analysis											√	√
		9. Validation of Data											√	√
3rd YEAR														
3	**3RD YEAR: DATA COLLECTION, ANALYSIS AND THESIS WRITE UP**	**SUB-TASK**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**
		1. Internal Evaluation Assessment	√											
		2. Learning Agreement		√										
		3. Literature Review	√	√	√	√	√	√	√	√	√	√	√	√
		4. Study Visit/Data Collection						√	√					
		5. Data Analysis								√	√	√	√	
		6. Robustness Test								√	√	√	√	√
		7. Thesis Write Up			√	√	√	√	√	√	√	√	√	√
		8. First Paper draft										√	√	

		9. Feedback and Corrections						√	√	√	√	√	√	√
4th YEAR														
4	**4th YEAR THESIS WRITE UP, SUBMISSION & VIVA PRESENTATION**	**SUB-TASK**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**
		1. Thesis Write Up	√	√	√	√	√	√	√					
		2. Submit First Draft for Review				√								
		3. Feedback and Corrections					√							
		4. Submit Second Draft for Review						√						
		5. Submit Thesis officially							√					
		6. Preparation for Viva								√	√			
		7. Attend Viva										√		
		8. Feedback & Correction of Viva											√	
		9. Final Submission												√

LEGEND		
S/N	CODE DESCRIPTION	COLOR CODE
1	ACTION PLAN	
2	DATE AND NUMBER CODE	
3	SUB- TASK	
4	COMPLETED TASK	√
5	PENDING TASK	×

PROJECT MILESTONES	
S/N	VARIABLE IDENTIFICATION
1	MEASUREMENT DEVELOPMENT
2	STAKEHOLDER ENGAGEMENT
3	PILOT STUDY
4	DATA GATHERING & ANALYSIS
5	PAPER PUBLICATION
6	THESIS WRITE UP & VIVA

APPENDIX B: PICTURAL HIGH LEVEL CONFERENCES, SEMINARS AND TRAININGS



APPENDIX C: TRAININGS, WORKSHOP, SEMINARS AND CONFERENCES ATTENDED

SN	NAME	TYPE	DATE	VENUE	LEARNING AIM
MARCH 21					
1	Salford Business School Seminar Series	Seminar	17/3/21	Virtual	Peer Review and knowledge sharing.
2	Writing a Data Management Plan	PGR Training	22/3/21	Virtual	Data Management and Protections skills and Etiquette
3	PGR Inter-disciplinary Research Seminar Series	PGR Training	24/3/21	Virtual	Exploring strategies to prepare for the Research Project
4	Research Ethics	PGR Training	25/3/21	Virtual	Research Ethics Application and Procedures required for Learning Agreement.
5	Copyright for researchers - School of Science, Engineering & Environment	PGR Training	30/3/21	Virtual	Using copyrighted material in research and protecting owns copyright
APRIL 2021					
6	Library session for academic staff & PGRs	PGR Training	1/04/21	Virtual	How to use the Digital Library and repository.
	PGR Student Forum	Forum	14/4/21	Virtual	Introduction and meeting the PGR Teams
7	Salford Business School Seminar Series	Seminar	14/4/21	Virtual	Peer Review and knowledge sharing.

8	IEEE Authorship and Open Access Symposium	Conference	21/04/21	Virtual	Best Practices to get published to increase the Exposure and Impact Research Project.
8	Critical Reading, Critical Writing	PGR Training	22/04/21	Virtual	Writing skill and etiquette
9	Essex University: Getting Started with Secondary Analysis	PGR Training	22/04/21	Virtual	Data Analysis and management
10	Developing academic & ORCID profile	PGR Training	28/04/21	Virtual	Learn how to effectively promote academic research and profile online
11	IEEE: Disruptive Technologies	Conference	28/04/21	Virtual	Get an insight from industry practitioners and expert on the role and benefit of Disruptive technologies
12	Essex University: Data Management Basics	PGR Training	29/04/21 30/04/21	Virtual	Introduction to Ethical and legal issues in sharing and management. General Data Protection Regulation (GDPR). strategies that enable sharing research data.
13	Peer Support Group meeting with Dr McMurtry	PGR Training	29/04/21	Virtual	The PhD Journey: What not to do.
MAY 2021					
14	Essex University: Seminar	PGR Training	18/05/21	Virtual	Introduction to secondary analysis for quantitative and qualitative data.
15	Qualitative Methods: Challenges in the Field	PGR Training	19/05/21	Virtual	Exposure to possible challenges in data gathering

16	USIR training (Library)	PGR Training	19/05/21	Virtual	Learn how to use the institutional repository USIR.
17	PGR Seminar Series	Seminar	19/5/21	Virtual	Introduction to SEM Techniques: Peer Review and knowledge sharing.
18	Research Development	Conference	24/5/21 25/5/21	Virtual	Knowledge sharing on IA, IE and Viva preparation. Raising Research Profile & Publishing whilst doing PhD. Ethics and strategy on publishing papers.
19	Salford Business School Seminar Series	Seminar	26/5/21	Virtual	Peer Review and knowledge sharing.
20	Essex University: Consent issues in data sharing	PGR Training	27/05/21	Virtual	Data Management Etiquette
JUNE 2021					
21	Research Story Telling Workshop	PGR Training	7/6/21	Virtual	developing story, crafting an engaging narrative, strategies to translate this into a media presentation to camera, and tips for planning presentation.
22	Presentation Skills Conference	PGR Training	9/6/21	Virtual	Skills and Techniques for presentation.
23	Data Analysis SPSS and NVivo Hands-On	PGR Training	10/6/21	Virtual	Data Manipulation using SPSS and NVivo Software
24	Presentation Skills Conference	PGR Training	16/6/21	Virtual	Skills and Techniques for presentation. Presentation Live and Under Scrutiny.

25	‘’’There’s magic in the middle’	PGR Training	22/6/21	Virtual	Being transparent and convincing in qualitative analysis
26	Copyright for researchers – Salford Business School	PGR Training	23/06/21	Virtual	Learn how to use copyrighted material in your research and protect your own copyright
27	University of Exeter Research Ethic Conference 2021	Conference	25/06/21	Virtual	share knowledge, best practice and understanding of the importance of research and practical ethics
28	SPARC 2021: ‘Against All Odds’	Conference	30/06/21	Virtual	Peer Review and knowledge sharing (Festival of Research)
JULY 2021					
29	SPARC 2021: ‘Against All Odds’	Conference	1/07/21	Virtual	Peer Review and knowledge sharing (Festival of Research)
30	SBS PGR Writing Workshop	PGR Training	23/07/21	Virtual	Professional Writing Skills and Etiquette
SEPTEMBER 2021					
31	Manchester Metropolitan University PGR Development Program 2020/2021	PGR Training	26/09/21	Virtual	Writing retreats: Writing skills and etiquette
OCTOBER 2021					
32	Salford University Job Fair	Career	6/10/21	Virtual	Career Opportunity
33	University of Luxenberg 7th FinTech Conference	Conference	6/10/21	Virtual	Knowledge, peer review and networking with the industry players

