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POLICY RESEARCH and ANALYSIS**

The Role of Cryptocurrency in Facilitating Access to Financial Services in Kenya

Pamela Muhia and Christopher Mutiri

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**THE KENYA INSTITUTE FOR PUBLIC POLICY
RESEARCH AND ANALYSIS (KIPPRA)**

**YOUNG PROFESSIONALS (YPS) TRAINING
PROGRAMME**

The Role of Cryptocurrency in Facilitating Access to Financial Services in Kenya

Pamela Muhia and Christopher Mutiri

*Kenya Institute for Public Policy
Research and Analysis*

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Abstract

This study sought to examine the role of cryptocurrency in facilitating access to financial services in Kenya. The paper navigated complexities involved in cryptocurrency adoption, fostering a conducive environment for inclusion of financial services for all Kenyans. The methodology used was futures foresight that entailed developing scenarios and evaluating the implications of achieving optimal conditions. The key findings reveal that successful cryptocurrency incorporation in Kenya hinges on several vital factors. Firstly, clear regulatory policies are essential in providing a secure and stable environment for cryptocurrency transactions. Secondly, economic stability measured by exchange rate volatility is necessary for fostering confidence among investors and users. Thirdly, technological advancements, which include robust cyber security measures and blockchain innovation, are pivotal in supporting the required cryptocurrency infrastructure. Finally, social factors such as trust, positive attitude towards cryptocurrency and public awareness are significant in influencing the usage and adoption in financial services. On the policy front of the cryptocurrency landscape, the study recommends that emphasis on regulatory transparency and education will build trust and awareness among users. It suggests the implementation of regulatory policies to protect consumers and stabilize cryptocurrency value against exchange rate volatility. The establishment of a national cybersecurity framework tailored for cryptocurrency transactions is proposed to ensure user confidence and platform security. The initiatives will foster innovation, sustainable growth and broader financial inclusion through informed adoption of cryptocurrencies in Kenya.

Abbreviations and Acronyms

4 ¹ R	4th Industrial Revolution
AI	Artificial Intelligence
DIO	Diffusion Innovation Theory
IoT	Internet of Things
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KNBS	Kenya National Bureau of Statistics
MICMAC	Matrice d'Impacts Croisés-Multiplication Appliquée à un Classement [Cross-Impact Matrix-Multiplication Applied to a Classification]
PESTEL	Political, Economic, Social, Technological, Environment and Legal
SDGs	Sustainable Development Goals
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TAM	Technological Acceptance Model
UTAUT	Unified Theory of Acceptance and Use Technology

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1. Introduction

Cryptocurrency is a digital currency where transactions are recorded and verified by a decentralized system using cryptography rather than a centralized authority. The decentralized platform means that cryptocurrencies operate on a peer-to-peer network without the control of financial institutions or the government. It, however, runs on a public distributed ledger called blockchain where transactions are recorded across computer networks known as nodes (Agu and Kingdom, 2020). The decentralized network of blockchain technology ensures security and transparency, which leads to cheaper and faster cross-border payments. Cryptocurrencies such as Bitcoin (BTC), Stellar (XLM), Binance Coin (BNB), Litecoin (LTC), Bitcoin Cash (BCH), Chainlink (LINK), among others, can be used for various purposes. This includes as a form of investment, remittance payment, online purchases, and as a means of transferring value across and within borders. Globally, they have gained attention as speculative alternative investment assets, with prices experiencing significant volatility.

Cryptocurrencies have become an essential part of the global economy and more importantly in numerous emerging markets (Bommer et al., 2023). North America is the largest cryptocurrency market with an estimated value received on-chain at US\$ 1,2 trillion (The Geography of Cryptocurrency Report, 2023), which represents a total of 24.4 per cent of transaction activity globally. It is followed by Southern Asia, Oceania and Central with 19.3 per cent; and Northern, Central and Western Europe region with 17.6 per cent. In addition, Eastern Europe at 8.9 per cent, Eastern Asia at 8.8 per cent, Latin America at 7.3 per cent, Middle East and North Africa (MENA) at 7.2 per cent and Sub-Saharan Africa account for 2.3 per cent. This is a representation of the global transaction volume between July 2022 and June 2023. During this period, Sub-Saharan Africa received an on-chain value estimated at US\$ 117.1 billion. This figure has been increasing as compared to US\$ 105.6 billion for the period July 2020 and June 2021 (The Geography of Cryptocurrency Report, 2020).

Although Sub-Saharan Africa has been the smallest cryptocurrency market, a closer analysis reveals that it has penetrated key populations and become an integral part of many residents' day-to-day social and economic lives and activities. An example is Nigeria, which is currently ranked second overall on the Global Crypto Adoption Index (2023). Consequently, Kenya is ranked at 21, Ghana at 29 and South Africa at 31, which is high in the index. Kenya has made significant strides in financial inclusion, particularly through bank and mobile service platforms such as M-Pesa. However, a substantial segment of the Kenyan population remains excluded and underserved from traditional financial services. Embracing crypto technology can play a significant role in improving the efficiency of financial services and driving innovation in Kenya. Blockchain technology and cryptocurrencies promise faster transactions, greater transparency and lower costs.

This research offers evidence-based recommendations for developing comprehensive regulations that foster innovation while ensuring the safeguarding of the financial system. Consequently, cryptocurrencies can streamline cross-border remittances, offering an efficient and cost-effective alternative to

traditional methods (Agu and Kingdom, 2020). The plausible legal integration of cryptocurrencies into Kenya's financial system presents both risks and opportunities. The envisioned goal is to ensure that the adoption of cryptocurrency supports sustainable economic growth without compromising financial stability. In recent years, cryptocurrencies have emerged as an important innovation in the financial landscape, which offers new ways of storing value, conducting transactions and managing assets (Agu and Kingdom, 2020). Notably, a substantial population in Kenya remains underbanked and unbanked, necessitating the potential of cryptocurrencies in providing access and inclusion of financial services. The integration of crypto platforms into Kenya's financial services is fraught with challenges in security concerns, volatility of digital currencies and regulatory uncertainties.

Despite the promising prospects of cryptocurrencies globally, regionally and Kenya in particular, there is limited comprehensive research on the specific role of cryptocurrency in facilitating financial services. A key question that remains unanswered is how cryptocurrencies effectively address the financial needs of the Kenyan population, especially those excluded from the traditional banking system. Cryptocurrency's impact on the economic and regulatory environment in Kenya requires examination. The study seeks to explore the role of cryptocurrency in facilitating access to financial services in Kenya. The specific objectives of the study were to explore the drivers of change in the incorporation of cryptocurrencies in Kenya, to develop plausible future scenarios in its usage and adoption, and to draw policy recommendations that will be used by stakeholders in enhancing the adoption and usage of cryptocurrencies in Kenya.

2. Status of Cryptocurrency

2.1 Global Context of Cryptocurrency in Financial Services

According to the Global Crypto Adoption Index of 2023 by Chainalysis, the top countries by crypto adoption include Vietnam, India, Pakistan, Ukraine, and Kenya. As of 2023, it is estimated that over 300 million people worldwide own cryptocurrencies. In the same year, the total market capitalization of cryptocurrencies surpassed US\$ 1 trillion, with Bitcoin and Ethereum accounting for a significant share.

