Czech University of Life Sciences Prague

Faculty of Economics and Management

Department of Economics

Master's Thesis

Impact of Cryptocurrency on SMEs in Nigeria; A Case Study of SMEs in Lagos State

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Impact of Cryptocurrency on SMEs in Nigeria; A Case Study of SMEs in Lagos State

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Objectives of thesis

The aim of the study is to explore the impact of cryptocurrency on SMEs in Nigeria. The objectives are to:
1. Determine the level of adoption of cryptocurrency by SMEs in Nigeria
2. Determine the factors affecting the adoption of cryptocurrency among SMEs in Nigeria
3. Examine the impact of cryptocurrency on income of SMEs in Nigeria
4. Evaluate the challenges of cryptocurrency use by SMEs in Nigeria

Methodology

A mixed research design will be used to gather quantitative and qualitative data from both primary and secondary sources. Primary data will be collected using an internet-administered questionnaire while secondary data will be collected from published cryptocurrency statistics, SME data from Nigeria Bureau of Statistics and Central Bank of Nigeria. Descriptive and inferential statistics such as ANOVA and multiple regression will be used to analyse the data using SPSS version 26.

The proposed extent of the thesis

60 – 80 pages

Keywords

Cryptocurrency, blockchain, SME, technology, adoption, income, revenue, growth, Nigeria

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Recommended information sources

Bracci, E., Tallaki, M., Ievoli, R. and Diplotti, S., 2021. Knowledge, diffusion and interest in blockchain technology in SMEs. Journal of Knowledge Management.

Khadka, R., 2020. The impact of blockchain technology in banking:

LeBlanc, G., 2016. The effects of crytocurrencies on the banking industry and monetary policy.

Manurung, R. and Paath, D.K., 2020. Utilization of the Digital Cryptocurrency Model Bitcoin as a Payment System for the Development of Micro, Small and Medium Enterprises (MSMEs). Solid State Technology, 63(3): 4178-4190.

Mazikana, A.T., 2018. The impact of cryptocurrencies in Zimbabwe. An analysis of bitcoins. An Analysis of Bitcoins.

Nuryyev, G., Wang, Y.P., Achyldurdyyeva, J., Jaw, B.S., Yeh, Y.S., Lin, H.T. and Wu, L.F., 2020. Blockchain technology adoption behavior and sustainability of the business in tourism and hospitality SMEs: An empirical study. Sustainability, 12(3): 1256.

Roos, C., 2015. The motivation and factors driving crypto-currency adoption in SMEs (Doctoral dissertation, University of Pretoria).

Roussou, I. and Stiakakis, E., 2016, June. Adoption of digital currencies by companies in the European Union: a research model combining DOI and TAM. In 4th International Conference on Contemporary Marketing Issues (ICCMI) (pp. 163-168).

Treiblmaier, H., 2021. Will blockchain really impact your business model? Empirical evidence from Slovenian SMEs. Empirical evidence from Slovenian SMEs (November 18, 2021).

Wörner, D., 2017. The Impact of Cryptocurrencies on the Internet of Things-Insights from Prototypes (Doctoral dissertation, ETH Zurich).

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Declaration

I declare that I have worked on my master's thesis titled "Impact of Cryptocurrency on SMEs in Nigeria; A Case Study of SMEs in Lagos State" by myself and I have used only the sources mentioned at the end of the thesis. As the author of the master's thesis, I declare that the thesis does not break any copyrights.

In Prague on 31 /03 /2023 _____

Akintola Bartholomew Akintayo

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Abstract

This research study investigates the impact of cryptocurrency on small and medium-sized enterprises (SMEs) in Lagos, Nigeria. The study uses a quantitative approach and collected data through a structured survey questionnaire from 300 SMEs. The results indicate that facilitating conditions, effort expectancy, and perceived risk are significant factors affecting the adoption of cryptocurrency by SMEs in Lagos, Nigeria. Facilitating conditions, such as availability of technology, infrastructure, and supportive regulations, have a positive impact on the adoption of cryptocurrency by SMEs. Effort expectancy, which refers to the perceived ease of use of cryptocurrency, also has a positive impact on adoption. However, perceived risk associated with cryptocurrency has a negative impact on its adoption by SMEs in Lagos, Nigeria. The study concludes that policymakers and regulators should focus on creating a supportive environment for the adoption of cryptocurrency by SMEs. This includes improving technology infrastructure, promoting regulations that safeguard against risks, and increasing awareness of the benefits of cryptocurrency adoption. SMEs should also be encouraged to explore and adopt cryptocurrency as it has the potential to increase their financial inclusion, reduce transaction costs. Due to the volatility concerns in Cryptocurrency, the study also investigated the relationship between income of SMEs in Lagos state Nigeria and bitcoin volatility index, and there was no consistent relationship.

Keywords: Cryptocurrency Adoption, SMEs, Bitcoin, Price Volatility, Income, Regression, Correlation.

Abstrakt

Tato výzkumná studie zkoumá dopad kryptoměn na malé a střední podniky (MSP) v Lagosu v Nigérii. Studie využívá kvantitativní přístup a sbírá data prostřednictvím strukturovaného dotazníku od 300 malých a středních podniků. Výsledky ukazují, že usnadňující podmínky, očekávané úsilí a vnímané riziko jsou významnými faktory ovlivňujícími přijetí kryptoměny malými a středními podniky v Lagosu v Nigérii. Usnadňující podmínky, jako je dostupnost technologie, infrastruktura a podpůrné předpisy, mají pozitivní dopad na přijetí kryptoměn malými a středními podniky. Očekávané úsilí, které se týká vnímané snadnosti používání kryptoměny, má rovněž pozitivní dopad na její přijetí. Vnímané riziko spojené s kryptoměnou má však negativní dopad na její přijetí malými a středními podniky v nigerijském Lagosu. Studie dochází k závěru, že tvůrci politik a regulační orgány by se měli zaměřit na vytvoření příznivého prostředí pro přijetí kryptoměn malými a středními podniky. To zahrnuje zlepšení technologické infrastruktury, podporu předpisů, které chrání před riziky, a zvýšení povědomí o výhodách přijetí kryptoměn. Malé a střední podniky by také měly být podporovány v tom, aby prozkoumaly a přijaly kryptoměny, protože mají potenciál zvýšit jejich finanční začlenění, snížit transakční náklady. Vzhledem k obavám z volatility kryptoměn studie zkoumala také vztah mezi příjmy malých a středních podniků v nigerijském státě Lagos a indexem volatility bitcoinů, přičemž nebyl zjištěn žádný konzistentní vztah.

Klíčová slova: přijetí kryptoměn, malé a střední podniky, bitcoin, volatilita cen, příjmy, regrese, korelace,

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1. Introduction

As the year passes by, the monetary system has change progressively from the local bartering to the money that we use today. The introduction and later development of technology played a major role in the evolution. The 21st century, commonly known as the "century of the digital economy," saw significant technological innovation. From the use of fiat currency to electronic/digital and virtual currencies, the financial sector has greatly benefited from technology advancements. With the advent of cryptocurrencies, a wide range of opportunities have once more emerged in the current Age of the Internet. In summary, Cryptocurrency is designed to work as medium of exchange. The primary concern and driving force behind Bitcoin, the first cryptocurrency, was to displace fiat money. Gilpin argued that the purpose of cryptocurrency was to remove financial authority from the government and central bankers and reassign it to the people's control (Gilpin, 2014). Nonetheless, it will probably be a very long time before cryptocurrencies totally replace fiat money.

Even while change is unavoidable, it doesn't happen instantly. Cryptocurrencies need "cryptography" in order to protect and validate transactions, as well as control the creation of new units of currency. In the current period, cryptography is the study of mathematical techniques for defending digital information, systems, and distributed computations from adversarial attacks (Katz & Lindell, 2020). “Cryptocurrencies utilize cryptographic protocols, or very complicated coding systems, to safeguard their units of trade. These protocols are based on cutting-edge mathematics and computer engineering concepts that make them almost tough to crack, making it difficult to replicate or falsify cryptocurrencies” (Martucci, 2018).

As a peer-to-peer, decentralized cashless system built on blockchain technology, cryptocurrency enables payments to be transmitted from one peer to another over the internet (Chuen, 2015). The study conducted by a number of scholars (Ablyazov et al., 2019; Nadeem et al., 2021) ascertained that cryptocurrencies are a reliable, low-cost, and quick way of international money transfers utilized for online transactions. After the creation of a Bitcoin whitepaper in 2008, Bitcoin was the first cryptocurrency launched in 2009 (Luther, 2016).

According to Scardovi (2017), Cryptocurrencies and other forms of digital financial technology will upend established international economic structures.

Small and medium-sized businesses (SMEs) are undeniably important to Nigeria's economy. Unfortunately, a multitude of environmental restrictions, such as a lack of essential infrastructure, unreliable power supplies, unfavourable economic policies, and theft and robbery, have hindered their survival, growth, and success. (Basil, 2015) Also, they have struggled with providing client balances after purchases, managing business money without separating personal expenses from business earnings, receiving counterfeit Naira notes, being unable to conduct cross-border transactions owing to issues with banking services, etc. (Adepoju 2013). These problems have caused a great deal of anxiety since they have forced the closure of many SMEs in our society.

Yet, bitcoin has been proposed to allow a number of financial services that benefit both company organizations and individual users, with the potential to address some of the aforementioned challenges facing SMEs.

The majority of industrialized nations, including the United States, Canada, the Netherlands, and Australia, use cryptocurrencies extensively (Scott, 2016). While evidence suggests that Bitcoin has received widespread acceptance in these developed nations, developing economies like Nigeria have not yet seen the same degree of adoption.

In order to comprehend the effects of cryptocurrencies on Small and Medium Businesses (SMEs) in Nigeria, this research will use Lagos State as a case study.

2. Objectives and Methodology

2.1 Objectives

The aim of this study is to explore the impact of cryptocurrency on SMEs in Nigeria. The objectives are to:

1. Determine the level of adoption of cryptocurrency by SMEs in Nigeria
2. Determine the factors affecting the adoption of cryptocurrency among SMEs in Nigeria
3. Examine the effect of bitcoin price volatility on income of SMEs in Nigeria

2.2 Research questions

The following research questions were asked to guide the research

1. What is the level of adoption of cryptocurrency by SMEs in Nigeria?
2. What are the factors affecting the adoption of cryptocurrency among SMEs in Nigeria?
3. How does bitcoin price volatility affect the income of SMEs in Nigeria?

2.3 Methodology

Descriptive research design was used to gather quantitative data from both primary and secondary sources. Primary data was collected using an internet-administered questionnaire while secondary data was collected from published cryptocurrency statistics, SME data from Nigeria Bureau of Statistics and Central Bank of Nigeria, Information on inclusion criteria of SMEs and also published articles on cryptocurrency policies articles was gotten from the secondary sources. Descriptive and inferential statistics such as ANOVA and multiple regression was used to analyse the data using SPSS version 26. The regression analysis was conducted to determine the factors that affect the adoption of cryptocurrency. The dependent variable is adoption of cryptocurrency while the independent variables are intention to use, performance expectancy, facilitating conditions, social influence, effort expectancy, perceived risk and financial literacy.

The correlation analysis was also conducted to determine if the volatility of cryptocurrency affects the income of SMEs using a Time period of 10years this was done by determining the linear relationship between Bitcoin price volatility and income of SMEs (in naira).

2.4 Research Design

Research approaches are techniques and strategies used to create specific strategies for data collecting, analysis, and interpretation that are derived from general premises. (Cresswell, 2014). The sort of information the writer needs to address the main research topic will determine the research technique that should be used. It is vital to choose the study design (qualitative, quantitative, or mixed methodologies) before beginning to gather primary data. Open-ended and communicative data are collected and understood using qualitative approaches, such as focus groups, ethnographic research, ethnographic case studies, and interviews.

By examining the links between variables and the numerical and statistical data that is typically gathered through surveys or questionnaires, quantitative techniques are utilized to test for objective hypotheses. Using a quantitative and qualitative technique, known as "mixed methods," this makes it easier to evaluate the data and get a greater knowledge of the study subject. (Cresswell, 2014).

The descriptive research approach was utilized to gather the primary data, and an online survey was employed to help answer this research question. By examining a sample of the indicated population, a survey design analyses numerical or quantitative trends, attitudes, or views of a population (Creswell, 2014). The survey's sample results were then extrapolated or generalized to the entire population. Questionnaires were utilized since it is simpler to gather and aggregate a lot of data from the audience and use it to better understand how bitcoin is affecting Businesses in Nigeria. Surveys assisted in determining what worries SMEs about bitcoin adoption and what can be done to promote cryptocurrency adoption. This is because the belief in, and adoption of cryptocurrency by the participants of the survey (as well as the rest of the world) are a major influencing factor of the potential growth of cryptocurrency in the future.

A major benefit of gathering data through surveys is that it can be done remotely via a computer screen, making it possible to do so at a lower cost and with a broader audience. Also, to stop the COVID19 pandemic from spreading further, it is important to avoid large gatherings of people.

2.4.1 Target Population

The population for this study consists of all SMEs in Lagos State Nigeria. It is important that all the respondents have experience with cryptocurrency whether directly or indirectly.

2.5 Sampling Design

Sampling is the process of choosing a number of units of analysis for a research so that the results reflect the population from which the units were chosen (Mugenda and Mugenda, 2008).The SMEs were chosen for the study using a random sample approach to obtain information.Israel (2013) asserts that the degree of accuracy, the degree of confidence, and the degree of variability all influence the sample size.300 SMEs in all were chosen for this study's purposes.