34	Salford Business School Seminar Series	Seminar	13/10/21	Virtual	Peer Review and knowledge sharing.
NOVEMBER 2021					
35	Regional PGR Networking Event	Conference	2/11/21	Virtual	Knowledge, peer review and networking with follow researchers
36	Writing & thinking retreat on Campus	PGR Training	5/11/21	Virtual	Dedicated time to writing and planning project
37	University of Salford ESRC Festival of Social Science: COP26	Conference	8/11/21 15/11/21	Virtual	Insight into the outcome and deliberations of the 2021 United Nations Climate change conference.
38	Salford Business School Seminar Series	Seminar	13/11/21	Virtual	Peer Review and knowledge sharing.
39	PGR Peer-to-Peer Support Group	Seminar	18/11/21	Mary SeacoleMS11 University of Salford	Peer Group Support
	Salford Business School Seminar Series	Seminar	24/11/21	Virtual	Peer Review and knowledge sharing.
DECEMBER 2021					
40	Salford Business School Seminar Series	Seminar	8/12/21	Virtual	Peer Review and knowledge sharing.
41	Applied Ethnography	PGR Training	9/12/21	Virtual	Insight into descriptive ethnographical study
JANUARY 2022					
42	Communication week: Using social media for	Workshop	26/01/22	Virtual	Social Media Profile branding for professional use

	Professional Development				
43	Communication week: Science Communication for the Public Good	Workshop	28/01/22	Virtual	Strategies, ethics, and benefit of communicating research to the public.
FEBRUARY 2022					
44	Economic Crime: From Conception to Response 3rd Economic Crime Symposium. (Organized by Portsmouth University)	Symposium	03/02/22	Virtual	Discussion and knowledge on how economic criminology can feed an effective response to economic crime also Network and knowledge sharing with researchers, practitioners, students, and other community members in the Economic and financial crime field.
45	Statistics – Correlation and Regression	Training	07/02/22	Virtual	knowledge and competence in screening data for linear relationships before following it with regression analysis.
46	Salford Business School Seminar Series	Seminar	09/02/22	Virtual	Peer Review and knowledge sharing.
47	Introduction to Learning and Teaching in Higher Education (IUT1)	Training	16/02/22	Virtual	Introduction to learning and teaching in Higher Education - what this means, how to develop professionally, and being a reflective practitioner.

48	Managing your Research Data	PGR Training	16/02/22	Virtual	Managing research data. Including how to write a Data Management Plan, how to organize, securely store, and effectively share data.
MARCH 2022					
49	Theories of learning and teaching in HE (IUT2)	Training	02/03/22	Virtual	Understanding the theories of learning and teaching in Higher Education.
50	Academics Talk: Introduction to Qualitative and Quantitative Research	PGR Training	02/03/22	Virtual	Understanding different type of data.
51	Statistics – Test and ANOVA	Training	07/03/22	Virtual	Develop the skills and confidence to select the correct statistics to analyze your data and to draw informed statistical conclusions.
52	Literature Reviewing for Doctoral Researchers: Making Sense of a Body of Work	Seminar	15/03/22	Virtual	Introduction to mapping and its importance in understanding a body of research suggest different ways to map that can provide tips on how to build a 'big picture' of the research.
53	Teaching Large Group and Small Group (IUT3) Making Sense of a Body of Work	Training	16/03/22	Virtual	Skills and understanding Teaching large and Small Group.

54	Salford Business School Seminar Series	Seminar	23/03/22	Virtual	Peer Review and knowledge sharing.
55	Dissertation Project: Introduction to Secondary Analysis for Qualitative and Quantitative Data.	Seminar	24/03/22	Virtual	Research process of secondary analysis project, including an overview of the methodological and ethical issues.
56	Viva, IA, IE Assessments - Preparation	Workshop	28/03/22	In Person Peel Campus University of Salford	Peer Review and knowledge sharing
57	Data Management Basic: Ethical and Legal Issues in data sharing	Training	29/03/22	Virtual	Ethical and legal aspects of data management.
58	Blended and Online Learning (IUT4	Training	30/03/22	Virtual	Skills and understanding Teaching Blended and Online Learning
59	Communicate with Confidence, Authority & Authenticity - Course Description	VOX Training	31/03/22	In person Peel Campus University of Salford	Communication skills and Etiquette
APRIL 2022					
60	IPGRC 2022 – Resilience in Research and Practice	PGR Conference	04/04/22	Virtual	Peer review learning and Networking
61	SPARCH Abstract Writing	Seminar	04/04/22	Virtual	Preparation for the SPARC 2022 conference to be able to Identify how to match

					research objectives to the conference theme.
62	Finding and accessing data from the UK Data Service	Workshop	11/04/22	Virtual	UK data services introduction and access
63	Salford Business School Seminar Series	Seminar	27/04/22	Virtual	Prof Trevor Wood-Harper - The Thesis: knowledge Sharing and Networking
MAY 2022					
64	Assessment and Feedback in HE (IUT6).	Training	11/05/22	Virtual	Understanding the methods and techniques of Assessment and feedback in Higher Education.
65	Consent issues in data sharing.	Workshop	15/05/22	Virtual	Ethical issues around Data sharing
66	SPARC Chairing and Facilitation Skills Training.	Workshop	16/05/22	Virtual	Preparation for the 2022 PGR Conference.
67	Wellbeing Wednesday Laser Cutting at the Maker Space.	Workshop	18/05/22	In person Peel Campus Maker Space University of Salford	Preparation for the 2022 PGR Conference.
68	How to become a computational social scientist	Workshop	19/05/22	Virtual	Introduction to computational Social Scientist
69	Getting started with secondary analysis	Workshop	24/05/22	Virtual	key issues to consider when using secondary data analysis as a method.
70	Introduction to copyright: Copyright issues in secondary data use	Workshop	27/05/22	Virtual	Understanding copyright considerations when creating, using or sharing data.

JUNE 2022					
71	Salford Business School Seminar Series	Seminar	08/06/22	Virtual	knowledge Sharing and Networking
72	Salford University TEDx Talk	Conference		In person Media City Campus University of Salford	knowledge Sharing and Networking
73	Presented at the World Economic Forum/CCAF-Sub-Saharan Africa Digital & Financial Literacy Seminar	Conference	22/06/22	Virtual	Knowledge Sharing, Networking and Feedback
75	Salford University SPARC 2022	Conference	27/06/22 30/06/22		Participate, Network and presented Research
JULY 2022					
76	Luxemburg Sustainable Finance Seminar Series	Seminar	05/07/22	Virtual	Analyzing the EU Sustainable Finance Regulation: expectations, challenges, and solutions. Bring together research and practice to propose an enriched debate on sustainable finance technical topics.
SEPTEMBER 2022					
77	Sub-Saharan Africa Working Group Meeting	Meeting	22/09/22	Virtual	Regulatory Research on Equity Crowdfunding