In Asia, high cryptocurrency adoption rates are observed in India, the Philippines, and Vietnam. These countries leverage cryptocurrencies for remittances and as investment vehicles. Cryptocurrencies offer a low-cost and fast alternative to traditional remittance channels. Countries with large expatriate populations, such as the Philippines and Nigeria, are leveraging this advantage. In Europe, there is a growing cryptocurrency adoption with countries such as Russia, Turkey, and Ukraine showing significant usage. This growing adoption rate is driven by regulatory clarity and investment opportunities.

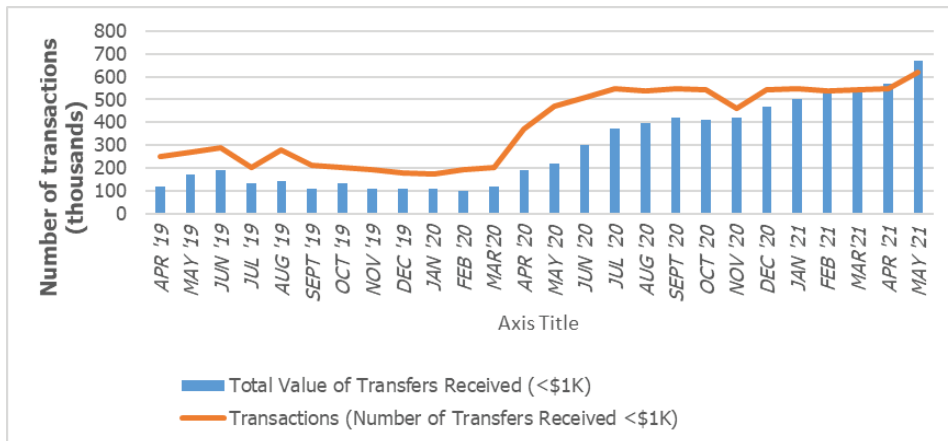
In North America, the US and Canada have substantial cryptocurrency markets, driven by innovation in blockchain technology, investment, and increased merchant acceptance. In more stable economies, cryptocurrencies are primarily viewed as investment assets. Institutional adoption is growing, with large financial institutions and companies such as Tesla and MicroStrategy investing in Bitcoin and other cryptocurrencies. In Latin America, countries such as Argentina and Venezuela see high adoption due to hyperinflation and economic instability. In this region, cryptocurrencies are used as a store of value and for cross-border transactions. In addition, in countries such as Zimbabwe and Vietnam with unstable economies, cryptocurrencies serve as a hedge against inflation and currency depreciation.

Countries such as Switzerland, Malta, and Singapore have favourable cryptocurrency regulatory frameworks to encourage its adoption and innovation. These countries are becoming hubs for blockchain technological development. On the other hand, countries such as India and China have implemented stringent regulations, including outright bans on cryptocurrency transactions. These measures have a significant impact on cryptocurrency adoption rates.

2.2 Regional Context of Cryptocurrency in Financial Services

In Africa, countries such as Kenya and Nigeria are leading in cryptocurrency adoption and usage in Sub-Saharan Africa. The primary drivers towards this adoption and usage are the need for protection against local currency devaluation, financial inclusion, and remittances (Crypto Adoption Index Chainalysis, 2023). In light of these drivers, Figure 2.1 illustrates the growing role of cryptocurrency for remittance payments in Africa.

Figure 2.1: The growing role of cryptocurrency for remittance payments in Africa

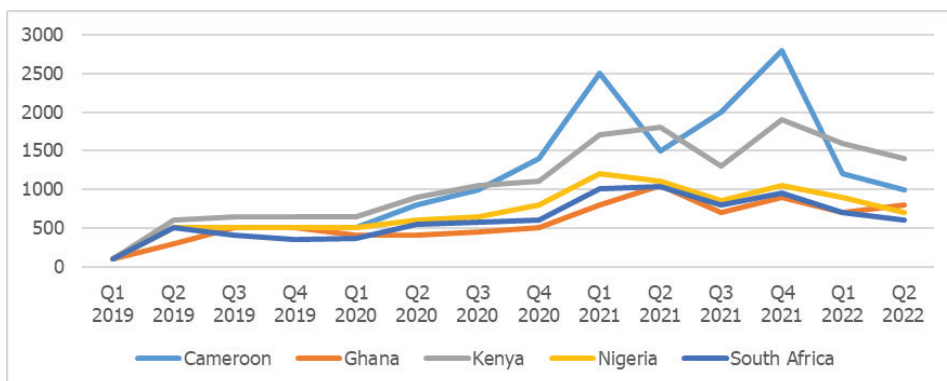


Source: “2021 Geography of Cryptocurrency Report.” Chainalysis, 2021

Figure 2.1 highlights the increasing utilization of cryptocurrencies for remittance payments across various countries in Africa. In Africa, remittances are crucial as they are a source of income for many households. Traditional remittance channels often involve longer transfer times and high fees as compared to cryptocurrencies, which are faster and cost-effective thereby facilitating financial inclusion in Africa. As such, when compared to international wire transfer platforms whose fees cost an average of 7 per cent of the total amount sent and could take several days, cryptocurrencies are designed to support foreign exchange transfers for less than a US penny and the transfer process takes 3 to 5 seconds (Chainalysis, 2021).

A significant population in Kenya relies on remittances from abroad. The adoption of cryptocurrencies will significantly reduce the cost of receiving remittances and enhance efficiency, thus directly improving access to financial services for many individuals. Figure 2.2 demonstrates the growth in quarterly web traffic to cryptocurrency sites by country from Q1 2019 to Q2 2022.

Figure 2.2: Growth in quarterly web traffic to cryptocurrency sites by country, Q1 2019 - Q2 2022



Source: “2021 Geography of Cryptocurrency Report.” Chainalysis, 2021

The figure presents data that reflects on the growing engagement and interest in cryptocurrencies in various African countries, including Kenya. This alludes to the fact that residents in Sub-Saharan Africa face issues that cryptocurrency platforms have proven to solve. This approach has enabled cross-border transactions to be in place with strict saving through economic volatility and strict capital control (Chainalysis, 2021).

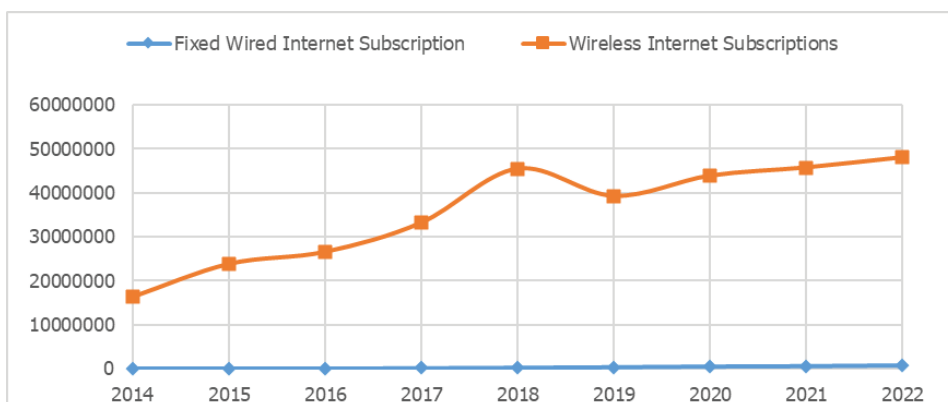
An increase in the web traffic to cryptocurrencies suggests a rising adaption and awareness of digital currencies. This means that more people in Africa are exploring cryptocurrency platforms as viable financial tools, which could probably contribute to greater financial inclusion. In the case of Kenya, this growing interest is linked to the country's increasing mobile connectivity and Internet penetration, which makes it easy for Kenyans to use and access cryptocurrencies. This notion supports the hypothesis that cryptocurrencies play a significant role in enhancing financial access to Kenya and globally.