2.6 Data Collection Instrument

The process through which a researcher gathers information for a study is known as data collection (Creswell, 2002). The stage of data collection describes the type of data being gathered for the study, whether it is primary or secondary, the data collection tool being utilized, and the timeframe for collecting the data.The study employed primary data to supply details that were used to analyze the data. A questionnaire was used as the primary data collection instrument, and was semi-structured with the structured part While the open-ended portion supplied information not available in the structured sections, the consistent answer enabled easier data analysis,because they provided data crucial to the study and provided researchers with first-hand knowledge for analysis, questionnaires are crucial data gathering tools. Mugenda and Mugenda (2003) asserted that questionnaires give thorough answers to the issues being studied.Moreover, questionnaires have gained popularity as a technique of data collecting due to their relative simplicity in preparation, delivery, and cost efficiency. The validity of the

instrument was tested using pre-test and face validity to make sure it measured the items it was intended to measure..

2.7 Data Analysis

The acquired data is coded, processed, cleaned, and tabulated during the data analysis stage.At this phase, the study used both quantitative and qualitative data analysis methodologies to analyze the data in order to respond to the research questions.Descriptive statistics for univariate variables (in the form of means and standard deviation) and bivariate analysis, which was carried out through regression analysis, were included in quantitative analysis approaches.Using the SPSS software program version 26, the analysis of the univariate and bivariate statistics was carried out.Tables and charts were used to display the results.

2.7.1 Regression Analysis

The regression analysis was conducted to determine the factors that affect the adoption of cryptocurrency.

Dependent variable (Y) = Adoption of Cryptocurrency

Independent variables (X) are facilitating conditions, effort expectancy and perceived risks.

Multiple Regression equation is provided as:

$$Y = b_o + b_1X_1 + b_2X_2 + \cdots + b_kX_k + u \quad (1)$$

Where Y = Adoption of Cryptocurrency

bo= Constant

b1, b2,…,bk = the regression coefficients which interpret the effect of X on Y

X = independent variables

X1 = facilitating conditions

X2 = effort expectancy

X3 = perceived risk

u = error term

2.7.2 Correlation analysis

The correlation analysis was also employed to determine the influence of the bitcoin price volatility on sales of SMEs in Nigeria

Correlation equation used is:

$$r_{xy} = \frac{\Sigma(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Sigma(x_i - \bar{x})^2 \Sigma(y_i - \bar{y})^2}} \quad (2)$$

Where:

r_{xy} – the correlation coefficient of the linear relationship between the variables x (bitcoin price volatility) and y (sales of SMEs)

x_i – the values of the x-variable in a sample

$\bar{x}$ – the mean of the values of the x-variable

y_i – the values of the y-variable in a sample

$\bar{y}$ – the mean of the values of the y-variable

3. Literature Review

3.1 Cryptocurrency

Till this day, Satoshi Nakamoto, an undisclosed person, created Bitcoin, by far the most famous cryptocurrency in the world, in 2008. (DeVries, 2016). Cryptocurrency is an encrypted digital currency used in exchange networks to conduct secure and private peer-to-peer transactions. Bitcoin is a form of cryptocurrency that is not electronic money, because digital money is simply money deposited into an account through a point-of-sale terminal or bank, whereas cryptocurrency is an asset produced through the internet that is not associated with any traditional currencies (Bondarenko et al., 2019). Although Bitcoin's structure has stayed consistent since its inception in 2009, the effect of constantly evolving and rapidly increasing global markets has resulted in greater market demands for cryptocurrencies than was anticipated in 2009 (DeVries, 2016). The primary cause of this spike in demand is the enormous rise in the price of cryptocurrencies, particularly Bitcoin, which has increased by more than 500% since April 2017, when the first significant awareness of cryptocurrencies emerged (Conti et al., 2017). As a result, the public sought to profit from Bitcoin's weakness, causing cryptocurrency awareness and use to skyrocket. Another explanation for the rise in market is the decentralization of cryptocurrencies, including one that suggests people can have self-control over their assets, as opposed to centralized authorities, such as banks, which control your assets without the user knowing where it is going or what it is used for (ibid). A further reason for this is the growing popularity of the digital space and digital technologies, which facilitate daily processes by making them safer, faster, and more trustworthy, such as making investments, lending, paying, and so on (Bondarenko et al., 2019). There are numerous services and platforms that indicate and update information about cryptocurrencies (such as cryptocurrency prices, articles, upcoming Initial Coin Offerings, and so on), and Coinmarketcap is the most popular and user-friendly platform for tracking cryptocurrency information. The market capitalization of a cryptocurrency is one variable that determines its "prominence," which is measured by multiplying the total number of circulated coins by the existing market value of one coin.

3.2 Blockchain

The Satoshi Nakamoto used the blockchain as a necessary part of cryptocurrency after it was proposed in 2008 and executed in 2009 (Wang et al., 2018). The blockchain is an open record that records all cryptocurrency peer-to-peer transfers in the form of blocks (Al-Essa, 2019). Asymmetric cryptography and a consensus mechanism algorithm underpin the blockchain (ibid.). Transactions in blockchain technology are not based on trust, but rather on the evidence of the two or more users engaged in the cryptocurrency business process, continuing to make a third-party data redundancy (ibid). Furthermore, blockchain technology can work in a decentralized setting by incorporating some of the core technologies, like the cryptographic hash, the cryptographically signed (which refers to the asymmetric cryptography mechanism), and a transmitted consensus mechanism, all of which contribute to the confirmation of a transaction (Wang et al., 2018). Because of these attributes, the blockchain can continue to stay effective and trustworthy while significantly lowering the costs of monetary operations, which is a tendency that our world is heading toward. Bitcoin and cryptocurrencies are still the most popular blockchain applications today. Fig1.0 below depicts how transfers are recorded and implemented on the blockchain. In general, blockchain technology is recognized for four main traits (Wang et al., 2018).

1. Decentralization: is any peer-to-peer transfer that does not involve a centralized system.

2. Immutability: is the difficulty of adapting and modifying previously verified and existing details on the blockchain. Any forgery would be easily detected.

3. Auditability: refers to the ease with which previous transactions can be traced because they have been validated and documented alongside the transaction's details on the blockchain. This makes tracing previous transactions easier.

4. Anonymity: refers to the lack of a central party which keeps records of a user's information, thereby providing each user with privacy. Blockchain privacy, on the other hand, is not constantly assured due to inherent constraints.

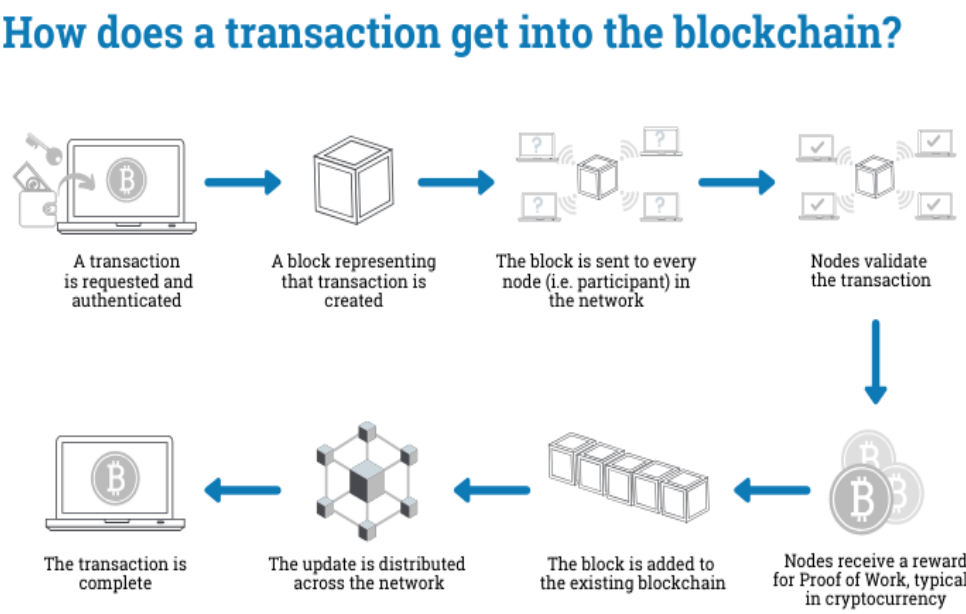


Fig 1.0 How transactions get into Blockchain (source: Euromoney Learning 2020)

3.3 Mining

Many different methods for creating cryptocurrencies and releasing them into business circulation for buying and trying to trade. One method of generating cryptocurrency is through "mining," a process by which more Bitcoin, Monero, Ethereum Classic, and other cryptocurrencies are cleared into business circulation (Aljabr et al., 2019). Bitcoin will be used as an example to describe the cryptocurrency mining process. Bitcoin mining is associated with the blockchain, which documents bitcoin and other cryptocurrencies in the number of blocks, each of which includes a hash value and the previous block's hash value (Eyal & Sirer, 2013). A legitimate component on the blockchain includes an answer to a complicated arithmetical brain teaser involving the hash of the previous block, the hash of the exchanges in the current block, and a Bitcoin address to which benefits for figuring out the solution will be sent. A node (a powerful computer operating the Bitcoin software and the blockchain) is used to generate an additional block and find a suitable and unused hash, and this process is known as Bitcoin mining (Eyal & Sirer, 2013). The miners then try to get the "solid evidence," and the initial node

that fixes the abstract numerical brain teaser and reveals the hash is compensated with 6.25 BTC (as of the time of the study), which is the way new Bitcoins are released into market circulation, which happens every ten minutes and usually takes up plenty of memory space and energy. Some other widely known way to generate cryptocurrency tokens involves the crafting algorithm, that also uses "proof-of-stake" consensus rather than "proof-of-work" and is typically regarded efficient, more environmentally friendly, and less energy-intensive, trying to make it a lower priced and more viable option (Popov, 2016).

3.4 Characteristics of Cryptocurrencies

To comprehend why cryptocurrencies are so revolutionary, it is necessary to examine the qualities that elaborates the reason this asset has the possibility of influencing global markets in the long term and integrate it into people's daily lives.

3.4.1 Decentralization

Decentralization in the context of cryptocurrencies means that the network is not under the control of a single organization or group, and that the cryptocurrency's owner has complete power over it (Fang et al., 2021). One of the primary reasons why people use cryptocurrencies is due to their decentralized nature, which makes them more appealing to the general public (Radivojac & Gruji, 2019), and why it might one day be used in the financial sector. The public will find it appealing since consumers have complete control over their money and are free from concern that a bank or the government won't be able to provide them with the entire sum due, in the event of a possible bank failure or a weak government economic (ibid). Additionally, this implies that anyone can now buy products and services without the government being aware of the transaction.

However, the Financial Crimes Enforcement Network, the FBI, and others have speculated extensively about this, as decentralized transactions have enabled illegal activities such as money laundering, drug sales, weapon smuggling, and so on (Radivojac & Gruji, 2019). Sadly, unless the government of a country accepts and supports cryptocurrencies, it will be nearly impossible for everyone to switch to using only cryptocurrencies. (Frebowitz, 2018). This

is because it would be challenging for the government to monitor employees' salaries in their country, employees could avoid paying taxes on their salaries this way. The decentralized feature of cryptocurrencies would be eliminated if the government had a mechanism to monitor the financial inputs and outflows of an individual's account. In general, decentralization makes cryptocurrencies more secure and private because users may fully control their finances as transactions are pseudonymous. (Frebowitz, 2018).

3.4.2 Security of Cryptocurrencies

The adoption and expansion of bitcoin use in the future are significantly influenced by the security of cryptocurrencies. The blockchain and mining, consensus, and key management are the three components that go into determining cryptocurrency security (Conti et al., 2017). The blockchain supports cryptocurrencies by including the full history of network transactions in its open ledger. Due to changes in the hash values of the current and succeeding blocks, tampering with data that has already been placed on the blockchain is practically impossible. As a result, security is guaranteed because hackers cannot alter data that has already been uploaded to the blockchain. The blockchain is regulated by the miners, who, for instance, must solve a mathematical crypto puzzle to certify the production of a block that will be added to the blockchain. The consensus protocol is also known as the Proof-of-Work (PoW) consensus algorithm (Conti et al., 2017). PoW is a decentralized consensus system in which a complex mathematical puzzle must be solved in order to create a block on the blockchain and be rewarded for it (Conti et al., 2017). Furthermore, because mining requires a time and money investment to begin, it incentivizes miners to be fair with their work in the blockchain because if there is any cheating, the miner will be permanently banned from the Bitcoin network and would consequently lose money on their initial investment. Additionally, this prevents any cryptocurrency user from having complete control over the blockchain because even users with large amounts of cash are unable to sway the actions of the entire network (Conti et al., 2017). In general, PoW maintains complete decentralization while managing the high scalability of nodes that want to participate in mining.

Key management describes how a cryptocurrency user can increase system security by controlling their public and private keys. The advantage of a private key is that hackers cannot

steal Cryptocurrency from an account unless they have the user's private key, as they do not have access to spending the cryptocurrency in through digitally signed transactions (Conti et al., 2017). Since the private key is typically kept offline, obtaining it becomes exponentially more difficult for the hacker. Furthermore, using the hash of the public key to receive transactions from others provides the user with anonymity and cannot be used to hack into the user's system (Conti et al., 2017).