78	World Bank Group Meeting	Meeting Seminar	29/09/22	Virtual	Responsible Open Finance – Making Open Finance Inclusive and Safe Through Data Protection
OCTOBER 2022					
79	Sub-Saharan Africa Working Group Meeting	Meeting	06/10/22	Virtual	Regulatory Research on Equity Crowdfunding
80	Sub-Saharan Africa Working Group Meeting	Meeting	2/10/22	Virtual	Regulatory Research on Equity Crowdfunding
NOVEMBER 2022					
81	**University of Luxembourg** 7th Inclusive & Sustainable Finance Research Conference	Conference	22/11/22	Virtual	Annual conference by important institutions and partners involved in financial inclusion research and development.
82	International Financial Inclusion Conference (IFIC22)– Scaling Innovative Digital Models	Conference	24/11/22 25/11/22	Virtual	Knowledge and understanding of the financial inclusion journey in Nigeria, the successes, the challenges and use cases within its dynamic financial system.
FEBRUARY 2023					
83	International Compliance Association-Anti Money Laundering	Conference	14/02/23	Virtual	Explore qualifications that equip you with the knowledge and skills to manage money laundering risks in a global marketplace.
84	International Compliance	Conference	14/02/23	Virtual	Discover qualifications to help learners navigate

	Association-Governance, Risk and Compliance				complex regulatory environments.
85	International Compliance Association-Financial Crime Prevention	Conference	17/02/23	Virtual	Discover the financial crime prevention qualifications that teach you how to investigate and prosecute.
86	International Compliance Association-KYC/CDD	Conference	21/02/23	Virtual	Explore the extensive qualifications that will help the learner understand the customer and its requirements.
87	Three Minutes Thesis Session	Training	20/02/23	Maxwell Building University of Salford	Practical session in preparation for the Competition.
88	Women In FinCrime – AML Intelligence	Training	22/02/23	Virtual	Knowledge sharing and Networking
89	IE Examination Session	Assessment	28/02/23	Maxwell Building University of Salford	PhD Internal Evaluation for onward entering 3rd Level.
MARCH 2023					
90	Central Bank of Nigeria Staff Promotion Examination	Examination	16/03/23	Virtual	Assessment for the promotion from Deputy Manager to Manager with my employer/PhD Sponsor
91	PGR Work tribe Training	PGR Training	21/03/23	Virtual	Guide to final dissertation submission new portal/platform

92	Vox Viva Training	Training	24/03/23	Maxwell Building University of Salford	Vivas and interviews, offering you useful tips to aid communication and boost confidence in a viva setting.
93	SBS Seminar Series	Seminar	5/03/23	Virtual	Knowledge Sharing
94	SPARC abstract writing support session	Training	5/03/23	Virtual	
APRIL 2023					
95	What is REF, KEF and Impact?	PGR Training	5/04/23	Maxwell Building University of Salford	This session introduces the Research Excellence Framework; Knowledge Exchange Framework and Impact.
96	2023 Africa FinTech Summit	Conference	11/04/23	Virtual	Peer review, knowledge sharing and Presented research findings to FinTech expert and specialist in the African ecosystem.
97	SBS Innovation Hub	Training	19/04/23	Maxwell Building University of Salford	support towards developing and enhancing research, enterprise and knowledge exchange activities.
98	FinTech Regulation in Sub-Saharan Africa- Working Group Meeting	Committee Work	20/04/23	Virtual	Inaugural Knowledge Sharing Session (KSS) of the SSA WG. Topic of the day: Crowdfunding Regulatory

	(Committee Work)				Trends in Sub-Saharan Africa
99	SBS Research Seminar Series	Seminar	26/04/23	Virtual	Knowledge sharing and peer review.
MAY 2023					
100	Central Bank of Nigeria Webinar Series: Leveraging an Ecosystem Approach for Driving Financial Inclusion	Seminar	01/05/23	Virtual	Highlight key priority areas of the revised Nigeria National Financial Inclusion Strategy (NFIS 3.0) and unveil action plans for closing identified gaps in the financial inclusion ecosystem to attain 95% inclusion by 2024.
101	Using NVivo for Qualitative Research (Module 2)	PGR Training	03/05/23	Virtual	Introduction to the NVivo software package, which is designed to help in the organization, management, and analysis of qualitative data.
102	Digital Transformation Expo	Conference	17/05/23	Virtual	Networking and Knowledge sharing with Industry enterprise IT and digital professionals.
103	One on one writing support session	Training	23/05/23	Virtual	Detailed and intensive academic writing skills. Toning down technical wording to public for seminar and conference audience.

104	Africa RegTech Conference 2023	Presenter Conference	24/05/23 – 26/05/23	Lagos Nigeria	Conference on Regulatory Services Innovation and Excellence with a focus on Africa. It provides the platform for regulators, and regulated and key industry stakeholders to engage, collaborate and share knowledge about new technologies and practices that support better regulations.
105	Developing your academic profile	Training	24/05/23	Virtual	Learn how to effectively promote yourself and your research online.
JUNE 2023					
106	Choosing a journal for publication	Training	01/06/23	Virtual	To achieve potential reach and impact on research publication and identifying and evaluating journals suitable for publishing research work.
107	Cambridge Judges School: Regulatory Knowledge Exchange Leaders in FinTech Session	Committee Work	07/0623	Virtual	Knowledge Sharing Session
108	13th International Critical	Presenter Conference	20/06/23 – 21/06/23	Nottingham Trent University	Presented the research findings so far and

	Management Studies Conference.			– Nottingham UK	knowledge sharing and networking.
109	Disruptive Technologies Cluster Meeting - Generative AI for Good	Seminar	22/06/23	Maxwell Building University of Salford	How will ChatGPT, Dall-E, Bard and other Generative AI tools change our disciplines? This session will be an opportunity look beyond 'toy' examples to find out more about Generative AI, to discuss how to capitalize on the opportunities they offer, and to consider how to mitigate some of the challenges they undoubtedly pose.
110	SPARC Practice Session	Conference SPARC	23/06/23	Maxwell Building University of Salford	In preparation for SPARC and 3min Thesis practice
111	Three Minute Thesis Final	Conference SPARC	26/06/23	Peel Park University of Salford	Competition session
112	FinEquity Tools Workshop: Gender Intelligent Design	Committee Work	29/06/23	Virtual	World Bank Group Session. Committee Work
113	How to be an effective reviewer workshop	Training	30/06/23	Virtual	Professional academic method of reviewing papers and publication

JULY 2023					
114	University of Salford SPARC Conference		05/07/23 – 06/07/23		Knowledge sharing, peer review and networking
115	Cambridge Judges School: Regulatory Knowledge Exchange Women in FinTech Working Group	Committee Work	14/07/23	Virtual	Committee Work – Peer Review and knowledge exchange with other women leaders from different Regulatory agencies around the globe.
116	Meeting with Central Bank of Nigeria (CBN) Statistic Department	Data Collection	24/07/23	CBN Abuja, Nigeria	Data gathering and Analysis
117	Meeting with Central Bank of Nigeria (CBN) National Financial Inclusion Unit	Data Collection	27/07/23	CBN Abuja, Nigeria	Data gathering and Analysis
118	Meeting with Nigeria Economic and Financial Crime Commission (EFCC) and Nigeria Financial Intelligence Unit (NFIU)	Data Collection	31/07/23	NFIU Abuja, Nigeria	Data gathering and Analysis
AUGUST 2023					
119	Cambridge Judges School:	Committee Work	1/08/23	Virtual	Committee Work – Peer Review and knowledge

	Regulatory Knowledge Exchange Women in FinTech Working Group				exchange with other women leaders from different Regulatory agencies around the globe.
	Independent Corrupt Practices and Other Related Offences Commission (ICPC)	Data Collection	2/08/23	CBN Abuja Nigeria	Data gathering and Analysis
120	Meeting with Nigeria Federal Ministry of Justice National Drug Law Enforcement Agency (NDLEA)	Data Collection	3/08/23	Ministry of Justice Abuja, Nigeria	Data gathering and Analysis
121	Meeting with Nigeria Ministry of Foreign Affairs	78th UNGA Travel Logistics	10/08/23	Ministry of Foreign Affairs Abuja, Nigeria	Meet with the Director Consulate and Legal Services to fast-track Visa application to US and be included as Nigeria delegate for the 78th UNGA session to present paper.
SEPTEMBER 2023					
122	Presenter: 78th United Nation General Assembly: The International Conference on	78th UNGA Conference	18/09/23 – 20/0923	Columbia University New York United State of America	Identify and analyze successful case studies, best practices, and innovative solutions for sustainable development from around the world.