2.3 Local Context of Cryptocurrencies in Financial Services

Kenya's Internet penetration in 2023 had reached a rate of approximately 46 per cent, which represents 26 million Internet users, a significant increase as compared to previous years (Communications Authority of Kenya, 2023). Mobile connectivity has also surged, accounting for mobile subscriptions that surpass 59 million. This provides a robust foundation for digital currency adoption and transactions (GSMA, 2023). The Central Bank of Kenya reports a remittance of over US\$ 3.7 billion in 2022, which highlights the critical role of cross-border payments in the country's economy (Central Bank of Kenya, 2022). As discussed earlier, cryptocurrencies offer a faster and cheaper alternative for these remittances, which address the high cost associated with traditional money transfer services, which can charge as high as 10-15 per cent (World Bank, 2022; M-Pesa, 2023). In addition, the volatility of the Kenya Shilling, which depreciated by 7 per cent

against the US dollar in 2023 has made many Kenyans seek more stable stores of value, such as Binance Coin (BNB) and other cryptocurrencies (Trading Economics, 2023). This economic environment, combined with an increase in accessibility of digital platforms has positioned Kenya as a significant player in the landscape for cryptocurrency in Africa. The integration of these digital assets into Kenya's financial ecosystem not only provides a hedge against economic instability but also provides financial inclusion. Figure 2.3 demonstrates the rise in Internet subscriptions in Kenya, which advocates for this growing integration, adoption and usage of cryptocurrencies within the financial sector.

Figure 2.3: Internet subscriptions in Kenya

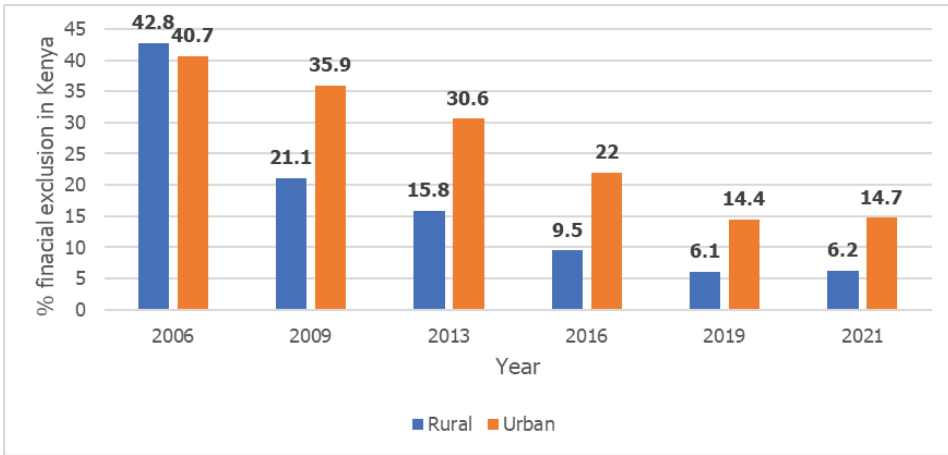


Source: KNBS (2021)

The figure displays Kenya's steady increase in both wireless and wired Internet subscriptions from 2014 to 2022. The bandwidth Internet capacity significantly increased by 9.9 per cent to 12.0 million Mbps in 2022 (KNBS, 2022). This Internet connectivity is an integral enabler for cryptocurrency adoption and usage, as the Internet is necessary for transacting and using digital currencies. Improved Internet connectivity will enable more and more Kenyans to participate in the cryptocurrency ecosystem. This will further facilitate access to financial services in Kenya, especially those in underserved and remote areas where there is a deficit of traditional banking infrastructure.

Financial exclusion refers to the insufficiency of access to formal financial services, such as insurance and banking, within a population. Financial inclusion in Kenya remains a pertinent issue that has significant implications for social equity and economic development. The country has made notable strides in the advancement of financial infrastructure and technology. However, a substantial portion of the population remains without access to formal financial services, disproportionately affecting marginalized communities. Figure 2.4 displays the percentage of financial exclusion in Kenya over several years, categorized by urban and rural areas.

Figure 2.4: Percentage of financial exclusion in Kenya over several years, categorized by rural and urban areas



Source: FinAccess (2021)

The development from 2006 to 2021 illustrates a consistent downward trend in financial exclusion rates across both urban and rural settings. This suggests that efforts to improve financial inclusion in Kenya have been efficient, with more people having access to formal financial services. Over the years, Kenya has made significant strides in reducing financial exclusion. However, there are still challenges that need to be addressed, particularly in maintaining momentum and ensuring that gains are sustained across all regions and maintain momentum.

3. Literature Review

3.1 Theoretical Literature

3.1.1 The Diffusion of Innovation (DOI) Theory

E.M. Rogers is the proponent behind the development of Diffusion of Innovation (DOI) in 1962. The theory explains how, over time, a product or idea gains momentum and diffuses through a social system or specific population. The result is that people of a population or social system adopt new behaviours, ideas or products and it is through this that diffusion is possible. The theory perceives these innovations as innovative as their adoption and usage occur gradually while different stakeholders exhibit varying propensities to embrace innovation. The adopters are categorized in five folds; i.e. innovators, early adopters, early majority, late majority and laggards. These individuals have unique characteristics that influence their adoption decisions.

The adoption process entails recognizing the need for innovation, settling on whether to reject or adopt and incorporating its regular usage. The theory acknowledges that adoption and innovation are affected by different factors. This includes compatibility with existing values, relative advantage, observability, triability, among others. The DOI Theory has proven to be effective in different fields as its application emphasizes the importance of understanding a target population on adoption and implementation aimed at behavioural change within a population or social system.

3.1.2 Technology Acceptance Model (TAM)

The proponents behind the Technology Acceptance Model (TAM) are Davis and colleagues, Davis, 1989; Davis, Bagozzi and Warshaw (1989) in the late 1980s. The application of the model has been tested in various contexts as evidenced by studies (Nah, Tan and Teh, 2004; Venkatesh and Davis, 2000) and a meta-analysis (Yousafzai, Foxall and Pallister, 2007a; 2007b). TAM is rooted in the Theory of Reasoned Action (TRA), which explores behavioural intention formation, asserting user's attitudes towards a particular system, which are shaped by perceived ease of use and general usefulness. These beliefs consequently influence user intention, as it is a robust predictor of system use (Taylor and Todd, 1995).

The evolution of TAM integrating various related models has contributed to the formation of the Unified Theory of Acceptance and Use Technology (UTAUT) (Venkatesh et al., 2003). Despite its widespread use, TAM lacks an in-depth explanation of how to formulate beliefs, which necessitated the emergence of TAM2 and TAM3, which identify antecedents and suggest further interventions (Venkatesh and Davis, 2000; Venkatesh and Bala, 2008). In relation to the 4th Industrial Revolution (4IR) and cryptocurrency, understanding of user acceptance and blockchain-based technologies adoption could be informed by TAM's frameworks, thus offering insights into the factors that influence the successful adoption and usage in various economies industries.