3.4.3 Trust factors of Cryptocurrencies

The willingness of a person to be vulnerable to the acts of another party is referred to as ‘trust’, assuming that the other party will fulfil its obligations to the trustor without the trustor's involvement or supervision (Marella et al., 2020). The public's trust in cryptocurrencies is critical for their continued adoption, use, and growth. More specifically, users' trust in the underlying technology of cryptocurrencies determines trust in cryptocurrencies. This is because, unlike financial intermediaries (such as banks), which are backed up by legislation and central government institutions, cryptocurrencies are only backed up by the proper operation of their current technologies, which are the blockchain, cryptocurrency wallets, and cryptocurrency exchange systems. (Marella et al., 2020).

The blockchain does not allow previously inserted data to be falsified, cryptocurrency wallets can be kept on external software, and cryptocurrency exchange systems require extensive verification before funds can be transferred to another wallet, and all these three factors contribute to the increased trust in cryptocurrencies. Although there is a great deal of literature on trust, research on trust in technology is scarce but in high demand. One of the most important questions to be addressed is how to increase public trust in cryptocurrencies, which will lead to cryptocurrency adoption and integration into everyday tasks. Marella's research paper revealed a wealth of useful information about trust in cryptocurrencies and their technologies, with Bitcoin serving as the primary example (Marella et al., 2020).

The main characteristics that create trust in cryptocurrencies such as Bitcoin are coin transfers, immutability, openness, and decentralization (Marella et al., 2020). Transferring Bitcoin is faster than transferring fiat currencies, according to users. The inability to falsify

information on the blockchain is referred to as immutability. The term "openness" refers to information that is publicly available on the blockchain. The openness, immutability, and blockchain structure of cryptocurrency technology contribute to trust in Bitcoin. Increased awareness of these factors should increase people's trust in cryptocurrencies and make them more likely to use them.

Similarly, this study found that cryptocurrency stability, regulation, security, and knowledge would make it a reliable technology, resulting in increased adoption. The term "stability" alludes to the volatility of Bitcoin, and having more stable Bitcoin and other cryptocurrency prices would make it more reliable. Regulation is the legal regulation of Bitcoin. Security is the enhancement of security protocols for bitcoin exchange platforms and wallets, which increases the dependability of Bitcoin. Knowledge refers to understanding of Bitcoin technology, which would increase its trustworthiness by allowing users to make better investment decisions, resulting in higher profits.

The factors that contribute to Bitcoin's stability and regulation cannot be changed because it is still a digital asset, and adding regulations would centralize Bitcoin and other cryptocurrencies and possibly cause more people to give up their cryptocurrency holdings, which would have a negative effect on the adoption and utilization of cryptocurrencies in the future. The underlying technology is what ultimately determines a person's trust in cryptocurrencies, according to analysis on the trust factors of cryptocurrencies. A greater understanding of cryptocurrency technology will further increase public trust and awareness, resulting in cryptocurrency adoption (Marella et al., 2020).

3.4.4 Privacy System in Cryptocurrencies

One of the main drivers of cryptocurrency success in the financial markets is the user's privacy and confidentiality when using and acquiring cryptocurrencies. Cryptocurrencies such as Bitcoin are pseudonymous in the sense that each Bitcoin user has a unique address that cannot be publicly identified (unless the user publicly shares their address) and serves as a pseudonym when making transactions (Conti et al., 2017). As a result, unless a Bitcoin's public keys or hashes are revealed to the public, recognising a cryptocurrency user is difficult, which gives

cryptocurrencies a benefit over central authorities, which have access to users' money and store their customers' identification details. However, not all cryptocurrencies are more anonymous and pseudonymous than others, such as ZeroCash (Zcash), which is a decentralized coin that employs an upgraded version of the zero-knowledge-proof algorithm called zk-SNARKs (ZeroKnowledge-Succinct Non-Interactive Argument of Knowledge), and adheres to strict privacy rules by not disclosing sensitive transaction data, such as the amount and recipient address (Alsalami & Zhang, 2019; Conti et al., 2017).

Another decentralized cryptocurrency that prioritizes anonymity for cryptocurrencies and user privacy protection is Monero (XMR) (Alsalami & Zhang, 2019). Monero uses ring signatures and stealth addresses, which conceal the sender and recipient's identities and make transactions harder to track. A ring signature is a type of digital signature where anyone in the group can sign on its behalf because there are no trusted managers involved. Ring Confidential Transaction is a further privacy feature that Monero has developed (RingCT), It provides consumers with even more privacy and lower transaction fees because it conceals transaction amounts. The existence of ZeroCash and Monero benefits cryptocurrencies since they enable new privacy technologies and standards and can alter how the general public views cryptocurrencies' privacy.

Sadly, pseudonymous addresses are the only reason Bitcoin has privacy and can be hacked using a variety of methods, including site spidering, IP address monitoring, payment tracking using blockchain analysis, and IP address monitoring, etc (Conti et al., 2017). It can be challenging and expensive to restore this privacy aspect once a user's identity has been discovered. Nonetheless, without altering the core technologies of cryptocurrencies, it is still possible to increase user privacy and anonymity. Protocols for peer-to-peer mixing are one approach to achieve this. Through the process of mixing, a user's funds are divided into smaller sums and then randomly mixed with random cryptocurrencies owned by other random users, leaving the original user with completely different cryptocurrencies. This helps to break the link between the user and the coins they bought, resulting in user anonymity (Alsalami & Zhang, 2019). Existing third-party mixing methods, like MixCoin, allow users to send their money there and then obtain back an equal amount from another user, maintaining tight anonymity from

outside entries. The public's perceived privacy worries would be eliminated if cryptocurrency technology could fully protect its users, which would definitely enhance adoption and awareness of cryptocurrencies (Alsalami & Zhang, 2019).

3.5 Applications of Cryptocurrencies

With increased knowledge and acceptance of cryptocurrencies, their applications have continued to grow, and many daily activities now entail the use of cryptocurrency due to its advantageous technological qualities when compared to previously used commodity services (Nagpal, 2017). The most common application of cryptocurrency is in financial and payment services. These services range from buying goods and services to sending or receiving money. They also include investing in digital assets and trading cryptocurrencies.

To begin with, cryptocurrency allows users all over the world to invest in any digital asset and potentially earn a return on their investment, which is the ultimate goal of any investor (Chuen et al., 2017). Users begin to notice a change in the value of their investment when the price of the purchased cryptocurrency changes. For example, if the cost of a cryptocurrency increases from the amount the customer paid when they first purchased it, the user is profiting from their investment, and vice versa. Similar to how commodities trade on the stock market, the market determines a cryptocurrency's value based on supply and demand (Nagpal, 2017). According to Mikhaylov (2020), "Cryptocurrency Market Analysis from an Open Innovation Perspective," investor sentiment is what drives the cryptocurrency market's volatility. When a user notices a rise in a cryptocurrency's price, they have a positive investor sentiment, which leads to an increase in demand for that token.

Due to its price volatility, cryptocurrency might be an appealing investment, making it riskier, which is less obvious with alternatives to investing, such as stock investments, foreign exchange investments, etc. which have lower volatility and risk. (Chuen et al., 2017). The number of bitcoins that will ever be created is limited to 21 million, 18.7 million of which have already been mined. This means that bitcoin is scarce, giving it "intrinsic" value, which may affect the price (Brekke & Fischer, 2021).

Higher reward equates to greater risk. This usually holds true for conventional asset types over the long run. What about bitcoin, though? Figure 3.1 below displays the average annualized return of traditional asset classes since July 2010 and bitcoin since that same month (when bitcoin started trading exchanges) to 2020. The annualized return on bitcoin over this time span is a staggering 340%. With such an average return, it is clear that bitcoin is not like other traditional asset classes.

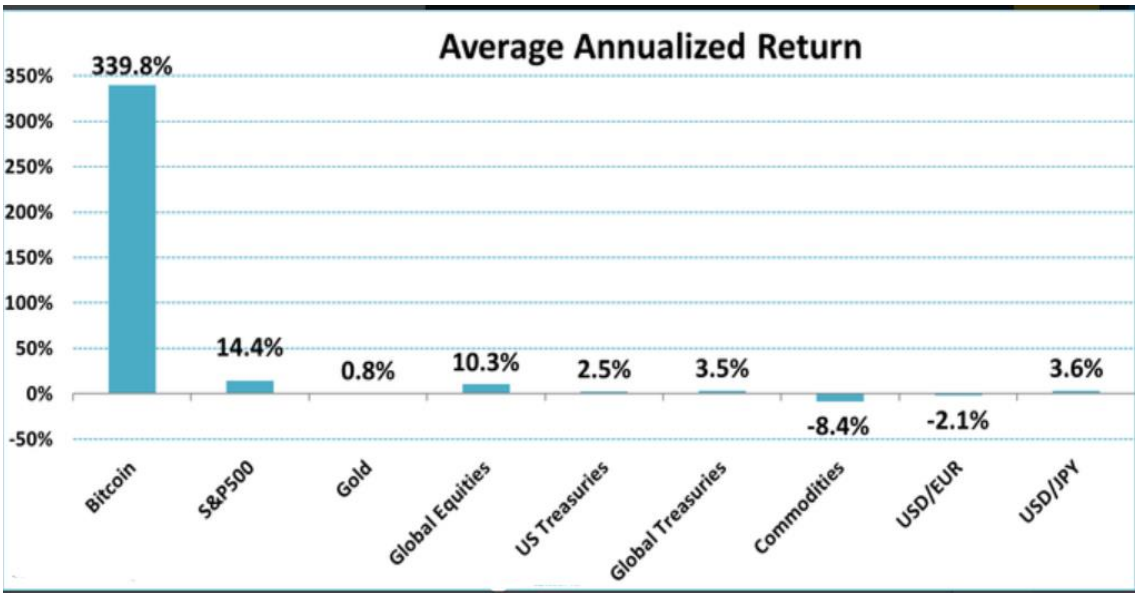


Figure 3.1: Average annualized return of bitcoin and of traditional assets 2010-2020 (Source: Bloomberg)

Furthermore, adopting cryptocurrencies can be done in a variety of ways. The most well-liked methods include using cryptocurrency exchange platforms. (Binance, Coinbase, Kucoin, etc.), through specific banks that facilitate the purchase and investing of cryptocurrencies, such as Revolut, Cashaa, etc. and even vending machines. The ease of adopting cryptocurrencies also makes the investment more appealing, which is due in part to their decentralized nature, which allows anyone with internet access to own cryptocurrencies. The partial explanation for the growth of the total cryptocurrency market capitalization is because the general public and firms have realized the potential returns of investing into cryptocurrencies and wanted to join the bandwagon, and by adopting cryptocurrencies, the value of the market rose. According to Glaser et al. (2014), the primary reason for a user purchasing Bitcoin is for speculative investment

(Baur et al., 2017). As a result, the demand for cryptocurrency investment increased, causing cryptocurrency prices and total market capitalization to rise.

Following the purchase of cryptocurrencies, they can be used to trade on various cryptocurrency exchange markets in order to profit from the investment (Muftic et al., 2017). The user chooses their own plan and option for how they will utilize their bitcoin to generate money after purchasing it(ibid). There exist three types of trading strategies, namely technical, fundamental, and recently, quantitative (Fang et al., 2021). A technical trading strategy entails analyzing historical patterns of transaction data, which traders use to forecast current and future market conditions in order to make a profit. A fundamental trading strategy entails analyzing the cryptocurrency company's events to determine when the cryptocurrency should be bought and sold for profit. A quantitative strategy is similar to a technical strategy in that it uses technical software to execute trades for the user by analyzing prices, volume, technical indicators, and so on. If the user decides to withdraw their investment and reinvest it in a different cryptocurrency, they can do so through pairs such as BTC/ETH, XRP/BTC, and so on, where the user pays lower transaction fees than first converting their cryptocurrency to a fiat currency (BTC/USDT, for example), and then purchasing their preferred cryptocurrency (ETH/USDT, for example).

There are numerous benefits to cryptocurrency trading. The cryptocurrency trading market is open 24 hours a day, allowing users to trade whenever they want (Fang et al., 2021). This is in contrast to the stock market, which only allows trading on weekdays from 9:30AM to 4PM because stocks are centralized, whereas cryptocurrencies are decentralized. Trading cryptocurrencies is pseudonymous and does not reveal the trader's identity, which benefits user privacy (Fang et al., 2021). Furthermore, because cryptocurrencies are peer-to-peer transactions, they do not rely on financial institution intermediaries, resulting in lower transaction fees for traders. Furthermore, because cryptocurrencies are peer-to-peer transactions, they do not rely on financial institution intermediaries, resulting in lower transaction fees for traders.

Cryptocurrencies are widely used to buy goods and services not only online, but also in physical stores. As of now, cryptocurrency can be used as a monetary equivalent to money

issued by a central authority, but it is decentralized and more secure (Sukarno & Pujiyono, 2020). Companies that accept cryptocurrency payments are growing in number, with recent notable examples including Barnes & Noble, Baskin Robbins, GameStop, Amazon's Whole Food Market, and others (Sukarno & Pujiyono, 2020). The procedure for purchasing goods and services involves placing an order for the item or service, selecting the cryptocurrency token required for the transaction, transferring the necessary amount of cryptocurrency onto the seller's account, and then the customer can receive their item or service once the payment is received (Semenchuk & Andreev, 2019). Another way to pay with cryptocurrency is with Crypterium's global "Crypto Debit Card," which allows users to load cryptocurrencies onto a virtual or physical card, which is then converted into fiat money and can be used to buy goods and services offline and online, as well as withdraw funds from an ATM. Crypterium conducted a customer survey in 2018 to better understand how to increase customer adoption of cryptocurrencies, and 70% of the 400,000 participants agreed that cryptocurrency cards are required for mass adoption, and that issuing them was a significant step toward increasing overall awareness, adoption, and use of cryptocurrencies in day-to-day activities (Semenchuk & Andreev, 2019). As public and corporate awareness of cryptocurrency attributes such as decentralization, security, privacy, and time savings grows, so will the use and adoption of cryptocurrency payment methods.