	Sustainable Development (ICSD)				Explore the roles and contributions of various stakeholders, including governments, international organizations, civil society, and the private sector, in achieving sustainable development. Develop skills in building and maintaining effective partnerships and collaborations to advance sustainable development goals.
OCTOBER 2023					
123	PhD Viva – Rules and Guidance Session with mock viva and feedback	PGR Training	19/10/23	Virtual	Gain a deeper understanding of the viva process, including the types of questions asked and the overall experience. Build confidence and improve performance in viva examinations through practice and peer feedback.
124	Selected Issues in Regulation of FinTech	International Monetary Fund Training	30/10/23 03/11/23	IMF- Africa Training Institute, Mauritius	Global developments in the regulation of FinTech, the implications of BigTech in financial

					services, policy implications of a technology neutral approach to regulation, the growth of Supervisory Technology (SupTech) and the need for public-private collaboration in Regulatory Technology (RegTech).
NOVEMBER 2023					
125	Getting into Academia	PGR Training	6/11/23	Maxwell Building University of Salford	Tips and guidance towards seeking a career in academia.
126	How to Publish your Manuscript Open Access with Wiley	PGR Training	7/11/23	Virtual	Journal writing tips citation, Altimetric, and Impact Factor information
127	Breaking Boundaries and Inspiring Gender Diversity in Technology: In Conversation with Jeanette Gamble	Seminar	24/11/23	Fire Station Building	Knowledge Sharing and Networking on overcoming gender stereotypes in tech related fields and leadership.
DECEMBER 2023					

128	FinTech Market Development and Policy Implication	International Monetary Fund's Training	4/12/23 - 8/12/23	IMF- Africa Training Institute, Mauritius	Foundation in understanding new financial technologies (FinTech) and the associated supervisory and regulatory issues. An overview of the source and nature of FinTech as well as general regulatory principle
JANUARY 2024					
129	Advance, HE Drop-in Session	PGR Training	8/01/24	Maxwell Building University of Salford	Guidance towards the application procedure for the Advance HE Certification
130	Revisiting Assumptions About the Data Revolution: Where Have We Made Progress and Where Are We Being	Committee Work: United Nation Sustainable Development Solution Network	9/01/24	Virtual	Ten years after the release of "A World That Counts: Mobilizing the Data Revolution for Sustainable Development," and the formal adoption of the Sustainable Development Goals (SDGs), the global environment has changed substantially
131	Economic Crime in War: Winter Economic Crime Symposium 2024		18/01/24	Virtual	The 5th Winter Economic Crime Symposium brings together a diverse body of researchers, practitioners, students, and other community members to discuss policing economic

					crime in war. The Symposium is supported by the *Journal of Economic Criminology*
132	SBS Disruptive Technologies Cluster Talk: The History, Reality and Possibilities of AI		17/01/24	Maxwell Building University of Salford	SBS Knowledge Sharing Session.
FEBRUARY 2024					
133	Thinking through Central Bank Digital Currency (TCBDC)	International Monetary Fund Training	12/02/24 – 16/02/24	IMF- Africa Training Institute, Mauritius	Evaluate CBDC pros (benefits), cons (costs), and conditions. Formulate a framework for guiding CBDC design and feasibility. Explore the regulatory and legal changes/framework on CBDC.
MARCH 2024					
134	Tech Intersect: Unlocking Global Financial Opportunity via WeB3 CBDCs	Webinar Seminar	25/ 03/2024	Virtual	Insight on web3-based CBDC (Central Bank Digital Currency) a solution that bridges the gap between traditional finance and innovative world of web3 that would not only create secure and efficient way to make

					payment but would broaden the scope of inclusivity in the financial space.
135	International Critical Management Studies Conference – Organizing Committee Work	Committee Work	26/03/2024	Virtual	International Critical Management Studies General Assembly committee work to review proposal submitted for the next Conference
JULY 2024					
136	Women of FinTech: Scaling teams for Success	Webinar	19/07/2024	Virtual	Opportunity to gain insights and strategies from experienced female leaders in the fintech industry on how to effectively scale teams for business success

APPENDIX D: RESEARCH QUESTIONNAIRE

SECTION A

1	Gender	
	Male	
	Female	
2	Marital status	
	Married	
	Single	
	Divorced	
	Widowed	
3	Age	
	Between 15 – 45	
	Between 46 – 60	
	Above – 60	
4	Source of Income	
	Employed	
	Self employed	
5	Geographical Location	
	North-central	
	Northeast	
	Northwest	
	Southeast	
	South-south	
	Southwest	
6	Level of Education	
	Primary	
	Secondary	
	Tertiary Institution	

Table A1 - Questionnaire Section A

SECTION B

MOBILE-BASED FINANCIAL SERVICES USAGE

Code	Measurement Items	SD	D	N	A	SA
MFS1	I use mobile banking applications for my financial transactions	1	2	3	4	5
MFS2	I use instructional materials that guide the usage of mobile banking applications	1	2	3	4	5
MFS3	I can be able resolve banking issues when encountered using my mobile banking applications	1	2	3	4	5
MFS4	I can be able to assist someone to use mobile banking applications.	1	2	3	4	5
MFS5	I can perform basic functions contained in mobile banking applications	1	2	3	4	5

Table B1 - Questionnaire Section B Mobile-Based
Modified from Personal ICT Usage (Cronbach Alpha = 0.85). Source: Türel, Y. K., Özdemir, T. Y., & Varol, F. (2017). Teachers' ICT Skills Scale (TICTS): Reliability and Validity. *Cukurova University Faculty of Education Journal*, *46*(2), 503-516.

WEB-BASED FINANCIAL SERVICES USAGE

Code	Measurement Items	SD	D	N	A	SA
WFS1	I use web-based internet banking facilities for my financial transactions	1	2	3	4	5
WFS2	I use online instructional materials that guide the usage of web-based internet banking facilities.	1	2	3	4	5
WFS3	I can be able resolve banking issues when encountered using web-based internet banking support services.	1	2	3	4	5
WFS4	I can be able to assist someone to use web-based internet banking facilities.	1	2	3	4	5
WFS5	I can perform basic functions contained in web-based internet facilities.	1	2	3	4	5

Table B2 - Questionnaire Section B Web-Based
Modified from Personal ICT Usage (Cronbach Alpha = 0.85). Source: Türel, Y. K., Özdemir, T. Y., & Varol, F. (2017). Teachers' ICT Skills Scale (TICTS): Reliability and Validity. *Cukurova University Faculty of Education Journal*, *46*(2), 503-516.