3.2 Empirical Literature

3.2.1 Cryptocurrency Potential

Cryptocurrency presents a range of opportunities and challenges within Kenya's financial sector, acting as a significant force for financial inclusion. The dual ability of cryptocurrencies to serve both banked and unbanked populations highlights their transformative potential in regions such as Sub-Saharan Africa, where traditional banking infrastructure is often inadequate (Muhleisen, 2018). By leveraging the widespread use of mobile technology, cryptocurrency platforms can bridge significant gaps in financial inclusion.

Ndung'u (2019) highlights the success of mobile money platforms such as M-Pesa in Kenya, demonstrating how familiarity with digital financial services creates a conducive environment for cryptocurrency adoption. The proliferation of mobile phones among the underserved population, who often lack access to traditional banks, indicates that cryptocurrency could extend financial services to this segment. This aligns with the broader trend of technological leapfrogging, where emerging economies bypass traditional development stages by adopting advanced technologies directly.

Omondi (2020) underscores the potential of cryptocurrencies to facilitate remittances to Kenya, a critical component of the nation's economy. The study shows that cryptocurrencies significantly reduce the cost and increase the speed of cross-border money transfers. This benefit is particularly valuable for the Kenyan diaspora community, which relies on remittances for financial support. By providing a faster and cheaper platform for accessing funds, cryptocurrencies can enhance the financial well-being of many Kenyans, supporting economic development and social equity.

Regulatory frameworks play a crucial role in the adoption and trust of cryptocurrencies. Chege (2021) emphasizes that clear and supportive regulatory policies are essential for building user trust and encouraging broader adoption. This is supported by Zohar (2015), who found that robust regulatory frameworks foster the safe use of cryptocurrencies. In Kenya, creating a regulatory environment that supports cryptocurrency while ensuring consumer protection could catalyze widespread adoption and integration into the financial ecosystem.

Trust and security are paramount in the cryptocurrency market, as highlighted by Gandal et al. (2018). The study stresses the need for robust security measures to prevent manipulation and fraud, which are critical for gaining public trust. Enhancing crypto security is not just a technical requirement but a foundational element for the broader adoption of cryptocurrencies. Ensuring that cryptocurrencies are secure and reliable can facilitate their acceptance as a legitimate and safe option for financial services.

3.2.2 Opportunities and challenges in cryptocurrency adoption

A study by Bondarenko et al. (2019) examined the relationship between cryptocurrency investment and national economic development in Ukraine in 2019. The research delved into the hypothesis regarding the potential of using cryptocurrency for economic progress. The results revealed that a majority of respondents acknowledged using cryptocurrency as a payment method. Despite this, the study cautioned against citizens investing in such assets without proper regulation. In addition, it highlighted the role of blockchain technologies in Ukraine's State of Science and Technology, serving as the foundation for the increased use and demand for cryptocurrency in the Ukrainian market. Notably, a legal framework in Ukraine legitimized the cryptocurrency industry, opening doors to foreign exchanges and investments.

3.3 Knowledge Gaps

A study by Grohmann et al. (2018) explored the relationship between financial inclusion and financial literacy across various countries. The finding of the study highlighted significant gaps in financial literacy, which are critical in understanding the effectiveness and usage of cryptocurrencies. In Kenya, addressing these technological gaps is crucial for leveraging cryptocurrencies to enhance financial access.

Zohar (2015) in a study mentioned earlier discussing regulatory and technical aspects of Bitcoin highlighted regulatory uncertainties and gaps that can directly or indirectly impact the adoption of cryptocurrencies. For Kenya, creating a supportive regulatory environment is key to facilitating the use of cryptocurrencies for financial services.

Gandal et al. (2018) in a study mentioned earlier examined the security issues and the potential for price manipulation within Bitcoin's ecosystem. It emphasized on the importance of security measures to build trust among users, thus Kenya needs to ensure a robust cybersecurity measure to promote safe and widespread use of cryptocurrencies. Addressing these gaps can help maximize the potential of cryptocurrencies to improve financial inclusion and access to financial services in Kenya.

4. Methodology

4.1 Introduction

The research employed future foresight methodologies which are systematic approaches used to anticipate and plan for future scenarios. Through this methodology, the study aimed to develop credible and desired scenarios, while exploring the implications of attaining an optimal condition. In line with studies by Gatune and Cloette (2022) and WEF (2024), the methodology integrated clearly defining the research problem, literature review, Delphi technique and scenario analysis to identify the key drivers influencing cryptocurrency ecosystems, both externally and internally, and subsequently informed policy based on plausible future scenarios.

4.2 Scope of the Study

The scope of the study comprehensively analyses the role of cryptocurrency ecosystems both externally and internally within geographical contexts. Using PESTEL analysis (Political, Economic, Social, Technological, Environmental, and Legal factors) the study explored the external factors affecting cryptocurrency developments on a global landscape. The study further used SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats) to investigate the strengths, weaknesses, opportunities, and threats pertinent to cryptocurrency developments in Kenya. By employing this comparative analysis, the study endeavours to offer valuable insight to policy makers, the government, businesses, and investors seeking to navigate the cryptocurrency landscape both internationally and within the Kenyan context.

4.3 Sampling Process

The study focused on the financial services sector in Kenya with the help of various stakeholders and experts in diverse organizations. It was approximated that there were more Kenyans using cryptocurrency in informal transaction platforms. Based on a target population of 100, a sample of 40 (stakeholders/ experts) was obtained using the threshold of 40 per cent as recommended by Kothari (2004). The sample population was selected using snowballing or purposive method. The questionnaires used were both open-ended and close-ended and were based on the research questions and objectives. The questionnaires were self-administered to the relevant stakeholders and experts.

4.4 Analytical Framework

4.4.1 Explore the drivers of change to achieve the incorporation of cryptocurrency in Kenya

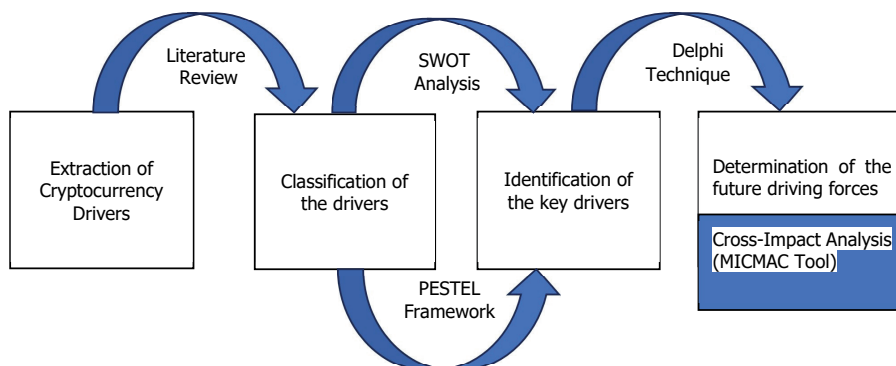
According to Popper (2008a, b), foresight methods can be categorized into qualitative, quantitative, or semi-quantitative. Semi-quantitative methods, such as cross-impact analysis and Delphi, use mathematical principles to quantify subjective, rational judgments, and viewpoints of key identified experts (Popper 2008a, b; Popper and Medina 2008). This study applied the cross-impact analysis as a semi-quantitative method.