With the use of cryptocurrencies, people who have never met can conduct transactions without the need for trust and in a secure manner without the use of a third party (Muftic et al., 2017). The ability to send any digital asset to another user has the practical benefit of providing a guarantee for the safety of the transfer of funds, which cannot be challenged due to the use of the blockchain public ledger in cryptocurrency transactions (Muftic et al., 2017). Another advantage of using cryptocurrency is the low transaction fees when compared to other financial service providers such as Western Union. For example, when sending USDT (Tether, a stablecoin) to another cryptocurrency wallet via TRC-20 (a technical standard used for smart contracts on the Tron Blockchain), the user sending the digital assets pays a 1$ transaction fee for any amount sent (TRON Developer Group, 2021). The speed of the transactions is another beneficial aspect of using cryptocurrencies (Titov et al., 2021). For instance, it often takes 10-

20 minutes to transmit Bitcoin from one cryptocurrency wallet to another (Titov et al., 2021). Ultimately, the key features of cryptocurrencies can make people more interested in them since they are cheaper, faster, and more secure than traditional financial services. As people become more aware of these advantages, more people will adopt and utilize cryptocurrencies in the future.

3.6 Small and Medium Scale Enterprises in Nigeria

According to Nigeria's Small and Medium Industries Equity Investment Plan, a small business is any initiative with a total capital base that is between N1.5 million and N200 million. This capital basis consists of working capital, excluding the cost of the land, with a staff size of between 10 and 300.The National Council of Industry defines small firms as undertakings with total expenses of 200,000,000 Naira (200,000,000.00) or less; more significantly, total costs once more exclude land (Oluwarotimi & Adamu, 2017). Entrepreneurs have continued to get support when making investments in small and medium-sized businesses. The ongoing assistance is due to its contribution to the creation of jobs, the eradication of poverty, and the expansion of Nigeria's economy. The federal government's MSMEs strategy is modelled after small businesses and follows best practices across the world.

The policy divides businesses into micro, small, and medium-sized firms based on the amount of assets and employment capacity. Every company initiative that may employ 0 to 10 people and has total assets worth less than $5 million is classified as a micro enterprise, to better clarify the definition. The boundary for small businesses is defined as having an employment capacity of between 10 and 49 people and an estimated asset value of between 5 and 50 million naira. The employment capacity of medium-sized businesses is between 50 and 199, and their estimated asset value is between 50 and 500 million naira. Importantly, land and buildings are not included in the assets that make up the aforementioned group. Additionally, Mordi et al. (2014) proposed that the federal policy on MSMEs considers suitable the number of employees supreme over asset size in the event of a potential conflict between the categorization criterion of asset size and employment. The nomenclature supplied by the federal government of Nigeria,

represented by the Central Bank of Nigeria, serves as the basis for categorizing SMEs for the purposes of this study.

3.7 Risk Perception of Cryptocurrencies

Risk perception is described as uncertainty around the drawbacks of employing an item or service in the Information Systems (IS) business (Chen & Farkas, 2019). The adoption of contemporary technologies, including e-governments, e-services, and of course, Bitcoin, has been affected by past research on how people perceive the risks associated with technology (Abramova & Böhme, 2016). Abramova and Böhme (2016) recognized and analysed the main risks connected to Bitcoin, such as market risk, counterparty risk, transaction risk, operational risk, privacy risk, and legal and regulatory risk. According to their findings, Bitcoin adoption is constrained by its volatile value, the possibility of losing money due to security flaws and system failures, and the paucity of consumer protection.

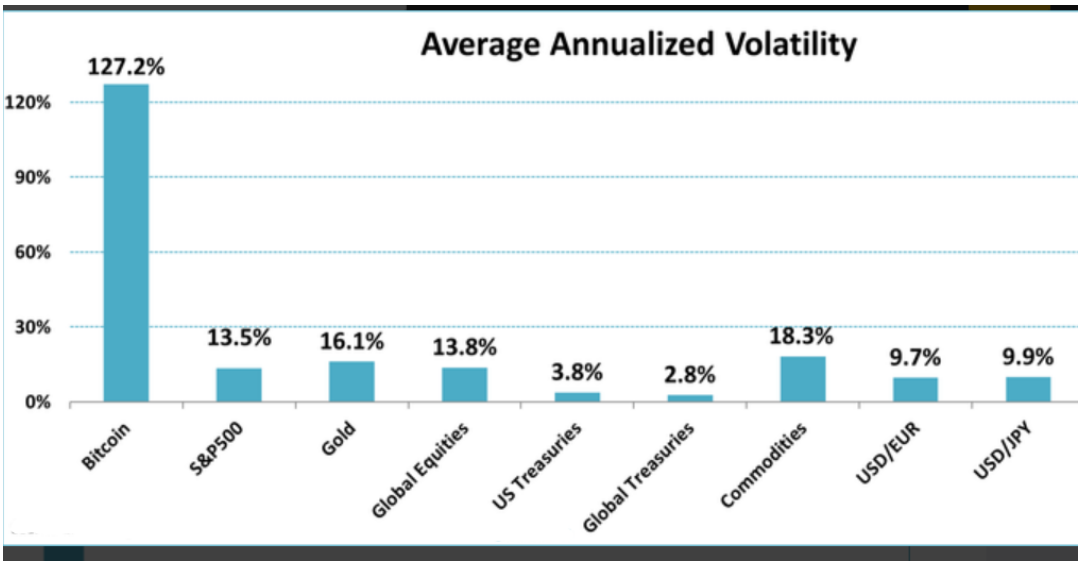


Figure 3.2: Average annualized Volatility of bitcoin and of traditional assets 2010-2020 (Source: Bloomberg)

The most popular risk in cryptocurrency is the market risk, that is the risk of permanent loss of asset due to the high volatility of Cryptocurrency. The volatility of a cryptocurrency is determined by how much its price fluctuates from time to time in relation to its average price.

Based on conjecture, the bitcoin market either performs well or thrives. investors makes predictions that Crypto price will go bullish or go bearish to make profits. This causes a sudden increase or decrease of Crypto prices, which leads to volatility. In Figure 3.2 below we can see average annualized Volatility of bitcoin and of traditional asset from July 2010 to July 2020 while Figure 3.3 shows the Average 30-Day BTC/USD historical volatility from 2010 to 2022.

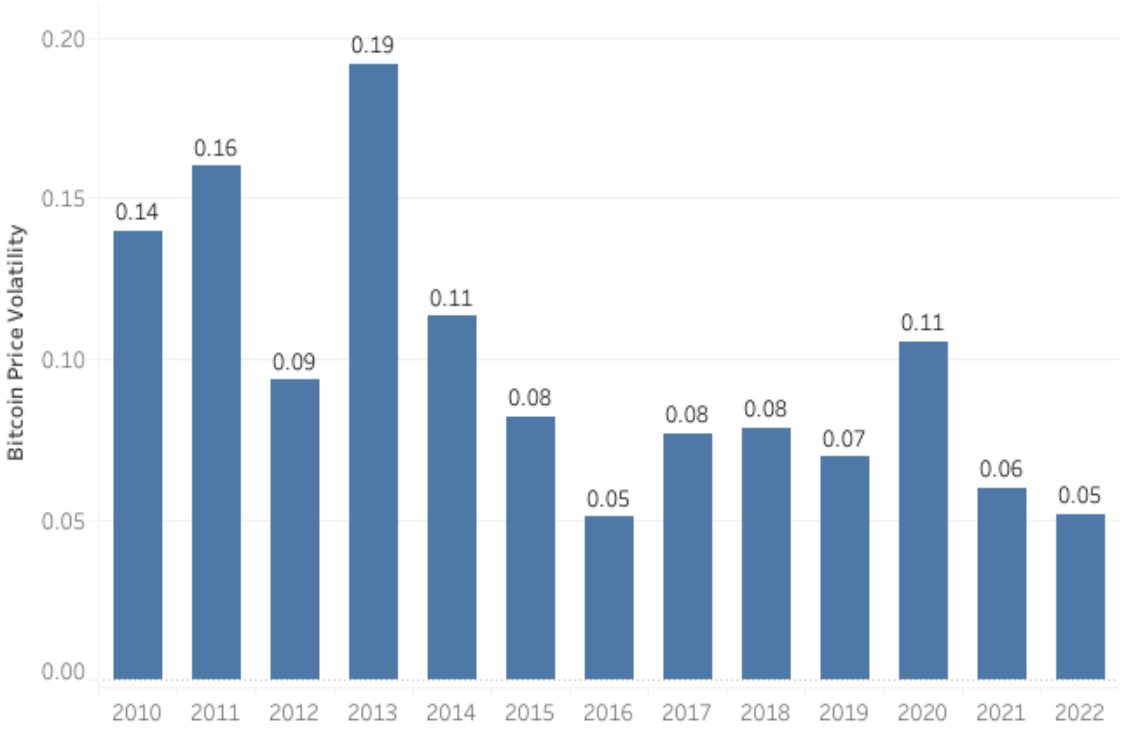


Figure 3.3 Bitcoin's historical volatility 2010-2022 (Source Coin Metrics**)**

Cryptocurrency exchange platforms like BitGO and Coinbase are partnering with insurance providers to provide consumers with insurance plans for various security hazards after analysing the loss of assets due to security breaches or malfunctions, Yet, not all of them, as it might be challenging for insurance providers to recognize bitcoin theft (Abramova & Böhme, 2016). The public wants the decentralized cryptocurrencies to be regulated, which would offer user safety and ensure that cryptocurrencies comply with the law, according to an analysis of the demand for legal protection of cryptocurrency users. The findings of Abramova and Böhme's (2016) study also demonstrated that Bitcoin users are concerned about the laws governing its

use. Also, it shown that users perceive a risk of usage since those who are contemplating adopting Bitcoin think it is a difficult system that calls for a lot of work (Abramova & Böhme, 2016), However, this can be changed by becoming more knowledgeable about how the cryptocurrency system functions and becoming more at ease with using and trading cryptocurrencies. Decentralization, a characteristic that cryptocurrency users' favour, has also been shown in the study to not contribute to a benefit of Bitcoin and is instead perceived as a risk because there is no central authority or legal protection for the user.

In light of all of these considerations, it appears that potential users are reluctant to adopt cryptocurrencies because of their underlying technology, which is sometimes immutable due to its technological components. Users must educate themselves on how cryptocurrency systems work as well as their effects on user privacy, security, etc. if they want to enhance bitcoin acceptance and reduce its perceived hazards. Since there are numerous cryptocurrencies and systems that prioritize privacy and security, including Monero and Zcash, as well as Binance and Huobi, users would be more likely to adopt them if they were made aware of the various cryptocurrencies and their technological features.

3.8 Cryptocurrency in Nigeria

Nigeria stands out for having a high ranking in the "Bitcoin Market Potential Index." (Hileman, 2015) and hailed as the "crypto capital" of Africa, with roughly 32% of the population using cryptocurrencies. (Adesina, 2020; Lawal, 2021). This high figure might be explained by the economic difficulties brought on by persistent unemployment as a result of the recession and the ongoing increase in inflation (Lawal, 2021). This environment has led many people, especially young people, to view cryptocurrency as a means out of their current financial situation (BBC News, 2021). Moreover, expenses for international money transfers and current borrowing prices have made cryptocurrencies a viable alternative to traditional banks (BBC News, 2021).

The Nigerian naira (NGN) lost value by over 15% in 2021 (Mojeed, 2022) as a result of devaluation by the Central Bank of Nigeria (CBN), raising concerns about a potential further decline. Hence, a lot of Nigerians think that keeping a bitcoin wallet is a good insurance policy

against impending inflation. Thus, the ongoing acceptance of Bitcoin, which is viewed as speculative in nature and thus regarded a risk to the financial security of Nigerians, has raised worries among the regulatory authorities, particularly the CBN (Bakare, 2021; Nwanisobi, 2021). Therefore, in a bid to regulate the market, the CBN placed a ban on banks facilitating cryptocurrency-related transactions in 2017 (Bakare, 2021). This, however, remained largely unenforced (Adesina, 2022).

After the initial order was revoked in 2021, the CBN moved swiftly once more, introducing a plan to safeguard the public and defend the nation from potential threats posed by "unknown and unregulated entities" that are "well-suited for conducting many illegal activities" (Nwanisobi, 2021). The CBN instructed banks to avoid utilizing their platforms to conduct business with or interact with businesses engaged in crypto activities (Bakare, 2021c; Uba, 2021). In addition, accounts of people or companies involved in bitcoin transactions had to be closed (Nwanisobi, 2021). Three banks were fined 800 million NGN (about 2.1 million US dollars) in April 2021 for failing to stop their clients from transacting in cryptocurrencies (Adesina, 2021). Since then, some Nigerians have claimed that activities relating to cryptocurrencies have resulted in the freezing of their bank accounts.