ATM-BASED FINANCIAL SERVICES USAGE

Code	Measurement Items	SD	D	N	A	SA
AFS1	I use ATM for my financial transactions	1	2	3	4	5
AFS2	I use instructional information in ATM to guide my usage of the machine for my financial transaction.	1	2	3	4	5
AFS3	I can be able resolve banking issues when encountered using ATM facility available to me.	1	2	3	4	5
AFS4	I can be able to assist somebody to use ATM when requested.	1	2	3	4	5
AFS5	I can perform basic functions for which ATM was designed to handle.	1	2	3	4	5

Table B3 - Questionnaire Section B ATM Based
Modified from Personal ICT Usage (Cronbach Alpha = 0.85). Source: Türel, Y. K., Özdemir, T. Y., & Varol, F. (2017). Teachers' ICT Skills Scale (TICTS): Reliability and Validity. *Cukurova University Faculty of Education Journal*, *46*(2), 503-516.

POS-BASED FINANCIAL SERVICES USAGE

Code	Measurement Items	SD	D	N	A	SA
PFS1	I use POS services for my financial transactions	1	2	3	4	5
PFS2	I can be able to use instructional information that guides the use of POS.	1	2	3	4	5
PFS3	I can be able resolve banking some of my banking needs using POS available to me to me.	1	2	3	4	5
PFS4	I can be able to assist somebody to use POS machine when requested.	1	2	3	4	5
PFS5	I can perform basic functions for which POS machine was designed to handle.	1	2	3	4	5

Table B4 - Questionnaire Section B POS-Based
Modified from Personal ICT Usage (Cronbach Alpha = 0.85). Source: Türel, Y. K., Özdemir, T. Y., & Varol, F. (2017). Teachers' ICT Skills Scale (TICTS): Reliability and Validity. Cukurova University Faculty of Education Journal, 46(2), 503-516.

MONEY LAUNDERING EXPOSURE

Code	Measurement Items	SD	D	N	A	SA
ML1	People nowadays use different instruments for making deposits into bank accounts	1	2	3	4	5
ML2	I know people to make huge cash withdrawals from banks	1	2	3	4	5
ML3	I know people that make the use of dual/multiple identities while transacting with banks	1	2	3	4	5
ML4	I know of people that make multiple deposits from different geographical locations into a single account	1	2	3	4	5
ML5	I am aware that people purchase of shares or make investments by proxy	1	2	3	4	5
ML6	I know that people nominate other to make transactions using their bank accounts	1	2	3	4	5
ML7	I know that people make payment to others using third parties	1	2	3	4	5
ML8	I know that people make invisible payments/transactions in such a way to hide the involvement in such transactions	1	2	3	4	5
ML9	I know that multiple individuals send funds to the one beneficiary in an attempt reduce the amount reportable to anti-corruption agencies	1	2	3	4	5
ML10	I know that multiple cheques can be cashed into the one bank account in an attempt reduce the amount reportable to anti-corruption agencies	1	2	3	4	5
ML11	I know that people make multiple transactions of a similar nature on the same day from different locations to beat the intelligence of anti-corruption agencies.	1	2	3	4	5

Table B5 - Questionnaire Section B Money Laundering Exposure
Money Laundering Indicators. (Cronbach Alpha= Nil). Source: Nigeria Financial Intelligence Unit (NFIU). Money Laundering Indicators indicating Financial Fraud. Available Online at:

https://www.nfiu.gov.ng/images/Downloads/downloads/mlindicators.pdf Accessed 11th November 2021

FINANCIAL REGULATION

Code	Measurement Items	SD	D	N	A	SA
FR1	Regulatory agencies exhibit a high degree of effectiveness in preventing financial crimes in Nigeria	1	2	3	4	5
FR2	There is monitoring systems for the detection of suspicious transactions in timely manner which serves as effective tools in the combating money laundering within the banking sector in Nigeria.	1	2	3	4	5
FR3	Regulators imposed penalties on the bank in the context of punitive anti-money laundering actions	1	2	3	4	5
FR4	Regulators deploy advanced technology to effectively control new emerging money laundering threats.	1	2	3	4	5
FR5	Regulators undertakes money laundering prevention programs to effectively guard the financial system against regulatory and reputational risk.	1	2	3	4	5

Table B6 - Questionnaire Section B Financial Regulation

Modified from Money Laundering Prevention Scale (Cronbach Alpha= 0.737). Source: Turki, M., Hamdan, A., Cummings, R. T., Sarea, A., Karolak, M., & Anasweh, M. (2020). The regulatory technology "RegTech" and money laundering prevention in Islamic and conventional banking industry. *Heliyon*, *6*(10), e04949.

FINANCIAL LITERACY

Code	Measurement Items	SD	D	N	A	SA
FL1	I am conversant with the term *savings* as financial terms	1	2	3	4	5
FL2	I am conversant with the term *loans* as financial terms	1	2	3	4	5
FL3	I am conversant with the term *insurance* as financial terms	1	2	3	4	5
FL4	I am conversant with the term *Remittances (Money transfer services*) *as* financial terms	1	2	3	4	5
FL5	I am conversant with the term *Interest rate* as financial terms	1	2	3	4	5

Table B7 - Questionnaire Section B Financial Literacy

Modified from Money Laundering Prevention Scale (Cronbach Alpha= 0.701). Source: Turki, M., Hamdan, A., Cummings, R. T., Sarea, A., Karolak, M., & Anasweh, M. (2020). The regulatory technology "RegTech" and money laundering prevention in Islamic and conventional banking industry. *Heliyon*, *6*(10), e04949.