First, an extensive literature review was conducted to identify the external drivers using the PESTEL framework and both external and internal drivers using SWOT analysis related to the cryptocurrency ecosystem. Next, a Delphi questionnaire was administered to key experts to further narrow down the drivers. Finally, the MICMAC tool was used to identify the key drivers of change needed to achieve the incorporation of cryptocurrency in Kenya. Figure 4.1 below summarizes these steps.

Figure 4.1: Methodology steps of cryptocurrency in facilitating financial services

Source: Authors, 2024

Step 1: Extraction and classification of drivers in the cryptocurrency ecosystem



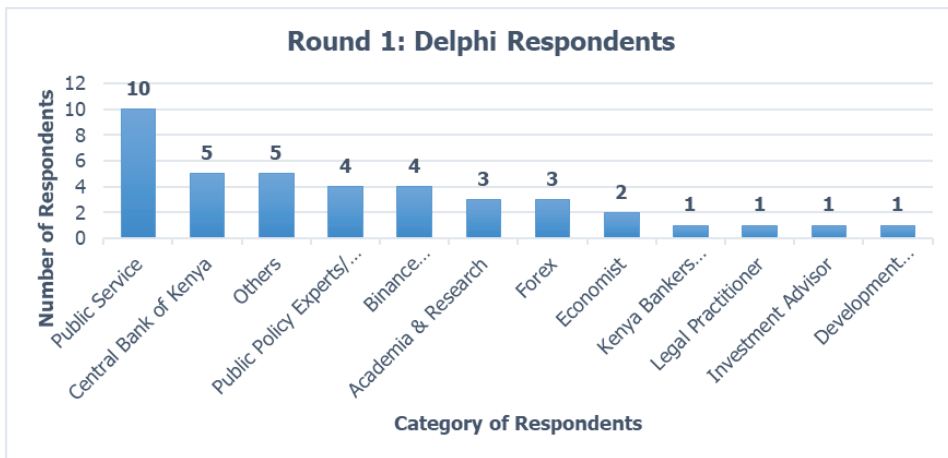
The identification of cryptocurrency drivers was conducted through an extensive literature review, guided by a well-defined research problem. The process involved systematically searching for and analyzing scholarly articles, reports, and other relevant publications to extract the key factors influencing the cryptocurrency ecosystem. The PESTEL framework and SWOT analysis were employed to categorize these drivers.

Step 2: Identification of the key drivers

a) Delphi Technique

Based on the drivers extracted from the literature review, questionnaires were developed to gather insights and opinions from a panel of experts familiar with the cryptocurrency dynamics. Its process was done in two rounds to gather and refine expert opinions regarding the significance and impact of the identified drivers. Figures 4.2 and 4.3 show the category of respondents who participated in round one and round two as shown below.

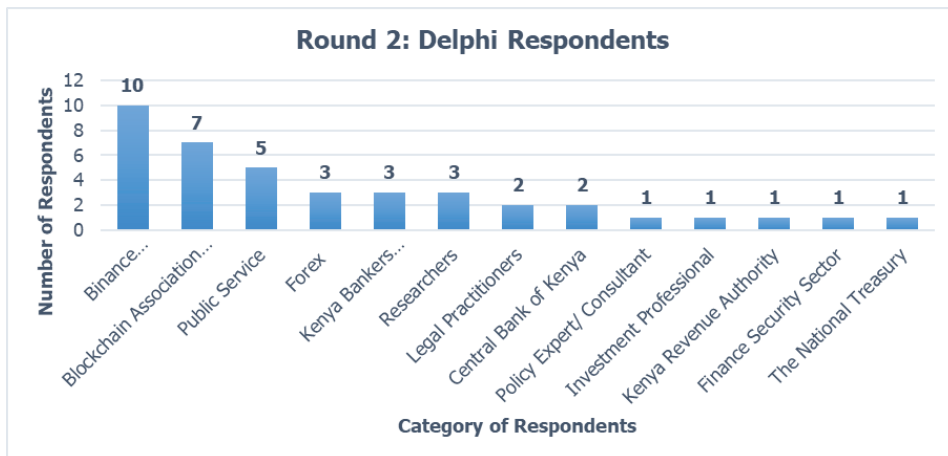
Figure 4.2: Category of respondents who participated in the first round of the Delphi process



Source: Authors, 2024

Figure 4.2 above shows that the largest group was respondents from public service with 10 respondents, followed by the Central Bank of Kenya with 5 and others with 5 respondents, respectively. The group with the least respondents includes legal practitioner with 1, investment advisor with 1 and the development professional with 1, respectively.

Figure 4.3: Category of respondents who participated in the second round of the Delphi process



Source: Data Analysis Results, 2024

Figure 4.3 above shows that the largest group was respondents from Binance Cryptocurrency trading company with 10 respondents, followed by Blockchain Association of Kenya with 7 and public service with 5 respondents, respectively. The group with the least respondents includes: Kenya Revenue Authority with 1, Finance Security Sector with 1 and the National Treasury with 1, respectively.

b) Cross-Impact Matrix

A cross-impact matrix was used to analyze the relationship between the different drivers identified through the Delphi process. This tool helps in understanding how changes in one driver can influence others, thus mapping the interdependencies within the cryptocurrency ecosystem. The key drivers were drawn from the results, highlighting those with high impact and interconnectivity. The analysis revealed the most influential factors that are crucial for the successful incorporation of cryptocurrency in Kenya (Gordon and Hayward, 1968).

4.4.2 Scenario development

Plausible scenarios based on the key drivers identified from the cross-impact matrix were developed. These scenarios represent different potential futures for the cryptocurrency ecosystem, having considered the various combinations and interactions of the key drivers.

5. Results and Discussions

This section presents the preliminary findings on the key factors that influence the role of cryptocurrency in facilitating access to financial services in Kenya.

5.1 Drivers of Change on the Incorporation of Cryptocurrency

5.1.1 PESTLE Analysis for Cryptocurrency in Facilitating Access to Financial Services

The study used PESTEL analysis to review and understand the factors/drivers that affect cryptocurrencies and their potential impact.