An initiative to increase the effectiveness of payment systems was started by the CBN about the same time (Olowodun, 2021) by introducing a Central Bank Digital Currency (CBDC), the only fully endorsed CBDC on the African continent as of this writing, that is centrally issued and controlled (Ozili, 2022). The resultant system was not widely embraced as a solution for cryptocurrencies due to its notable lack of decentralization and decoupling from the fluctuations of the NGN (Chukwuere, 2021). Many people still have a strong commitment to cryptocurrencies notwithstanding this endeavour and the governmental emphasis on them. People in Nigeria are turning to alternative technologies to realize profits and preserve money for themselves and their dependents as a result of growing mistrust in the government's capacity to foster economic freedom and job creation.

There is little academic research on cryptocurrency-related topics in the Nigerian environment. Several earlier publications portray Bitcoin as a technology that Nigerians

developed during the 2016 recession as a reliable replacement for the Naira's rapid depreciation (Nnabuife and Jarrar, 2018). To the best of our knowledge, only two quantitative academic studies using questionnaires and concentrating on Bitcoin in the Nigerian setting have been conducted: Eigbe (2018) looks at Bitcoin usage and awareness levels in Nigeria, despite their claims to the contrary, it was discovered that the majority of respondents lacked a proper understanding of how Bitcoin worked. According to a research by Salawu and Moloi (2018), which focuses on Nigerian professional accountants, a majority of them said that passing particular regulations would be a must before they would consider providing their services in a cryptocurrency environment. In most cases, several approaches are used.

The predominant view found in all pertinent studies is that Bitcoin in the Nigerian context is not a transitory trend but rather has substantial societal significance. According to a research by Jimoh and Benjamin (2020) It highlights the macroeconomic significance of Bitcoin by demonstrating how the erratic nature of cryptocurrency returns has a discernible effect on Nigeria's larger financial markets. Egbo and Ezeaku (2016) highlight the major disruptive potential of cryptocurrencies by demonstrating how they are endangering the commercial banks' ability to serve as intermediates in Nigeria. Although the aforementioned works emphasize the potential benefits of cryptocurrencies on the Nigerian economy, other works concentrate on their drawbacks, such as the dangers of using them to fund terrorism (Emmanuel and Michael, 2020) or the ineffectiveness of Nigerian regulation stopping cryptocurrency-related activity (Ukwueze, 2021; Gidigbi et al., 2021).

3.9 Cryptocurrencies Adoption in Nigeria

India, Pakistan, Colombia, Canada, and Nigeria are among the nations with the fastest-growing cryptocurrency user bases in Q1 2020, according to a 2020 analysis by CoinMarketCap. The nations with the fastest-growing female user bases include Greece and Romania. Nine countries, according to Coinmarketcap, witnessed the most increases in users between the ages of 18 and 24 in the first quarter compared to the previous one. Nigeria had the highest increase of 210.6% among the nine countries with at least 80% user growth, followed by Australia (158.07%), Spain (158.07%), and Nigeria (120.71%).The other top nations (81.79%) were

Canada (112.45%), Mexico (97.33%), the United Kingdom (91.48%), Colombia (85.07%), India (83.07%),and Pakistan.(bitcoin.com).According to the study, Nigeria's youth are driving change (Guen, 2020).Cryptocurrency use is increasing, according to Chainlysis' 2021 The report summary states that at the end of the second quarter of 2021, the global adoption rate will have increased by more than 880 percent in the previous year. Nigeria is also ranked sixth in the world, according to the report. According to the paper, peer-to-peer trades have spurred recent growth, particularly in emerging economies (Chainlysis, 2021).

Nigerians, as previously said, have the second-largest trade volume in the world on Paxful, a leading worldwide bitcoin peer-to-peer trading platform. Nigeria, only after the US and Russia, has the third-largest volume globally across all platforms, according to some assessments (BBC, 2021). Nigerians were early adopters of the cryptocurrency craze, and many have used it to their advantage as well as the country's by engaging in bitcoin trading and offering related services. Nigerians bought cryptocurrencies worth more than $400,000,000 (190 billion Naira) on local exchanges in only 2020, according to TechPoint Africa. Also, as a result, local and international investors have increased their investment of the crypto-fintech sector (Kene-Okafor, 2021).Koins and Kash write that isa better approach for individuals and start-ups to transfer funds to anyone in the world for remittance, suppliers, e-commerce shopping, as well as to and from friends and family members based abroad because it costs much less than many commercial banks in Africa, which charge exorbitant fees in an unstable currency market and unreliable economic ecosystem. Because the majority of African nations lack access to dollars, people are turning to cryptocurrencies to facilitate cross-border trade and remittances (sending money home). To connect worldwide suppliers more effectively, many African businesses and start-ups currently accept and pay in bitcoins, XRP, bitcoin, and bitcoin cash (Koinsandkash.com, 2020). And finally, many Nigerians are embracing cryptocurrencies to cut costs, much like their African rivals. The Naira is obviously not the solution for many young Nigerians who desire to accumulate money.

Stears Data estimates that, from 1972, the naira has lost 32 percent of its value annually on average. Nowadays, there are several investing options in the world of cryptocurrency. They include of short-term trading gains, farming for yields, staking assets, holding, and so on. Young

Nigerians who freelance now frequently get paid in cryptocurrencies. Nowadays, a lot of households receive their money through services that support crypto. Using fintech companies like Patricia and ABitNetwork, utility bills may be paid with bitcoin. In October 2020, Bitcoin was used to support the #EndSARScampaigns.The bitcoin contribution address was also pushed by Twitter CEO Jack Dorsey, a bitcoin lover. Just eight nations in Africa have bitcoin ATMs, with Nigeria being one of them. The ATM was introduced by Blockstale in April 2020.

3.10 Applications of Cryptocurrencies in Nigeria

There are several practical uses for cryptocurrencies in Nigeria. Because of this, it is thought to be promoting financial inclusion in the nation. The first example of a blockchain-powered remittance service is a collaboration between Oradian, a cloud-based software provider for microfinance institutions in underdeveloped nations, and Stellar, the open-source payment network sponsored by Stripe. 300,000 Nigerians, 90% of whom are women, may transfer money at minimal cost between microfinance institutions using the Oradian payment-transfer network, which is developed on top of the Stellar platform. (Finextra 2016).

In Africa, Nigeria has the most internet users (154.3m). With a population of 12 million more than Kenyans and South Africans utilize the internet. As a result, it's simple to understand how cryptocurrencies may be valuable in Africa. With just a smartphone and cryptocurrency applications, those without bank accounts may now engage in the global digital economy. Then they may pay for their usual products and services using cryptocurrency. Another element that has contributed to the acceptance of cryptocurrencies is the fact that utilizing cryptocurrencies, as opposed to wire transfers and other conventional means of transmitting money, it is far less expensive for individuals who live abroad to send money back to Africa. With traditional remittances, the sender must pay a fee, which, This, along with the cost of currency conversion, can reach as high as 20% in extreme circumstances.

Transactions with cryptocurrencies are relatively inexpensive because neither of these costs are involved (This Day Live, 2021). Additionally, the quantity of money that may be transmitted at once is strictly capped by many conventional methods. Many people believe that using dispersed technology will allow them to surpass the combined knowledge of industrialized

nations. By utilizing the chance to embrace next-generation technology presented by the absence of a financial infrastructure, governments in Africa may react to economic difficulties more swiftly. This approach has been shown to be quite successful on the continent.

For instance, without the need for hardwiring, 3G networks in Kenya and South Africa offer virtually ubiquitous phone coverage. Mobile payment solutions like M-PESA have emerged to rule the market in the absence of well-established payment networks. The GSMA estimates that 45,6% of people in Sub-Saharan Africa use mobile money. Although there are advanced mobile payment networks, blockchain integration can boost the functionality of current systems. Decentralization might reduce transaction costs, speed up settlement, and boost security. In Sub-Saharan Africa, there are 95 million unbanked individuals, including 34 million living in Nigeria.

Another important feature of blockchain technology is Decentralized Finance (DeFi), which enhances the performance of distributed networks. Offering a range of financial goods, such as loans, savings, and investments (via market making and blockchain security), on blockchain infrastructure considerably facilitates financial inclusion initiatives. As was previously said, the blockchain concept underlies cryptocurrencies; now let's examine how this technology advances financial inclusion (Blockchain-council.org, 2020):

- Blockchain addresses the problem of high transaction costs by enabling almost real-time and accurate payments.
- It makes it possible to manage financial entitlements and identities in a decentralized manner.
- Most crucially, because of its public character and authentication method, blockchain strengthens confidence between the two participating parties.

Blockchain creates a rapid and secure method that integrates value transfer and asset ownership. Moreover, this technology has uses in the financial sector that might increase financial inclusion and pave the way for the creation of financial products for various alternative asset classes (such as real estate and agriculture). In the banking and financial industries, blockchain technology offers a wide range of possible applications. Among of the use cases in

testing include know your customer (KYC), anti-money laundering (AML) data sharing, trade monitoring, regulatory reporting, collateral management, trading, settlement, and clearing.

Commodities, public and private stocks and bonds are a few examples of traditional financial assets that might benefit from the technology (Chinaka, 2016). Lastly, blockchain technology has the potential to increase financial inclusion by making things more accessible, affordable, and available. One of them is its ability to reduce bank account ownership and maintenance costs by eliminating the need for pricey intermediaries (by replacing it with wallets and addresses). Anybody considering entering the financial sector will find it simpler as a result to do so (Danho and Habte, 2019). All of these point to the opportunities that cryptocurrencies have created and can still create to aid faster and more robust financial inclusion in Nigeria.

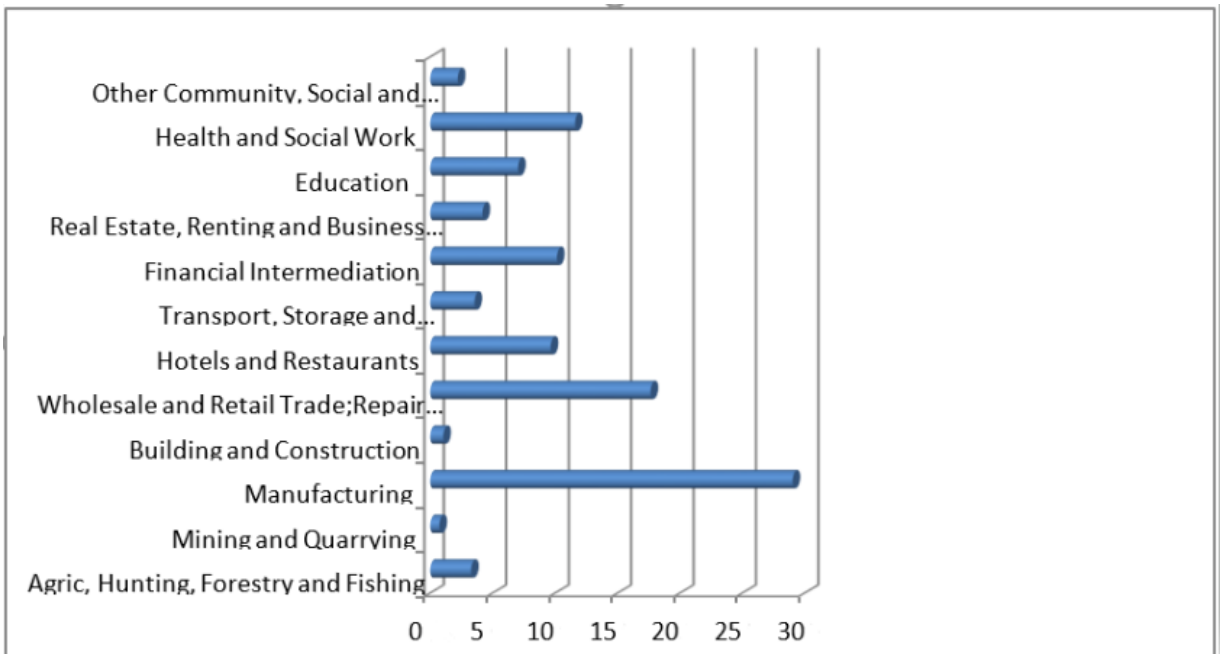


Figure 4.1: Sectoral composition of SMEs in Nigeria (Source: PWC's MSME Survey, 2020)

3.11 Sectoral composition of SMEs in Nigeria

The distribution of SMEs by sector in Nigeria is presented in Figure 4.1. It shows that with a 28% share, the manufacturing sector is the largest. This is a good attribute in a growing economy. Also, it demonstrates that the economy is in the capital accumulation stage, which is

the second stage of development and is classified as a growing economy according to Chenery and Taylor's patterns of development theory. The services sector is often the largest in a mature economy as structural changes increase, whereas the manufacturing sector is typically the biggest in a developing economy. With a share of around 17%, trade is the second-largest sector of SMEs. The smallest sector is mining and quarrying, which is closely followed by building and construction, which account for 0.6% and 1.0%, respectively. This may be due to the fact that only a few multinational corporations appear to be the major participants in Nigeria's mining, quarrying, and building and construction industries (KPMG, 2015).