APPENDIX E : ETHICAL APPROVAL & SURVEY CONSENT

Re: Ethics Application: Panel Decision

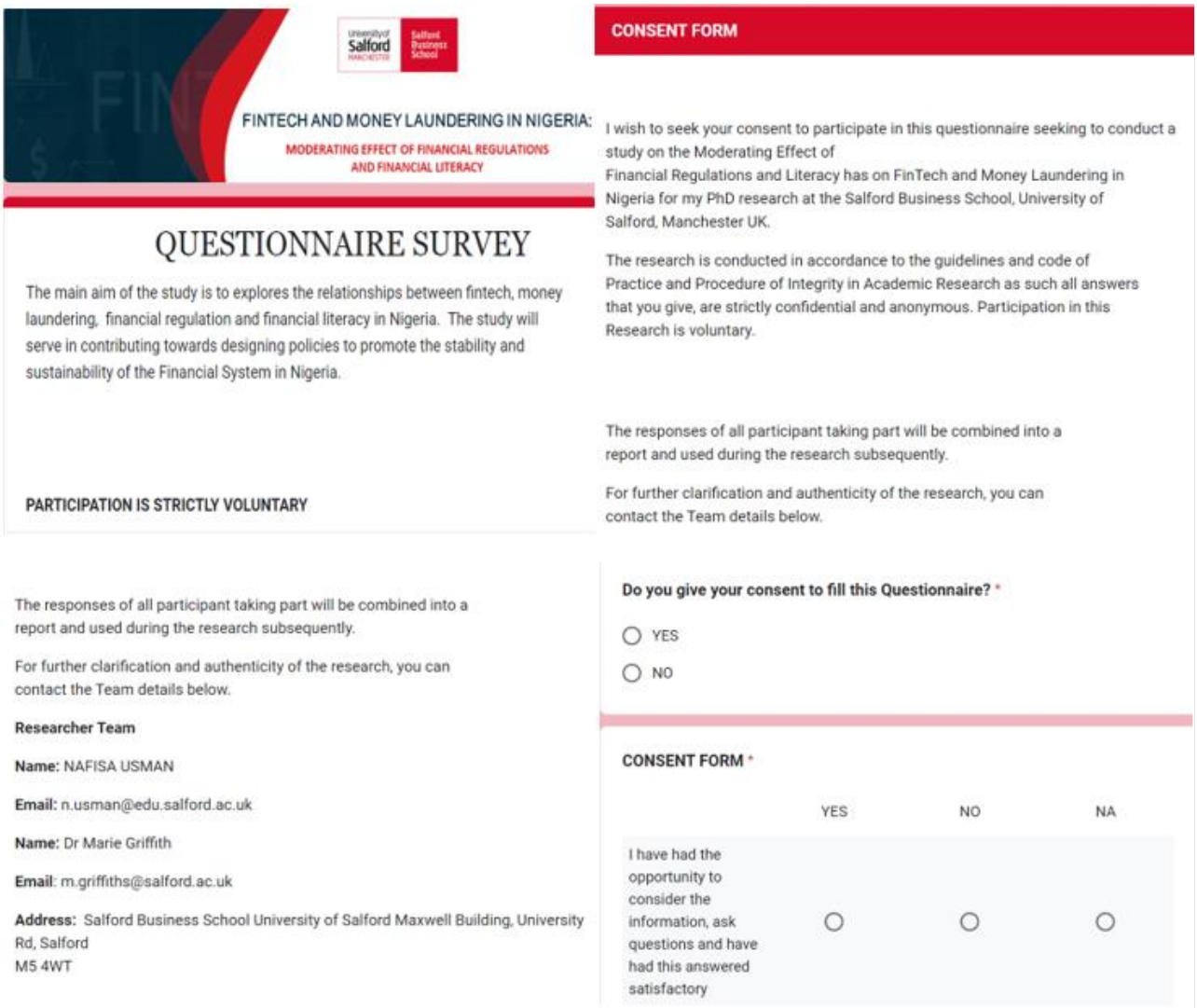
From: ethics <ethics@salford.ac.uk>
Sent: 15 August 2022 13:35
To: Nafisa Usman <N.Usman@edu.salford.ac.uk>
Cc: Marie Griffiths <M.Griffiths@salford.ac.uk>
Subject: Ethics Application: Panel Decision

The Ethics Panel has reviewed your application: FINTECH AND MONEY LAUNDERING IN NIGERIA: MODERATING EFFECT OF FINANCIAL REGULATIONS AND FINANCIAL LITERACY
Application ID: 6269

The decision is: Application Approved.

If the Chair has provided comments, these are as follows:
Comments
Appropriately completed application- however it will be interesting to note how the candidate/researcher will manage the reactions of the participants to the title of the thesis [below]- and get their consent and establish the Truth or reality of the situation ... *FinTech and Money Laundering in Nigeria: Moderating Effect of Financial Regulations and Literacy*

You will no longer be able to edit your application in the system.



FINTECH AND MONEY LAUNDERING IN NIGERIA:
MODERATING EFFECT OF FINANCIAL REGULATIONS AND FINANCIAL LITERACY

QUESTIONNAIRE SURVEY

The main aim of the study is to explores the relationships between fintech, money laundering, financial regulation and financial literacy in Nigeria. The study will serve in contributing towards designing policies to promote the stability and sustainability of the Financial System in Nigeria.

PARTICIPATION IS STRICTLY VOLUNTARY

CONSENT FORM

I wish to seek your consent to participate in this questionnaire seeking to conduct a study on the Moderating Effect of Financial Regulations and Literacy has on FinTech and Money Laundering in Nigeria for my PhD research at the Salford Business School, University of Salford, Manchester UK.

The research is conducted in accordance to the guidelines and code of Practice and Procedure of Integrity in Academic Research as such all answers that you give, are strictly confidential and anonymous. Participation in this Research is voluntary.

The responses of all participant taking part will be combined into a report and used during the research subsequently.

For further clarification and authenticity of the research, you can contact the Team details below.

The responses of all participant taking part will be combined into a report and used during the research subsequently.

For further clarification and authenticity of the research, you can contact the Team details below.

Researcher Team

Name: NAFISA USMAN

Email: n.usman@edu.salford.ac.uk

Name: Dr Marie Griffith

Email: m.griffiths@salford.ac.uk

Address: Salford Business School University of Salford Maxwell Building, University Rd, Salford
M5 4WT

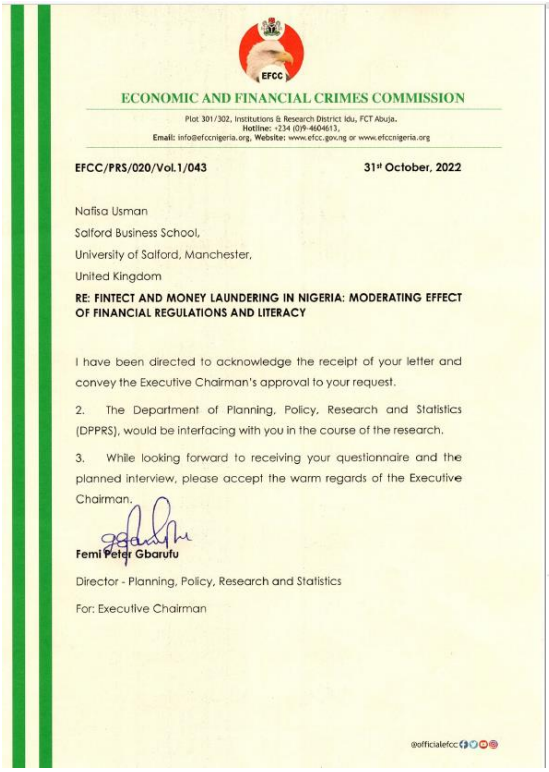
Do you give your consent to fill this Questionnaire? *

- YES
- NO

CONSENT FORM *

	YES	NO	NA
I have had the opportunity to consider the information, ask questions and have had this answered satisfactory			

APPENDIX F : STAKEHOLDER CONSENT APPROVAL



ECONOMIC AND FINANCIAL CRIMES COMMISSION

Plot 301/302, Institutions & Research District Idu, FCT Abuja.
Hotline: +234 (0)9-460461,
Email: info@efccnigeria.org, Website: www.efcc.gov.ng or www.efccnigeria.org