The following factors/ drivers were identified:

Table 5.1: PESTEL analysis of external factors

Framework	Drivers	References
POLITICAL	International co-operation regulatory policy	Lamberti and Plewnia (2019); Wang, Vergne, J. and Swain (2019); Chege (2021); Zohar (2015)
	Political stability	Rosales (2021)
ECONOMIC	Volatility in the exchange rate	Shaik, Rabbani, Nasef, Kayani and Bashar (2023); Yermack (2017)
	Transaction volume	Ghabri and Gana (2023); Omondi (2020)
	Investment trends	Yermack (2017); Bondarenko et al. (2019)
SOCIAL	Population usage	Foley, Karlsen, and Putniņš (2019)
	Trust perception	Bommer, Milevoj and Rana (2023)
	Awareness	Kamau (2022)
	Public attitude	Gagarina, Nestik and Drobysheva (2019)
	Financial inclusion	Muhleisen (2018); Ndung'u, (2019); Grohmann, Klühs and Menkhoff (2018)
TECHNOLOGICAL	Technological cost	Li and Wang (2017)

	Technological innovations (Big data, IoT, AI, and machine learning)	Nakamoto (2008)
	Cyber security measures	Sadiq, Aysan and Kayani (2023); Huang (2021); Gandal et al. (2018)
ENVIRONMENTAL	Energy consumption per transaction	Krause and Tolaymat (2018)
	Carbon footprint of cryptocurrency and traditional banking	Krause and Tolaymat (2018)
	Energy efficiency	Krause and Tolaymat (2018)
LEGAL	Number of legal cases reported	Wang, Vergne and Swain (2019) Foley, Karlsen and Putniņš (2019)
	Regulatory barriers	Srivastava, Singh and Rana (2024)
	Legal framework (CMA regulatory Sandbox)	Lamberti and Plewnia (2019)

Source: Authors (2024)

5.1.2 SWOT analysis of cryptocurrency in facilitating financial services in Kenya

Table 5.2 Presents a comprehensive SWOT analysis focusing on the role of cryptocurrency in enhancing financial services within the Kenyan context. This analysis examines both internal factors—strengths and weaknesses—and external factors—opportunities and threats—highlighting the strategic advantages and challenges posed by cryptocurrency adoption in Kenya's financial landscape.

Table 5.2: Analysis of internal factors: Strengths and weaknesses/ external factors: Opportunities and threats

SWOT	Assumptions
Strengths	100% Internet connectivity in Kenya will ensure all individuals get access to cryptocurrency trading platforms
	Kenya's high mobile phone usage and the success of M-Pesa demonstrates the country's technological advancement and readiness to adopt cryptocurrencies, providing a strong foundation for accessing and utilizing cryptocurrency platforms and services
	The public has already received training on how to use cryptocurrency platforms
Weaknesses	Lack of clear regulatory frameworks regarding cryptocurrency in Kenya
	High volatility of cryptocurrencies in their exchange rates against fiat currencies and other cryptocurrencies, influenced by factors such as market demand, investor sentiment, regulations, technology changes, economic trends, and media influence hindering its adoption.
	Technical complexities in wallet management and security practices
	Limited infrastructure for instance Internet connectivity and electricity in some parts of Kenya
Opportunities	Cryptocurrency will provide a faster and cheaper alternative for remittances
	Cryptocurrency will ensure financial inclusivity by reaching the underbanked and unbanked population in Kenya
	The blockchain technology will spur innovations in sectors such as insurance, lending, and identity verification
	Embracing blockchain technology and cryptocurrency will attract investment and foster Kenya's economic growth through entrepreneurship and the creation of job opportunities

Threats	Security threats such as cyber-attacks, phishing scams, malware, and social engineering, can lead to the theft of funds and sensitive information
	Regulatory risks include uncertainties and challenges from government policies, such as varying legal statuses, stringent compliance requirements, sudden policy changes, and unclear tax implications affecting cryptocurrency viability and operations
	Traditional banks may see cryptocurrencies as a threat and respond by lobbying for restrictive regulations, promoting negative perceptions, and enhancing their digital services to compete
	Misinformation and rumours about cryptocurrencies are generally negative, including false claims about scams, exaggerated risks, regulatory uncertainty, and technological misunderstandings that lead to fear and scepticism

Source: Authors (2024)

From the PESTEL and the SWOT analysis, the following drivers were identified:

Political Factors: Regulatory policies and political stability.

Economic Factors: Exchange rate volatility, transaction volume and investment trends.

Social Factors: Population usage, level of trust in cryptocurrency, awareness about cryptocurrency, public attitudes towards cryptocurrency, financial inclusivity among the underbanked and unbanked populations.

Technological Factors: Technological costs associated with cryptocurrency, Internet connectivity, innovation in the cryptocurrency sector (blockchain, IOT, AI, and machine learning) and cybersecurity measures

Environmental Factors: Energy consumption per transaction of cryptocurrency, carbon footprint of cryptocurrency compared to traditional banking and cross-border transactions.

Legal Factors: Reported legal cases related to cryptocurrency, regulatory barriers, and cybersecurity measures

5.1.3 The Delphi process results for rounds 1 and 2

The drivers initially identified were subjected to rounds of the Delphi process, wherein questionnaires were administered to key experts to determine the drivers with the highest impact on the cryptocurrency ecosystem in Kenya. From this process, six key drivers were identified as having the greatest impact: Regulatory Policy (RP), Exchange Rate Volatility (ERV), Level of Trust (LT), Awareness about Cryptocurrency (AC), Public Attitude about Cryptocurrency (PC), and

Cybersecurity Measures (CM). These six drivers were then further analyzed in a second round of the Delphi process to construct a cross-impact matrix.

Cross-Impact Analysis

A cross-impact analysis was done from the second Delphi process to identify the relationship between the factors identified. In the cross-impact analysis, a cross-impact table was developed by calculating the average means of the respondents' answers. Factors with the highest total score values indicate strong influence or dependence.

Table 5.3: Cross-Impact Table

	1: Regulatory Policies (RP)	2: Exchange Rate Volatility (ERV)	3: Level of Trust (LT)	4: Awareness about Cryptocurrency (AC)	5: Public attitudes towards cryptocurrency (PC)	6: Cyber Security measures (CM)	Sum
1. Regulatory Policies (RP)	0	2	3	2	2	2	11
2. Exchange Rate Volatility (ERV)	2	0	3	2	2	2	11
3. Level of Trust (LT)	1	2	0	3	2	2	10
4. Awareness about cryptocurrency (AC)	2	1	2	0	2	2	9
5. Public attitudes towards cryptocurrency (PC)	1	1	2	2	0	1	7
6. Cyber security measures (CM)	1	1	2	1	2	0	7
Sum	7	7	12	10	10	9	

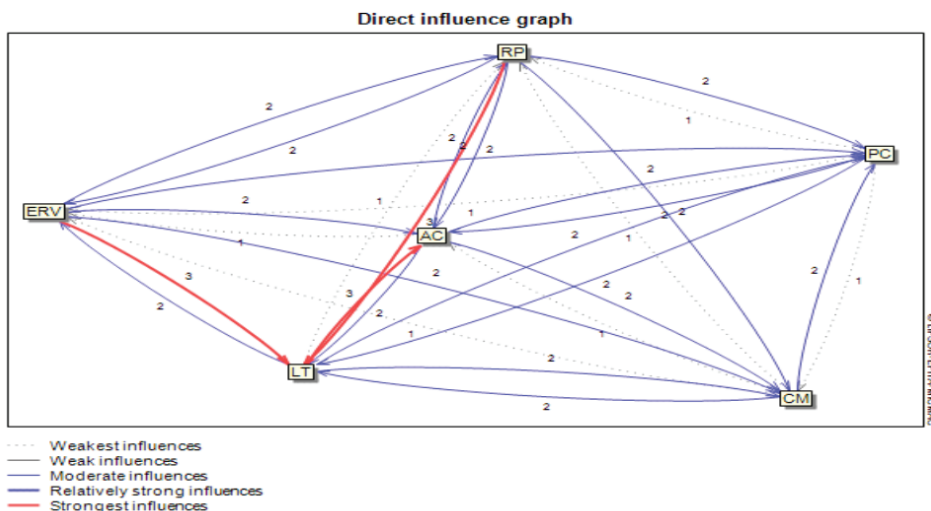
Source: Data Analysis Results (2024)

To identify the interrelationship between the drivers the MICMAC Software was used. This provided the direct influence graph and the direct influence map as shown below.