3.12 Sectoral composition of MSMEs in Nigeria by state

Nigeria is a country with a diverse economy, and the distribution of MSMEs across the country reflects this diversity. Lagos state, being the most populous state in Nigeria and the commercial hub of the country, clearly dominates in the distribution of MSMEs across the country. Lagos state alone accounts for 35% of all MSMEs in the country, which is a clear indication of the economic importance of the state. The state dominates in almost all sectors, except for the mining and quarrying sector, where Edo state takes the lead. The transportation, storage, and communication sector is also dominated by Lagos state and Katsina state, which have the same percentage share. This sector is crucial for the development of any economy, as it facilitates the movement of goods and services, and communication among businesses and individuals. In terms of sector composition, manufacturing has the largest share of MSMEs, with Lagos and Kano accounting for one-third of the sector's establishments in Nigeria. Lagos state has the highest share of the manufacturing sector in terms of the location of the establishment, accounting for 20% of the share, while Kano accounts for 16% of the share. This is a clear indication of the dominance of these two states in the manufacturing sector, which is an essential driver of economic growth and development.

Other states that have a significant presence in the manufacturing sector are Oyo state and Kaduna state. These two states closely follow Lagos and Kano in terms of the number of manufacturing MSMEs they have. The manufacturing sector is crucial for any country's economic development as it provides employment opportunities, drives innovation, and contributes significantly to the GDP. On the other hand, some states have very few MSMEs,

such as Osun state, which has only 68 manufacturing MSMEs. Bayelsa, Yobe, and Borno states are also among the states with the least MSMEs. This may be because of a number of things, such a lack of infrastructure, unfavourable business environments, or low levels of economic activity in these states.

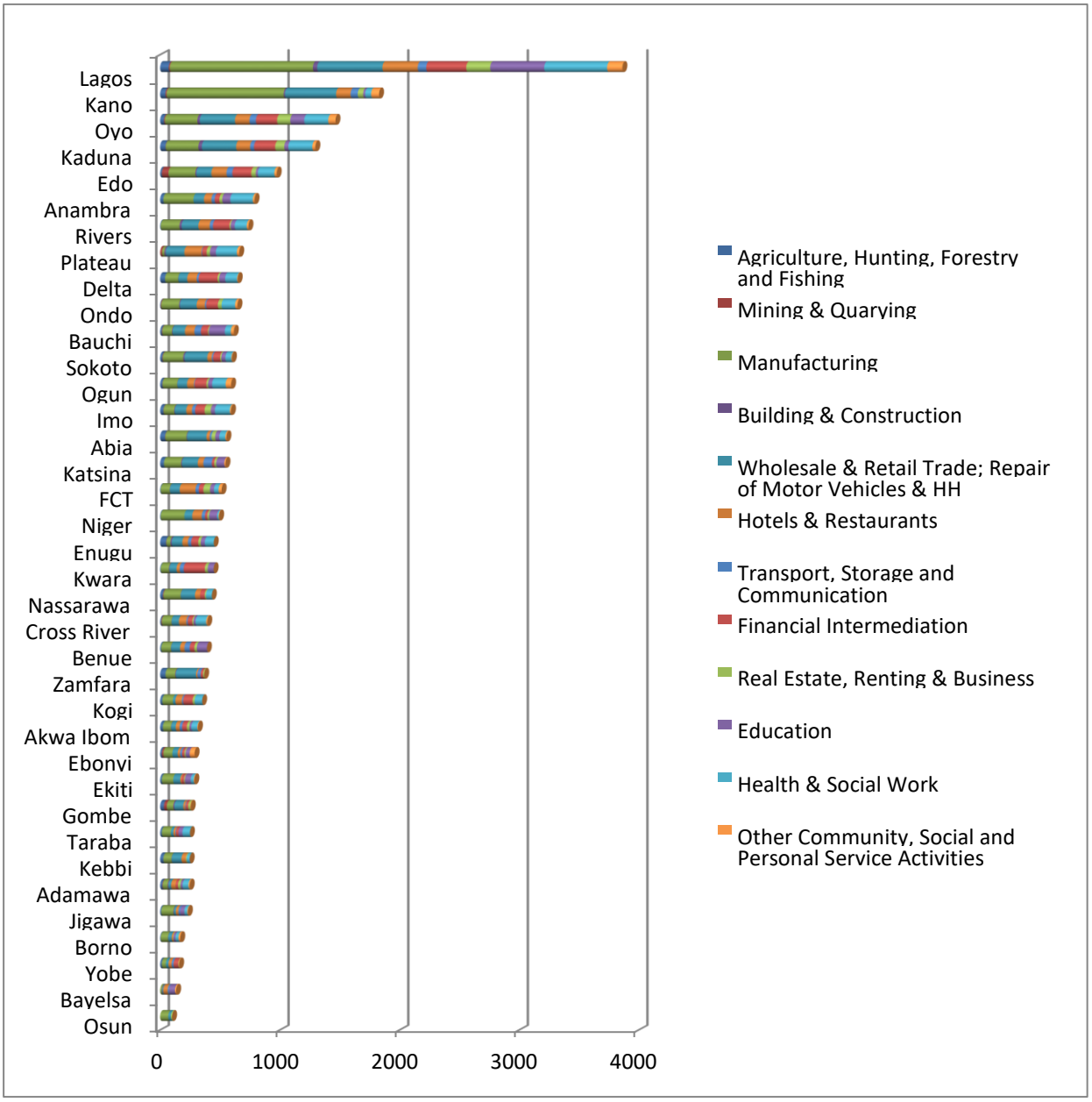


Figure 4.2: Sectoral composition of MSMEs in Nigeria by state (Source: SMEDAN)

The distribution of MSMEs across Nigeria is not uniform, with Lagos state dominating in almost all sectors. The manufacturing sector has the largest share of MSMEs, and Lagos and Kano states are the leading states in this sector. Other states such as Oyo and Kaduna also have a significant presence in the sector, while some states have very few MSMEs. The government must create a conducive environment for MSMEs to thrive in all states, as this is crucial for the country's economic growth and development. The distribution of MSMEs across Nigeria is not uniform, with Lagos state dominating in almost all sectors. The manufacturing sector has the largest share of MSMEs, and Lagos and Kano states are the leading states in this sector. Other states such as Oyo and Kaduna also have a significant presence in the sector, while some states have very few MSMEs. The government must create a conducive environment for MSMEs to thrive in all states, as this is crucial for the country's economic growth and development.

4. Practical Part

4.1 Sociodemographic Characteristics of Respondents

4.1.1 Gender of respondents

The gender distribution of the respondents is presented in Figure 5.1. Out of the total sample of SME owners, 203 were males, accounting for 68% of the sample, while 97 were females, accounting for 32% of the sample. These percentages provide a clear overview of the gender distribution in the sample and highlight the fact that there were more male SME owners in Lagos Nigeria than female.

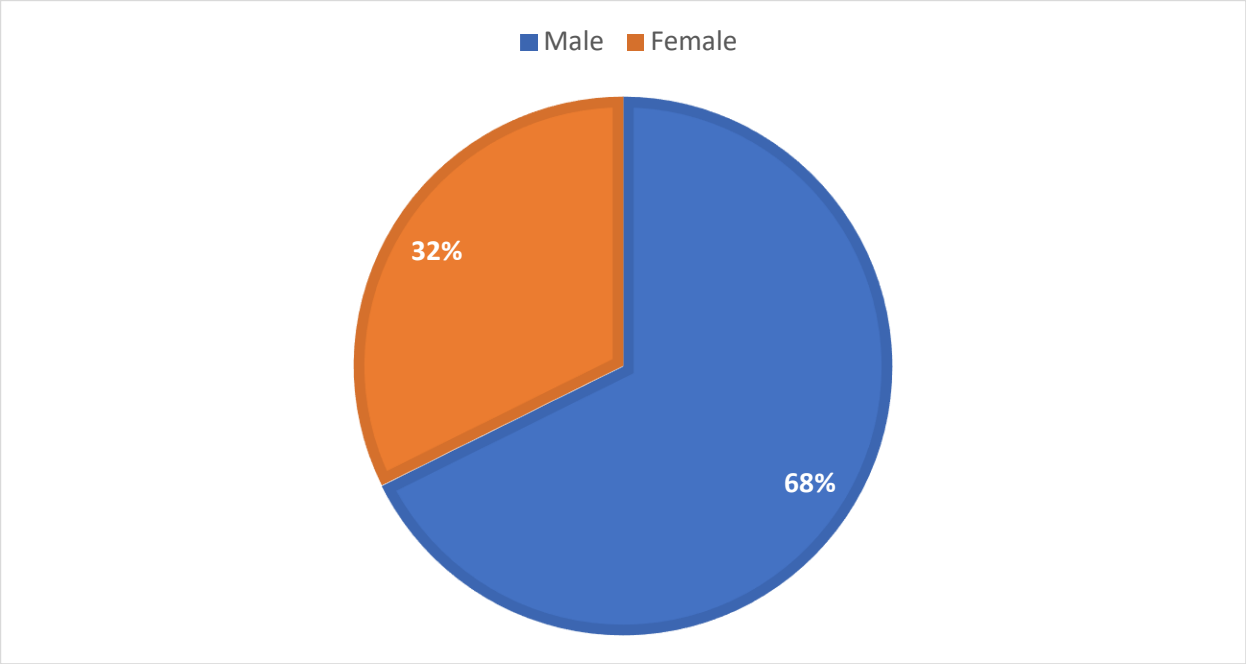


Figure 5.1: Gender of the respondents (n=300)

Source: Author Research data, 2023

4.1.2 Educational qualification of respondents

Table 5.1 shows the educational qualification of SMEs owners in Lagos Nigeria. The table shows that the majority of the respondents have completed at least a secondary education, with 32 individuals representing 10.7% of the group. Furthermore, 41% of them have completed a BSc degree, and 20.7% have completed an MSc/PhD. It is interesting to note that 1% of the

group have no formal education, and 3.7% have only completed vocational education. OND/NCE represents 18.7% of the group, indicating that a significant portion have completed technical or vocational training beyond secondary education. Overall, the table suggests that the SME owners in Lagos Nigeria are relatively well-educated, with a significant proportion having completed at least a Bachelor's degree.

Table 5.1: Educational qualification of respondents (n=300)

Educational level	Frequency	Percent
No formal education	3	1.0
Vocation	11	3.7
Primary	13	4.3
Secondary	32	10.7
OND/NCE	56	18.7
BSc	123	41.0
MSc/PhD	62	20.7
Total	300	100

Source: Author Research data, 2023

4.1.3 Marital status of respondents

The marital status of Small and Medium Enterprise (SME) owners in Lagos, Nigeria is presented in Table 5.2. There are four categories of marital status, including single, married, divorced, and widowed. The majority of SME owners are single, accounting for 57.7% of the sample. Married SME owners represent 36.3% of the sample, while only a small percentage are divorced (2.3%) or widowed (3.7%). This suggests that a large proportion of SME owners in Lagos, Nigeria are likely to be young and unmarried. This may reflect a trend towards entrepreneurship among younger individuals who have not yet settled down and started families.

Table 5.2: Marital status of respondents (n=300)

Marital status	Frequency	Percent
Single	173	57.7
Married	109	36.3
Divorced	7	2.3
Widowed	11	3.7
Total	300	100

Source: Author Research data, 2023.

4.1.4 Hours of work per day of the respondent

The number of hours that Small and Medium Enterprise (SME) owners in Lagos, Nigeria work per day is presented in Table 5.3. There are four categories of working hours, ranging from less than 5 hours per day to more than 10 hours per day. The majority of SME owners work between 6-8 hours per day, accounting for 36.0% of the sample. A significant proportion of SME owners work between 9-10 hours per day, representing 32.7% of the sample. Meanwhile, a smaller proportion of SME owners work less than 5 hours per day (18.7%) or more than 10 hours per day (12.7%). This suggests that SME owners in Lagos, Nigeria work relatively moderate hours, with a significant proportion working full-time hours of 9-10 hours per day. The low proportion of SME owners working less than 5 hours per day may reflect the high level of commitment required to run a successful business, while the small percentage of SME owners working more than 10 hours per day may reflect the challenges of work-life balance for entrepreneurs.

Table 5.3: Hours of work per day of the respondent (n=300)

Hours of work per day	Frequency	Percent
Less than 5 hours	56	18.7
6-8 hours	108	36.0
9-10 hours	98	32.7
More than 10 hours	38	12.7
Total	300	100

Source: Author Research data, 2023.

4.1.5 Business experience of the respondents

The business experience of the respondents is presented in Table 5.4. There are six categories of business experience, ranging from no experience to 10 years and above. The majority of SME owners have been in business for 8 – 10 years, accounting for 59.0% of the sample. A significant proportion of SME owners have been in business for 5-7 years, representing 18.7% of the sample. Meanwhile, a smaller proportion of SME owners have no experience (1.0%), less than 1 year of experience (5.0%), 2-4 years of experience (10.3%), or 10 years and above of experience (6.0%). This suggests that SME owners in Lagos, Nigeria have a relatively moderate level of business experience, with the majority having been in business for 8 – 10 years. The low percentage of SME owners with no experience or less than 1 year of experience may reflect the challenges of starting a new business, while the small percentage of SME owners with 10 years and above of experience may reflect the challenges of sustaining a successful business over the long term.

Table 5.4: Business experience of the respondents (n=300)

Business experience	Frequency	Percent
No experience	3	1.0
Less than 1 year	15	5.0
2-4 years	31	10.3
5-7 years	56	18.7
8-10 years	177	59.0
10 years and above	18	6.0
Total	300	100

Source: Author Research data, 2023.