EFCC/PRS/020/Vol.1/043 — 31st October, 2022

Nafisa Usman
Salford Business School,
University of Salford, Manchester,
United Kingdom

RE: FINTECT AND MONEY LAUNDERING IN NIGERIA: MODERATING EFFECT OF FINANCIAL REGULATIONS AND LITERACY

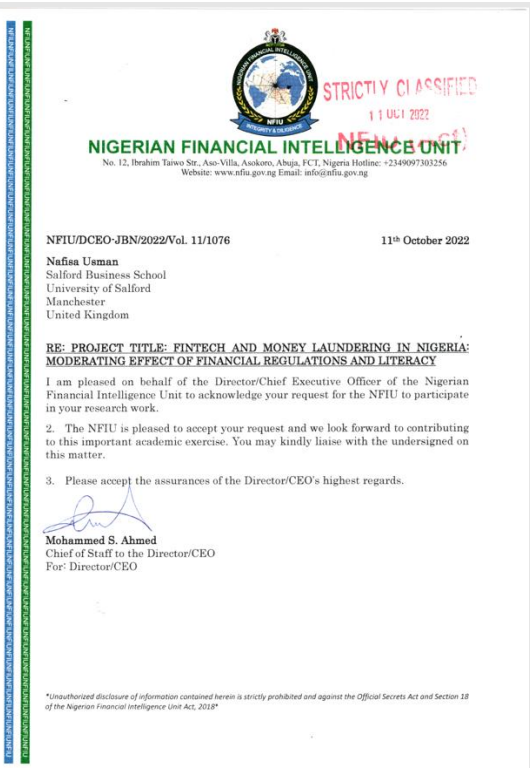
I have been directed to acknowledge the receipt of your letter and convey the Executive Chairman's approval to your request.

2. The Department of Planning, Policy, Research and Statistics (DPPRS), would be interfacing with you in the course of the research.

3. While looking forward to receiving your questionnaire and the planned interview, please accept the warm regards of the Executive Chairman.

Femi Peter Gbarufu
Director - Planning, Policy, Research and Statistics
For: Executive Chairman

@officialefcc



STRICTLY CLASSIFIED
11 OCT 2022

NIGERIAN FINANCIAL INTELLIGENCE UNIT
No. 12, Ibrahim Taiwo Str., Aso-Villa, Asokoro, Abuja, FCT, Nigeria Hotline: +2349097303256
Website: www.nfiu.gov.ng Email: info@nfiu.gov.ng

NFIU/DCEO-JBN/2022/Vol. 11/1076 — 11th October 2022

Nafisa Usman
Salford Business School
University of Salford
Manchester
United Kingdom

RE: PROJECT TITLE: FINTECH AND MONEY LAUNDERING IN NIGERIA: MODERATING EFFECT OF FINANCIAL REGULATIONS AND LITERACY

I am pleased on behalf of the Director/Chief Executive Officer of the Nigerian Financial Intelligence Unit to acknowledge your request for the NFIU to participate in your research work.

2. The NFIU is pleased to accept your request and we look forward to contributing to this important academic exercise. You may kindly liaise with the undersigned on this matter.

3. Please accept the assurances of the Director/CEO's highest regards.

Mohammed S. Ahmed
Chief of Staff to the Director/CEO
For: Director/CEO

Unauthorized disclosure of information contained herein is strictly prohibited and against the Official Secrets Act and Section 18 of the Nigerian Financial Intelligence Unit Act, 2018

DIRECTOR OF PUBLIC PROSECUTIONS OF THE FEDERATION

P.M.B. No. 192
Telephone: 09-2731553
Tel/Fax:

FEDERAL MINISTRY OF JUSTICE HEADQUARTERS
Plot 71B, Shehu Shagari Way
Maitama, Abuja
Nigeria

DPPA/SALFORD/683/22
12th September, 2022

NAFISA USMAN
Researcher
University of Salford, Manchester
The Crescent Salford, M5
4WT, United Kingdom

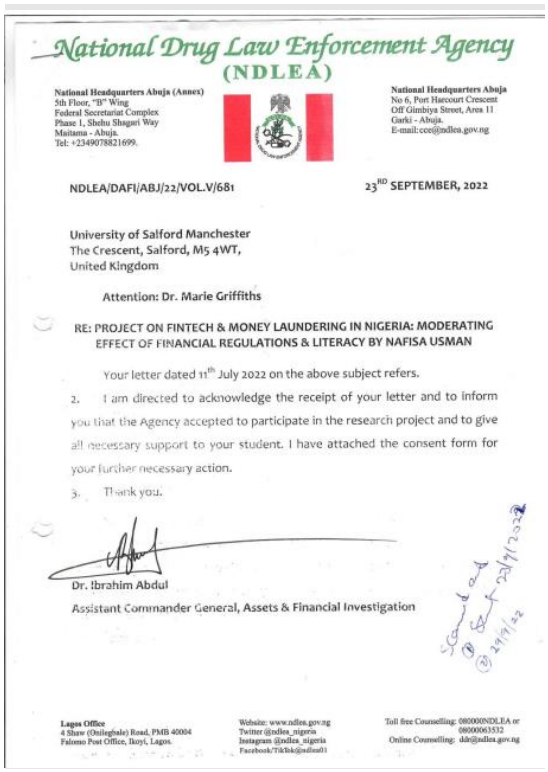
RE: PROJECT TITLE: FINTECH AND MONEY LAUNDERING IN NIGERIA: MODERATING EFFECT OF FINANCIAL REGULATIONS AND LITERACY

I am directed to acknowledge receipt of your letter on the above subject matter.

2. I am further directed to convey the acceptance of the Honourable Attorney General of the Federation and Minister of Justice to participate in your research work titled Fintech and Money Laundering in Nigeria: Moderating Effect of Financial Regulations and Literacy.

3. Accept please, the warm regards of the Honourable Attorney General of the Federation and Minister of Justice.

M.B ABUBAKAR
Director,
Public Prosecutions of the Federation.
For: The Honourable Attorney- General of the Federation and Minister of Justice.



National Drug Law Enforcement Agency
(NDLEA)

National Headquarters Abuja (Annex)
5th Floor, "B" Wing
Federal Secretariat Complex
Phase I, Shehu Shagari Way
Maitama - Abuja.
Tel: +2349078821699.

National Headquarters Abuja
No 6, Port Harcourt Crescent
Off Gimbiya Street, Area 11
Garki - Abuja.
E-mail:cce@ndlea.gov.ng

NDLEA/DAFI/ABJ/22/VOL.V/681 — 23RD SEPTEMBER, 2022

University of Salford Manchester
The Crescent, Salford, M5 4WT,
United Kingdom

Attention: Dr. Marie Griffiths

RE: PROJECT ON FINTECH & MONEY LAUNDERING IN NIGERIA: MODERATING EFFECT OF FINANCIAL REGULATIONS & LITERACY BY NAFISA USMAN

Your letter dated 11th July 2022 on the above subject refers.

2. I am directed to acknowledge the receipt of your letter and to inform you that the Agency accepted to participate in the research project and to give all necessary support to your student. I have attached the consent form for your further necessary action.