Direct Influence Relationship Graph

Figure 5.1 presents the Direct Influence Relationship Graph, which visually depicts the direct connections and influences among various factors within the study. This graph is essential for understanding the immediate impact each element has on the others, providing clear insights into the dynamics at play.

Figure 5.1: Direct influence graph



Source: Data Analysis Results (2024)

Key:

RP – Regulatory Policies

ERV – Exchange Rate Volatility

AC – Awareness of Cryptocurrency

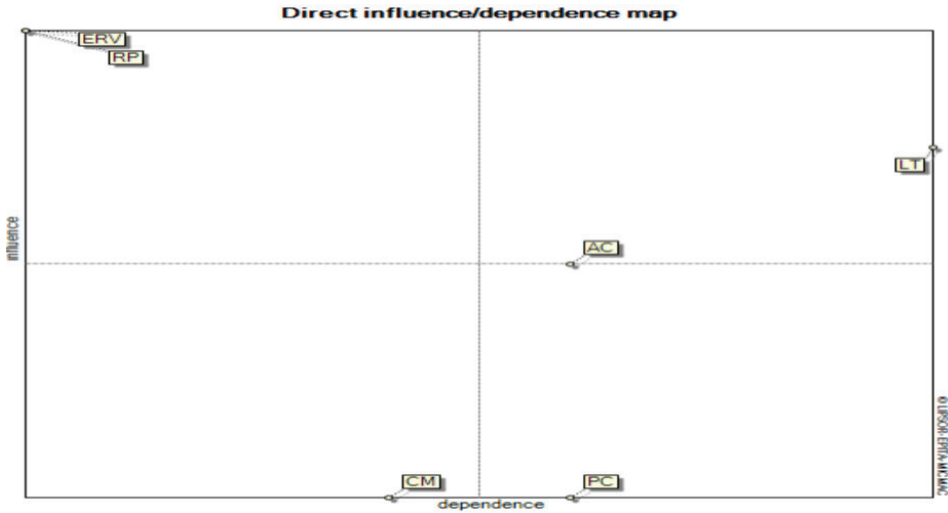
LT – Level of Trust

CM – Cyber security measures

PC – Public attitudes towards cryptocurrency

Direct Influence Relationship Map

Figure 5.2 presents the Direct Influence Relationship Map, showcasing the immediate impacts and interactions among various factors in the study. This map provides a clear visual representation of how different elements influence one another directly, highlighting the key relationships and their significance.

Figure 5.2: Direct influence map

Source: *Data Analysis Results, 2024*

Cross-impact analysis generates a quarter map divided into four quadrants representing the four types of variables as shown in the direct influence map. The difference between these variables lies in their influence and dependence (Alipour et al., 2017). The distribution of factors within one of the four quadrants of the influence map infers distinct aspects of the factor's impact, which is based on the varying level of the factor's influence and dependence (Arcade et al., 1999). The horizontal axis of the cross-impact matrix indicates the degree of dependency, and the vertical axis shows the extent of influence. The most important driving forces are the ones with high influence and the least dependency.

Quadrant I represents the relay factors. These factors are both highly influential and highly dependent on other factors. The relay factors, in this case, are the level of trust and awareness about cryptocurrency. To achieve high levels of trust and awareness education, campaigns, and advertisements play a very crucial role. A population that is well-educated about cryptocurrency makes informed investment decisions, hence building investor confidence. These factors play an important role in the adoption of cryptocurrency if the driving forces they depend on have a significant change.

Quadrant II represents the stable state where factors have high influence and low dependency. The factors in this case are exchange rate volatility and regulatory policy. A stable exchange rate volatility and robust regulatory policies that protect consumers, ensure that there is a safe and stable environment for sustainable development using cryptocurrency.

Quadrant III represents the unstable state/autonomous factors which have little influence and dependence on other factors, thus exerting negligible influence on cryptocurrency behaviours. The factor in this case is the cyber security measures taken. Low levels of cyber security measures lead to exposure to cyber-attacks.

These attacks lead to financial losses through direct theft, operational disruptions, reputational damage and regulatory penalties. The ripple effect is low consumer confidence, low investments and overall economic stability.

Quadrant IV represents the result factors that have low influence, and their dependence is highly sensitive to influence and relay factors. The factor in this case is public attitude about cryptocurrency. Positive sentiments lead to widespread adoption and investments in cryptocurrency while negative perceptions lead to limited usage, influencing market volatility and regulatory decisions.

5.2 Possible Future Scenario Analysis in the Incorporation of Cryptocurrency

The four quadrants give representations of scenarios that could occur in the future with regard to the adoption of cryptocurrency. In exploring the potential future scenarios for the incorporation of cryptocurrency in Kenya's financial services sector, it is crucial to consider the dynamic interplay of technological advancements, regulatory developments, and socio-economic factors. This analysis aims to project various possible futures where cryptocurrency could significantly enhance financial inclusion, streamline transactions, and foster economic growth. By examining trends in global cryptocurrency adoption, regulatory responses, and technological innovations, we can envision scenarios that range from widespread acceptance and integration of cryptocurrencies into everyday financial activities to cautious, regulated adoption aimed at minimizing risks. This forward-looking approach will help policy makers, financial institutions, and stakeholders anticipate challenges, leverage opportunities, and formulate strategies that harness the transformative power of cryptocurrency to improve access to financial services for all Kenyans.

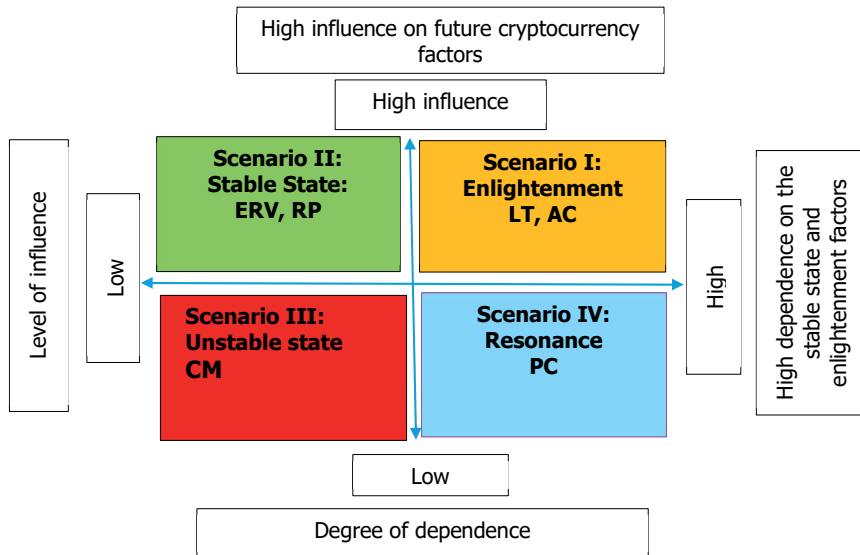
5.2.1 Scenario matrix

Scenario matrix provides a comprehensive framework for analyzing potential outcomes based on different variables. Figure 5.3 illustrates this matrix, offering a visual representation of the various scenarios considered in the analysis.