4.1.6 Type of businesses operated by respondents

Table 5.5 shows the types of businesses operated by Small and Medium Enterprise (SME) owners in Lagos, Nigeria. The majority of SME owners are engaged in trading activities, accounting for 56.3% of the sample. A significant proportion of SME owners provide services, representing 34.3% of the sample. Meanwhile, a smaller proportion of SME owners are engaged in artisanal work (5.7%), manufacturing (2.7%), or agriculture (1.0%). Artisanal work includes

businesses such as fashion design, hairdressing, and carpentry, while manufacturing refers to the production of goods for sale. Agriculture, which includes farming and livestock rearing, is also a relatively small sector of the SME market in Lagos. This suggests that the SME sector in Lagos, Nigeria is primarily dominated by trading and service-oriented businesses, which is consistent with the broader economic trends in the region. Lagos is known for its vibrant commercial sector, and the prevalence of trading and service-oriented SMEs may reflect the high demand for goods and services in the region.

Table 5.5: Type of businesses operated by respondents (n=300)

Type of business	Frequency	Percent
Trading	169	56.3
Artisan	17	5.7
Manufacturing	8	2.7
Agriculture	3	1.0
Services	103	34.3
Total	300	100

Source: Author Research data, 2023.

4.1.7 Form of businesses owned by respondents

Table 5.6 shows the form of businesses owned by Small and Medium Enterprise (SME) owners in Lagos, Nigeria. The majority of SME owners operate as sole proprietors, with 57.3% of the sample reporting this form of business ownership. This means that these businesses are owned and operated by a single individual, who bears all of the risks and rewards associated with the business. Meanwhile, 35.7% of SME owners report operating as partnerships, and a smaller proportion of SME owners operate as family businesses (5.3%), cooperatives (1.0%), or faith-based organizations (0.7%). The predominance of sole proprietorship in the SME sector in Lagos, Nigeria is consistent with broader trends in the region and in developing countries more generally. Sole proprietorship is often the simplest and most accessible form of business ownership for individuals with limited resources, and may reflect the challenges SME owners face in accessing capital and formalizing their businesses.

On the other hand, partnerships, which make up 35.7% of the reported form of business ownership, involve two or more individuals who share ownership and decision-making responsibilities. Partnerships can offer advantages in terms of shared risk and resources, as well as potential tax benefits. However, they also require clear communication and legal agreements to avoid conflicts or disputes among partners. The smaller proportion of SME owners who reported operating as family businesses, cooperatives, or faith-based organizations suggests that these forms of ownership are less common in the SME sector in Lagos, Nigeria. Family businesses can be particularly challenging, as they may involve complex interpersonal dynamics and succession planning issues. Meanwhile, cooperatives and faith-based organizations may face additional regulatory and cultural barriers to entry.

Table 5.6: Form of businesses owned by respondents (n=300)

Form of business	Frequency	Percent
Sole ownership	172	57.3
Family business	16	5.3
Partnership	107	35.7
Cooperative	3	1.0
Faith based organisation	2	0.7
Total	300	100

Source: Author Research data, 2023.

4.1.8 Business location of respondents

The information on business location of respondents presented in Figure 5.2 shows that the majority of SME owners in Lagos, Nigeria operates in urban areas, accounting for 89% of the sample. This is not surprising, given that Lagos is one of the largest cities in Africa and is known for its bustling commercial sector, which attracts businesses and entrepreneurs from across the country and beyond. Additionally, urban areas may offer SMEs greater access to infrastructure, technology, and markets, which can be critical factors for business success. On the other hand, only a small proportion of SME owners (11%) operate in rural areas in Lagos. This may reflect the challenges associated with doing business in rural areas, such as limited access to infrastructure, markets, and financing, as well as the lower demand for certain types of goods

and services. However, rural areas may offer certain advantages for SMEs, such as lower costs of operation and potentially less competition in certain sectors.

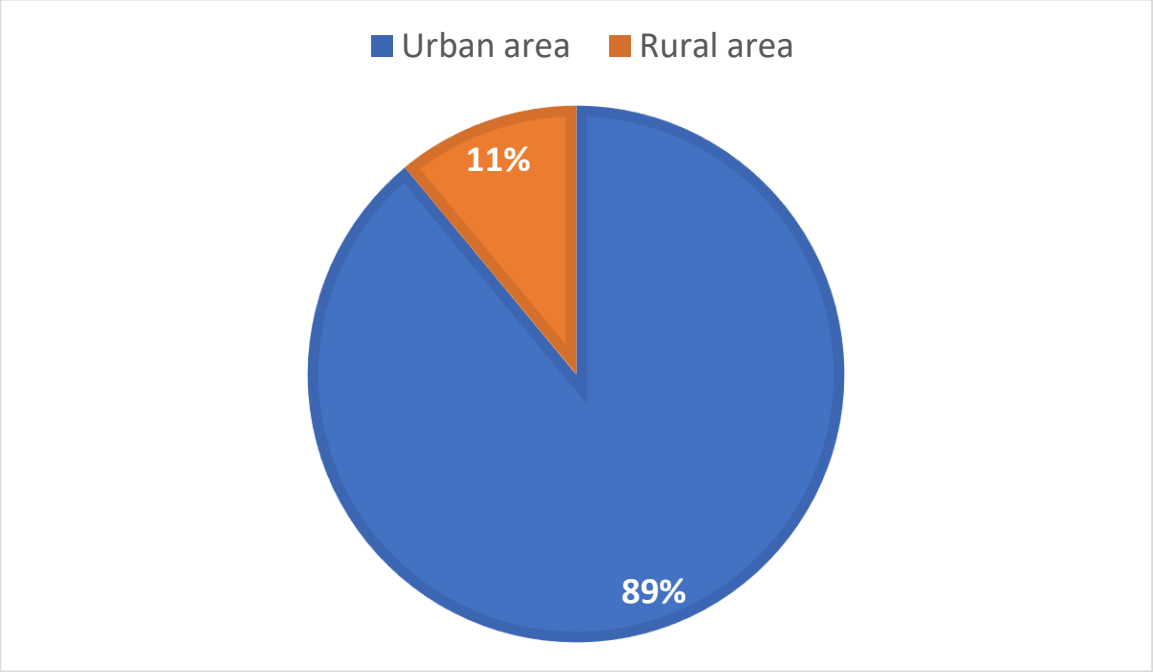


Figure 5.2: Business location of respondents (n=300)

Source: Author Research data, 2023.

4.1.9 Number of employees of respondents

Table 5.7 shows the frequency and percentage distribution of the number of employees in Small and Medium Enterprises (SMEs) in Lagos, Nigeria. According to the data, the majority of SMEs in Lagos have 10 or fewer employees (34.3%). The second-largest category is SMEs with 11-20 employees, which make up 39.3% of the total. SMEs with 21-30 employees account for 21.3% of the total, while those with 31-40 employees, 41-50 employees, and 51 and above employees make up a very small proportion of the total, at 4.0%, 0.7%, and 0.3%, respectively.

The data suggests that the vast majority of SMEs in Lagos are relatively small, with less than 20 employees. This could be due to a number of factors, such as limited financial resources, a challenging business environment, and a lack of government support. SMEs in this category may face a number of challenges, such as limited access to finance, difficulty in finding skilled employees, and limited bargaining power with suppliers. In contrast, the relatively small

proportion of SMEs with more than 30 employees suggests that it may be difficult for SMEs to scale up in Lagos, perhaps due to a lack of available financing or a difficult regulatory environment.

Table 5.7: Number of employees of respondents (n=300)

Total Number of Employees	Frequency	Percentage
10 or less	103	34.3
11 - 20	118	39.3
21 - 30	64	21.3
31 - 40	12	4.0
41 - 50	2	0.7
51 and above	1	0.3
Total	300	100

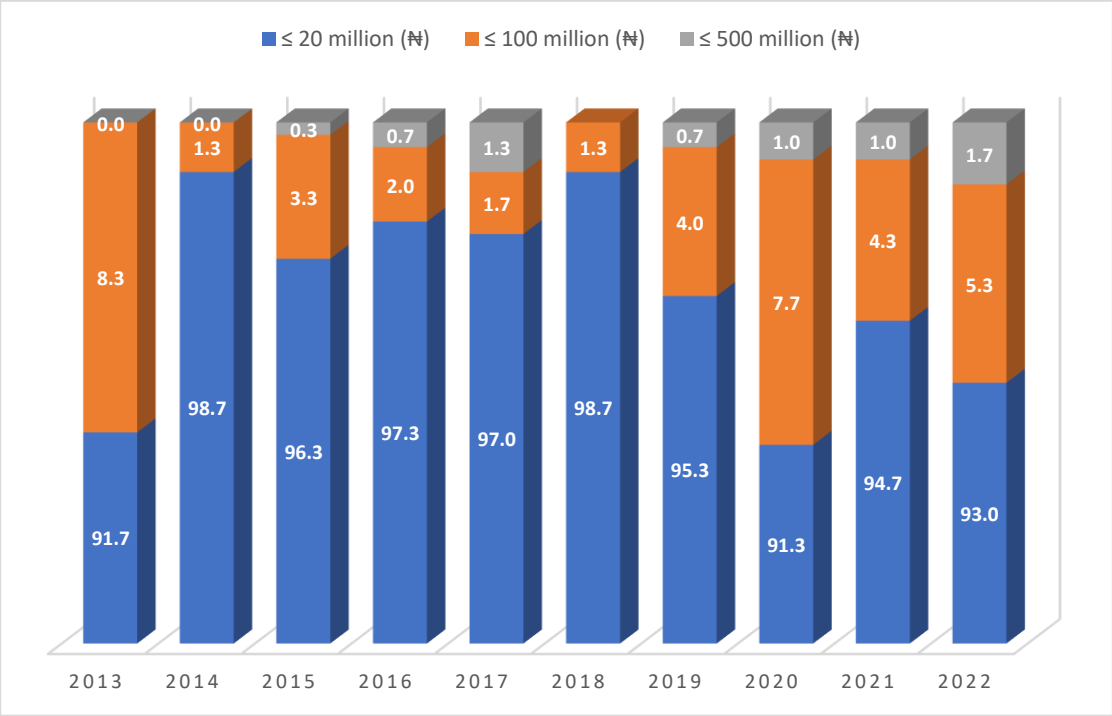
Source: Author Research data, 2023.

4.1.10 Average annual income for 10 years (₦)

The percentage distribution of average annual income for SME owners in Lagos, Nigeria, over a ten-year period, from 2013 to 2022 is presented in Figure 5.3. The data is categorized into three income classes: ≤20 million, ≤100 million, and ≤500 million. The data shows that for the period of ten years from 2013 to 2022, the vast majority of SME owners in Lagos earned an average annual income of ≤20 million (in Nigerian Naira). In 2013, 296 SME owners fell within this category, representing 98.7% of all SME owners. The proportion of SME owners earning ≤20 million remained high in subsequent years, with 98.7% in 2014, 96.3% in 2015, and at least 91.3% from 2018 to 2022. The data also indicates that the proportion of SME owners earning between ≤100 million and ≤500 million was low, with less than 5.3% of SME owners in these categories across all years.

A small proportion of SME owners in Lagos have an average annual income of ≤100 million, with a frequency of 4 (1.3%) in 2018, increasing to 16 (5.3%) in 2022. Meanwhile, no SME owners reported an average annual income of ≤500 million in 2018 and 2019. However,

two SME owners (0.7%) reported an average annual income of ≤500 million in 2020, which increased to five (1.7%) in 2022. The data suggests that the vast majority of SME owners in Lagos have relatively low average annual incomes, with only a small proportion reporting higher incomes. This could be due to a number of factors, such as a challenging business environment, limited access to finance, and a lack of government support.



Source: Author Research data, 2023.

Figure 5.3: Average annual income for a decade (n=300)

4.2 Adoption of cryptocurrency

4.2.1 Familiarity with cryptocurrency

Figure 5.4 shows that out of the total respondents, 254 or 84.7% are familiar with cryptocurrencies, while 46 or 15.3% are not familiar with them. This indicates that the majority of the respondents have some knowledge or experience with cryptocurrencies. This could mean that they have some knowledge about what cryptocurrencies are, how they work, and possibly even have experience with buying, selling or using them. The high percentage of respondents

who are familiar with cryptocurrencies could be due to the growing popularity of cryptocurrencies in recent years and the increasing use of them in various industries. On the other hand, the fact that 15.3% of the respondents are not familiar with cryptocurrencies suggests that there is still a segment of the population that is yet to explore this technology. This could be due to a lack of awareness or interest, or possibly due to scepticism about cryptocurrencies and their associated risks.

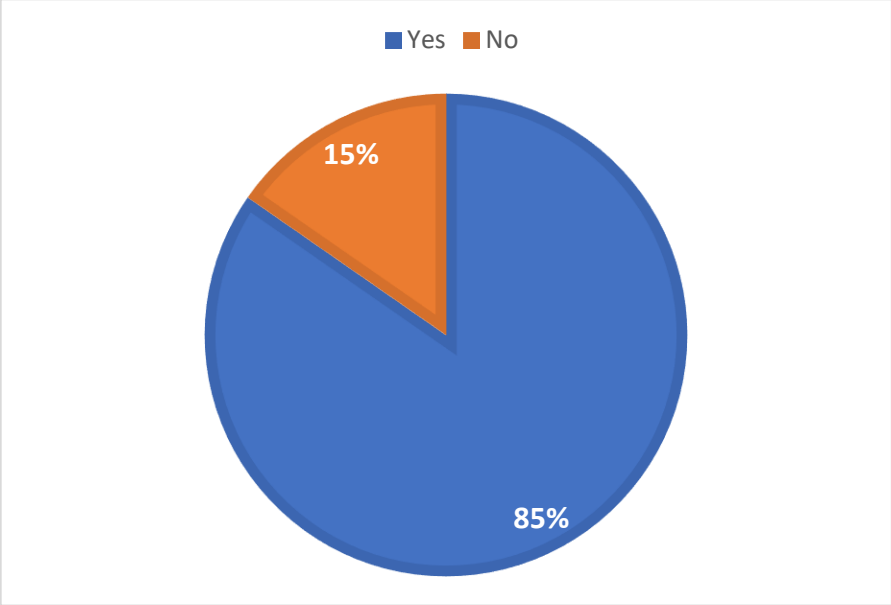


Figure 5.4: Familiarity with cryptocurrency (n=300)

Source: Author Research data, 2023.