3. Thank you.

Dr. Ibrahim Abdul
Assistant Commander General, Assets & Financial Investigation

Lagos Office
4 Shaw (Onilegbale) Road, PMB 40004
Falomo Post Office, Ikoyi, Lagos.

Website: www.ndlea.gov.ng
Twitter @ndlea_nigeria
Instagram @ndlea_nigeria
Facebook/Tiktbkj@ndlea01

Toll free Counselling: 080000NDLEA or 08000063532
Online Counselling: ddr@ndlea.gov.ng

APPENDIX G : INTERVIEW QUESTIONS

INTERVIEW QUESTIONS

(1) What do you define as "money laundering"?

(2) What type of money laundering crimes are prevalent in Nigeria and why?

(3) Do you think financial innovation has any effect on money laundering?

(4) Aside through digital platforms, what other channels do money launderers use to conceal the source of illicit proceeds?

(5) Are the current laws adequate in curtailing financial technology induced money laundering?

(6) Is there any law that specifically focus on technology-based money laundering?

(7) Can financial literacy reduce money laundering and is the level of financial literacy in Nigeria adequate in preventing financial technology induced money laundering?

(8) Is there any educational policy and/or curriculum that specifically focus on increasing the level of financial literacy in Nigeria?

(9) Which digital finance product (ATM, internet banking, POS, mobile banking, etc.) is commonly used for money laundering?

(10) Do you think the emergence of cryptocurrency could amplify the effect of financial technology on money laundering?

(11) What are the challenges associated with the use of technology in countering money laundering in Nigeria?

(12) Do you have any partnership with internal and external stakeholders in addressing technology-induced money laundering?

(13) How would you describe the effectiveness of those partnerships (if any)?

(14) What recommendations would you put in place to prevent financial technology induced money laundering?

(15) Is there any need to strengthen the bilateral and multilateral partnership with your internal and external stakeholders to prevent technology-induced money laundering

APPENDIX H: INTERVIEW QUESTIONS AND RESEARCH OBJECTIVES ALIGNMENT

S/N	Question Categories	Details
1	Questions to Assess Respondent Knowledge	Questions 1 and 2 are not directly tied to any specific research objective but are crucial for establishing the depth of the respondents' knowledge on money laundering issues. Understanding their baseline knowledge will help ascertain the degree of confidence in their responses.
2	Questions Linked to Objective 1	Objective 1: Examine the effect of FinTech on money laundering in Nigeria. Questions 3 and 4 are directly linked to this objective. Question 3 explores the perceived effects of financial innovation on money laundering. Question 4 serves as a validation tool for Question 3.
3	Questions Linked to Objective 2	Objective 2: Examine the moderating effect of regulatory quality on the relationship between FinTech and money laundering in Nigeria. Questions 5 and 6 address this objective. Question 5 evaluates the adequacy and effectiveness of existing regulations. Question 6 examines specific regulatory frameworks in Nigeria that might influence the effect of FinTech on money laundering.

4	Questions Linked to Objective 3	Objective 3: Examine the moderating effect of financial literacy on the relationship between FinTech and money laundering in Nigeria. Questions 7 and 8 assess the effectiveness of financial literacy programs and educational policies in mitigating risks.
5	Additional Knowledge Assessment Questions	Questions 9 and 10 are not linked to specific objectives but test respondents' knowledge of digital finance products. They contribute to broader insights.
6	Recommendations and Specific Industry Questions	Questions 11 to 14 gather recommendations for preventing technology-induced money laundering. Question 15 is tailored for financial institutions, focusing on their perspectives and experiences.

APPENDIX I: DETAILED THEMATIC ANALYSIS PROCESS: STEPS AND CRITERIA

Process	No.	Criteria
Familiarization	1	Data from the interviews was transcribed verbatim to ensure accuracy. The transcripts were re-read multiple times to identify initial ideas and ensure familiarity with the content.
	2	Key insights were noted during the review of transcripts, including

		recurring patterns and phrases.
Coding	3	Data items were systematically coded to highlight recurring themes related to the research objectives.
	4	Coding was inclusive, capturing all relevant data extracts across the dataset to avoid bias.
Theme Development	5	Initial codes were grouped to generate themes aligned with the research objectives, ensuring consistency with the study's focus.
	6	Themes were refined by checking them against the dataset and ensuring they reflected the data accurately.
Reviewing Themes	7	Themes were reviewed for internal consistency and coherence and cross-checked against other themes to ensure they were distinct.
	8	Compelling extracts and examples were selected to support the identified themes.
Defining and Naming Themes	9	Each theme was clearly defined and named to ensure relevance to the research objectives.
	10	Themes were detailed in a narrative form, linking

		back to the research questions and objectives.
Reporting	11	Themes were presented in the qualitative findings section, supported by vivid quotes and detailed interpretations.
	12	The narrative was balanced, integrating the themes with the analytical framework and research objectives.

APPENDIX J: SCHEDULE OF INTERVIEWS WITH REGULATORY AGENCIES AND PARTICIPANTS

S/N	AGENCY	CODE NAME	DATE	TIME START	TIME END
1	Central Bank of Nigeria	CBN Participant 1	24/07/2023	10:20	10:35
2		CBN Participant 2	24/07/2023	10:40	10:53
3		CBN Participant 3	24/07/2023	10:58	11:14
4		CBN Participant 4	27/07/2023	10:20	10:40
5		CBN Participant 5	27/07/2023	10:45	11:07
6	Nigeria Financial Intelligence Unit	NFIU Participant 1	31/07/2023	10:20	10:39
7		NFIU Participant 2	31/07/2023	10:44	10:59
8		NFIU Participant 3	31/07/2023	11:04	11:17
9		NFIU Participant 4	31/07/2023	11:22	11:38
10		NFIU Participant 5	31/07/2023	11:43	12:03
11	Economic and Financial Crimes Commission	EFCC Participant 1	31/07/2023	12:08	12:30
12		EFCC Participant 2	31/07/2023	12:35	12:54
13		EFCC Participant 3	31/07/2023	12:59	13:14
14		EFCC Participant 4	31/07/2023	13:19	13:32
15		EFCC Participant 5	31/07/2023	13:37	13:53
16	Independent Corrupt Practices and Other Related Offences Commission	ICPC Participant 1	02/08/2023	10:20	10:40
17		ICPC Participant 2	02/08/2023	10:45	11:07
18		ICPC Participant 3	02/08/2023	11:12	11:31
19		ICPC Participant 4	02/08/2023	11:36	11:51
20		ICPC Participant 5	02/08/2023	11:56	12:09
21	National Drug Law Enforcement Agency	NDLEA Participant 1	03/08/2023	10:20	10:36
22		NDLEA Participant 2	03/08/2023	10:41	11:01

23		NDLEA Participant 3	03/08/2023	11:06	11:28
24		NDLEA Participant 4	03/08/2023	11:33	11:52
25		NDLEA Participant 5	03/08/2023	11:57	12:12
26		MOJ Participant 1	03/08/2023	12:17	12:30
27		MOJ Participant 2	03/08/2023	12:35	12:51
28		MOJ Participant 3	03/08/2023	12:56	13:16
29		MOJ Participant 4	03/08/2023	13:21	13:43
30	Ministry of Justice	MOJ Participant 5	03/08/2023	13:48	14:07