Figure 5.3: Scenario matrix

Source: Data Analysis Results (2024)

Scenario I: Enlightenment



The Enlightenment scenario is positioned on the top right quadrant. It represents the factors having high dependency and influence on cryptocurrency in facilitating access to financial services in Kenya by 2063. The future is driven by an enlightened population with high levels of awareness and trust in digital currencies. The key characteristics include widespread knowledge due to extensive educational initiatives, robust security measures and regulatory frameworks that foster public confidence. Financial inclusion by providing financial services for the unbanked and the underbanked. This leads to the widespread adoption of cryptocurrencies for everyday transactions. The results experience includes stimulated economic growth through reduced transaction cost and increased financial inclusion. Cryptocurrencies also help to empower marginalized communities, promote equity, and reduce poverty. Although challenges such as maintaining trust, ongoing education about cryptocurrencies and managing economic stability remains, the overall outlook indicates that profound impact where there is enlightened public perception and adoption of cryptocurrencies can be achieved by 2063.

Scenario II: Stable State

The stable state scenario is positioned on the top left quadrant characterized by high influence and low dependency. It envisions a promising future for Kenya in the cryptocurrency space by 2063. The stable state scenario presents robust regulatory policies and a stable exchange rate volatility rate. It presents a scenario that fosters a predictable and secure environment for using cryptocurrency and

promotes steady growth and integration into the financial system. Clear and comprehensive regulations protect consumers and ensure transparency, while stable exchange rates minimize risks thus fostering investor and user confidence. This results in increased sustainable growth, foreign investment, and benefits SMEs. It also ensures that there is financial inclusion by providing reliable services to the unbanked and underbanked population leading economic empowerment. Cryptocurrency enhances technological advancement. All these factors lead to growth in public confidence. Although there might be challenges in maintaining regulatory balance, technological integration and economic stability, the overall outlook shows steady progress and significant advancement in Kenya's financial landscape.

Scenario III: Unstable State

The unstable state scenario, located in the lower left quadrant, is characterized by low levels of cyber security measures presenting both challenges and opportunities for Kenya. Inadequate cybersecurity measures make Kenya highly vulnerable to cyber-attacks leading to financial losses, low levels of user trust, and disruptions in the market while increasing the prevalence of fraud and scams. Regulatory bodies struggle to manage evolving cyber threats that have the potential to cause economic instability due to reduced level of trust in digital systems and deterred investments. Opportunities for innovation arise driven by local technology companies and startups and increased investment in education to develop skills in cybersecurity. Collaborations between Kenya and international cybersecurity firms and government could further strengthen the security frameworks. The use of AI could play a crucial role in enhancing threat detection, automating responses, providing predictive analytics, and improving fraud detection. Leveraging on AI and investing in a robust cybersecurity measure could transform this scenario and foster a secure and stable environment for cryptocurrency. This results in the overall growth of the economy positioning Kenya as a leader in fintech innovation globally.

Scenario IV: Resonances

The Resonance scenario for Kenya in the cryptocurrency space is positioned in the bottom right quadrant. It depicts a situation where Kenya lacks significant influence but is highly dependent on public attitudes towards cryptocurrencies. This underscores the critical role of public perception in shaping the cryptocurrency market. Positive sentiments lead to widespread adoption and investments in cryptocurrency while negative perceptions lead to limited usage, influencing market volatility and regulatory decisions. Despite the potential for market growth and innovation, this scenario poses risks of increased volatility and regulatory uncertainty. Navigating these challenges requires continued focus on educational initiatives, good communication strategies and the development of a clear regulatory framework to foster positive attitudes and promote responsible participation in the cryptocurrency market by 2063.

6. Conclusions and Policy Recommendations

6.1 Conclusion

Cryptocurrencies offer a high potential for improving access to financial services in Kenya by overcoming traditional barriers such as inadequate banking infrastructure, high transaction costs and rigid regulations. They offer a secure, transparent, and efficient method for financial transactions, benefiting the unbanked and underbanked populations by facilitating access to services such as savings, loans, and investments. However, regulatory uncertainty hinders widespread adoption, creating challenges for business and investors due to unclear taxation, licensing, and consumer protection policies. In addition, cybersecurity issues which include frequent attacks on exchanges and digital wallets pose significant risks and undermine the level of trust in cryptocurrency platforms. Cryptocurrencies also face challenges of being very volatile, hence reducing investor confidence. Having robust regulatory frameworks, stabilizing cryptocurrencies to cater for their volatility, and enhancing cybersecurity measures are crucial for maintaining investor confidence and subsequently increase the level of adoption and longevity of cryptocurrency markets. Although limited public awareness and prevalent misconceptions about cryptocurrencies remain to be significant barriers in Kenya, looking at the potential of cryptocurrencies will help to shape people's attitudes, thereby increasing their level of trust. This will result in an increase in the adoption of cryptocurrencies and thereby a revolutionized financial sector.

6.2 Policy Recommendations

Policy recommendations were made from the insight gained from the scenario analysis, which aimed at addressing the challenges and leveraging on the opportunities within the cryptocurrency landscape. The recommendations were made to stakeholders who included the government, regulatory bodies, financial institutions and cryptocurrency businesses. The recommendations made promote sustainable growth and innovation in the cryptocurrency space.

To enhance the level of trust and awareness in Kenya, it is important for stakeholders to implement a dual approach that focuses on education and regulatory transparency. This includes launching nationwide educational campaigns to increase public understanding of how cryptocurrency works, their benefits and potential risks. These campaigns include workshops, digital campaigns, and collaboration with educational institutions to incorporate cryptocurrency education in the school curriculum. On the other hand, establishing a clear, and transparent regulatory framework protects consumers and ensures that the trading platforms are secure. Publicizing these regulations and their enforcement builds trust by demonstrating commitment towards user safety and market integrity. By combining education with robust regulations, these measures foster a more informed and confident public, thereby facilitating the adoption of cryptocurrency in Kenya.

It is also imperative to establish a comprehensive regulatory policy that ensures consumer protection and fostering innovation. This policy includes clear guidelines for cryptocurrency operations, mandatory compliance with security standards and regular audits of cryptocurrency platforms to mitigate risks that may arise. In addition to this, addressing the exchange rate volatility by having local stable coins pegged to the Kenyan Shilling can stabilize the value of cryptocurrencies, making them reliable for everyday transactions. Collaborating with international cryptocurrency exchanges to enhance liquidity and reduce volatility supporting a stable financial environment. These measures will create a secure and stable ecosystem that will encourage the use of cryptocurrencies and improve financial inclusion in Kenya.

Establishing a national cyber security framework tailored to the unique challenges of cryptocurrency transactions is essential. This framework needs to incorporate strict security protocols for cryptocurrency platforms, which include multifactor authentication, encryptions, and regular security audits. In addition, creating a public-private partnership constructive collaboration for the purpose of sharing information on emerging cyber threats and best practices can enhance the overall security infrastructure. Investing in cybersecurity training programmes and campaigns will further improve defences against cyber-attacks. This ensures that users can transact using cryptocurrencies with confidence in the safety and integrity of their transactions.

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