4.2.2 Use of cryptocurrencies in business

Figure 5.5 shows that out of the total respondents, 218 or 72.7% have used cryptocurrencies in their business, while 82 or 27.3% have not. This indicates that a significant proportion of the respondents have experience using cryptocurrencies in their business operations, whereas a sizeable minority have not yet integrated this technology into their business practices. The high percentage of respondents who have used cryptocurrencies in their business could be due to the potential benefits that this technology offers, such as lower transaction fees, faster processing times, and greater security. It also suggests that more

businesses are beginning to recognize the value of cryptocurrencies and are adopting them as a payment option for their customers.

On the other hand, the fact that 27.3% of the respondents have not used cryptocurrencies in their business suggests that there are still some barriers or challenges that prevent them from doing so. This could be due to concerns about the volatility of cryptocurrencies, regulatory uncertainty, or a lack of understanding about how to use them effectively.

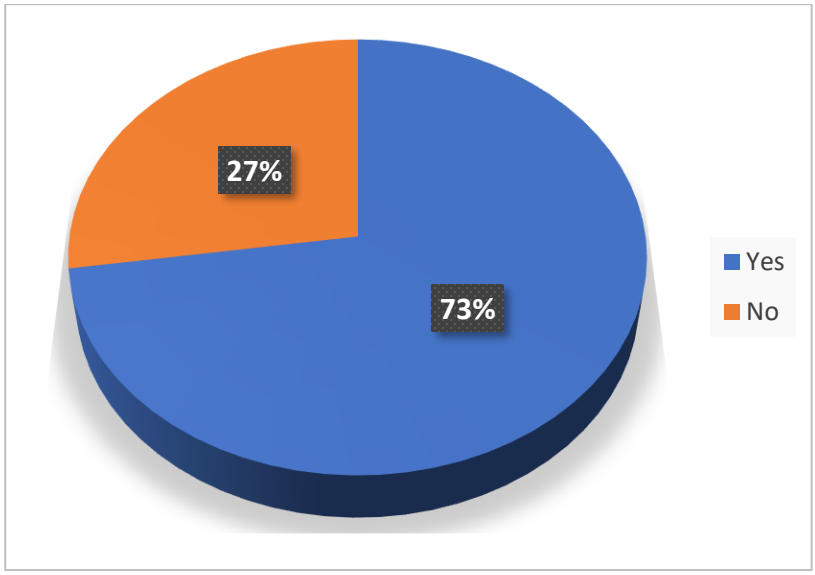


Figure 5.5: Use of cryptocurrencies in business (n=300)

Source: Author Research data, 2023.

4.2.3 Cryptocurrency use cases in business

Table 5.8 shows that out of the 218 respondents who reported using cryptocurrencies in their business, the most common use of cryptocurrencies is for investment for growth purposes (36.7%), followed by store of value or savings (21.1%), international money transfers (15.1%), hedge against local currency devaluation (12.4%), and transactions/payments (14.7%). The high percentage of respondents using cryptocurrencies for investment for growth suggests that cryptocurrencies are becoming increasingly attractive as an investment option for businesses,

possibly due to the potential for high returns and the growing acceptance of cryptocurrencies in the mainstream financial market.

The use of cryptocurrencies for international money transfers is also significant, as it suggests that businesses are recognizing the potential benefits of using cryptocurrencies for cross-border transactions, such as faster processing times, lower fees, and greater security. The use of cryptocurrencies as a store of value or savings suggests that businesses may be using cryptocurrencies as a means of diversifying their assets and protecting against inflation. While the use of cryptocurrencies as a hedge against local currency devaluation suggests that businesses may be turning to cryptocurrencies as a way to protect themselves against economic instability and currency fluctuations in their local markets.

Table 5.8: Cryptocurrency use cases in business (n=218)

Cryptocurrency usage cases in business	Frequency	Percent
Transactions/Payments	32	14.7
Investment for growth	80	36.7
International money transfers	33	15.1
Store of value or savings	46	21.1
Hedge against local currency devaluation	27	12.4
Total	218	100

Source: Author Research data, 2023.

4.2.4 Duration of using cryptocurrency in business

Figure 5.6 shows that out of the 218 respondents who reported using cryptocurrencies in their business, the majority have been using it for more than 4 years. Specifically, 37.2% of the respondents reported using cryptocurrencies for 4-6 years, while 45.0% reported using them for more than 6 years. Only 17.9% reported using cryptocurrencies in their business for less than 3 years. These findings suggest that a significant number of businesses have been using cryptocurrencies in their operations for a considerable amount of time, and may have gained valuable experience and insights into the benefits and challenges of using this technology. It also suggests that cryptocurrencies are becoming increasingly integrated into business

operations, possibly due to the growing acceptance and recognition of the potential benefits that cryptocurrencies offer.

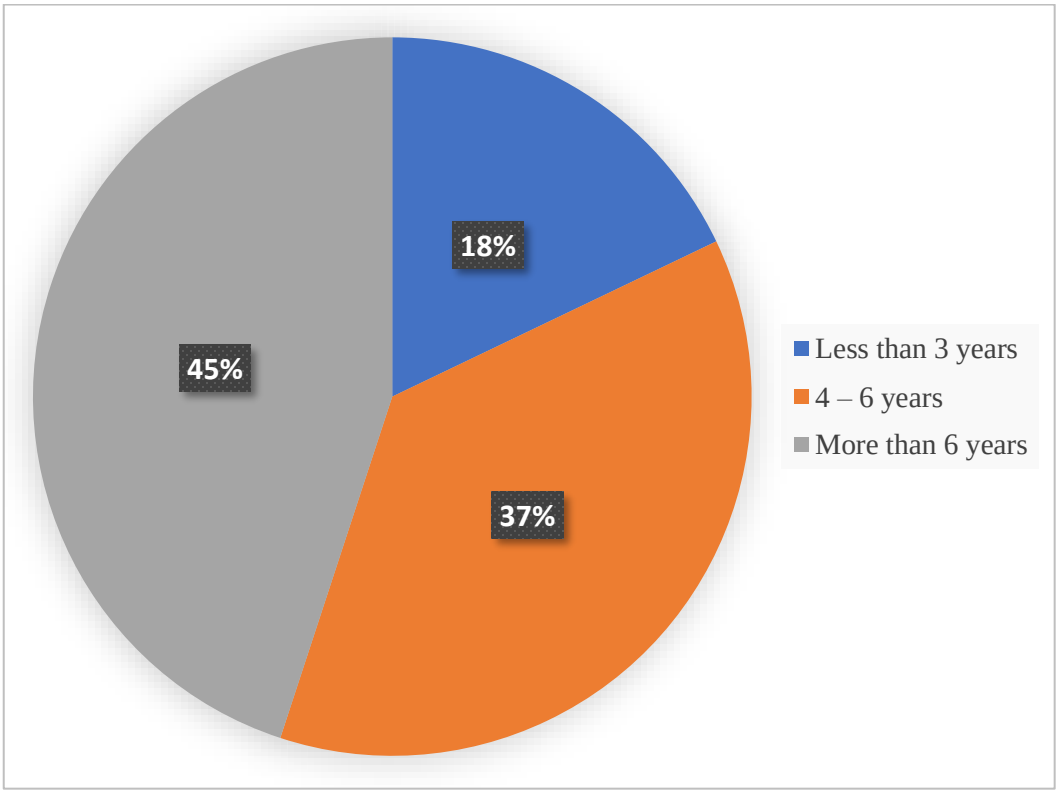


Figure 5.6: Duration of using cryptocurrency in business (n=218)

Source: Author Research data, 2023.

4.2.5 Frequency of use of cryptocurrencies per week

Table 5.9 presents the frequency of use of cryptocurrencies per week among the 218 businesses that reported using them. The majority of businesses reported using cryptocurrencies between 6 to 20 times per week, with 38.5% reporting usage of 16-20 times per week and 30.3% reporting more than 20 times per week. On the other hand, a smaller proportion of businesses reported using cryptocurrencies 5 times or less per week (8.3%) or 11-15 times per week (7.8%).

These findings suggest that businesses that are using cryptocurrencies tend to use them relatively frequently, with a substantial proportion using them more than 20 times per week. This could be indicative of cryptocurrencies being used as a regular and reliable form of

payment or investment. However, it's worth noting that the frequency of use may vary depending on the specific nature of the business and its operations.

Table 5.9: Frequency of use of cryptocurrencies per week (n=218)

Frequency of use of cryptocurrency per week	Frequency	Percent
5 times or less per week	18	8.3%
6-10 times per week	33	15.1%
11-15 times per week	17	7.8%
16-20 times per week	84	38.5%
More than 20 times per week	66	30.3%
Total	218	100

Source: Author Research data, 2023.

4.2.6 Gender and Cryptocurrency Usage

Table 5.10 shows the counts of individuals by their gender and their use of cryptocurrency. Based on this table, out of the total of 300 SMEs, 218 use cryptocurrency and 82 do not use cryptocurrency. The table also shows that out of 203 males, 149 use cryptocurrency and 54 do not use cryptocurrency, while out of 97 females, 69 use cryptocurrency and 28 do not use cryptocurrency.

Table 5.10: Gender and Cryptocurrency Usage

		Use of Cryptocurrency		Total
		Yes	No	
Gender	Male	149	54	203
	Female	69	28	97
	Total	218	82	300

Source: Author Research data, 2023.

Chi-square test was used to determine whether there is a significant relationship between gender and cryptocurrency use. The chi-square test presented in Table 5.11 shows that that there

is no significant association between gender and cryptocurrency use. This may be attributed to the fact that cryptocurrency is a gender-neutral technology and does not inherently discriminate against any gender. It is a decentralized digital currency that is available to anyone with an internet connection, regardless of their gender, race, or nationality.

Table 5.11: Chi-square test for gender and cryptocurrency usage

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.170	1	0.681
Likelihood Ratio	0.169	1	0.681
Linear-by-Linear Association	0.169	1	0.681
N of Valid Cases	300		

Source: Author Research data, 2023.

4.2.7 Education and Cryptocurrency Usage

Table 5.12 shows the use of cryptocurrency by individuals based on their education level. From the table, the majority of individuals who use cryptocurrency have a BSc degree (93 out of 123), followed by those with OND/NCE (41 out of 56) and those with MSc/PhD (44 out of 62). The education categories with the least number of cryptocurrency users are No formal education (2 out of 3) and Vocation (10 out of 11). This back the claim of the increase in literacy rate in Nigeria, as this response contains high number of Bachelor's Degree holders and Master's Degree holders. The study further examined the relationship between Education and cryptocurrency, which was explained in Table 5.13 below.

Table 5.12: Education and Cryptocurrency Usage

	Use of Cryptocurrency		Total
	Yes	No	
No formal education	2	1	3
Vocation	10	1	11
Primary	12	1	13
Secondary	16	16	32
OND/NCE	41	15	56
BSc	93	30	123
MSc/PhD	44	18	62
Total	218	82	300

Source: Author Research data, 2023.

The chi-square test for this relationship is presented in Table 5.13. The Pearson Chi-Square value is 13.335 and the asymptotic significance is 0.038. This suggests that there is significant relationship between education level and cryptocurrency use.

Table 5.13: Chi-square test for education and cryptocurrency usage

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	13.335[a]	6	0.038
Likelihood Ratio	13.545	6	0.035
Linear-by-Linear Association	0.025	1	0.874
N of Valid Cases	300		

Source: Author Research data, 2023.

4.2.8 Years of Experience and Cryptocurrency Usage

Table 5.14 shows the distribution of cryptocurrency use among individuals in different categories of years of experience. The data reveals that the majority of SMEs who use cryptocurrency fall into the 5-7 years of experience category, with 125 out of 177 individuals using cryptocurrency. On the other hand, the category with the lowest usage of cryptocurrency is No experience, with only 2 out of 3 individuals using it. The data also shows that there is a gradual increase in the number of individuals using cryptocurrency as years of experience increase, with the highest number of individuals using cryptocurrency in the 5-7 years and 8-10 years categories. However, this trend does not continue in the Above 10 years category, as the number of individuals using cryptocurrency drops to 14 out of 18.

Table 5.14: Years of experience and cryptocurrency usage

	Use of Cryptocurrency		Total
	Yes	No	
No experience	2	1	3
Less than 1 ear	7	8	15
2 - 4 years	25	6	31
5 - 7 years	125	52	177
8 - 10 years	45	11	56
Above 10 years	14	4	18
Total	218	82	300

Source: Author Research data, 2023.

The chi-square test for this relationship is presented in Table 5.15. The chi-square tests results indicate the strength and statistical significance of the relationship between the variables of cryptocurrency use and years of experience. The Pearson chi-square value is 8.430 with a p-value of 0.134. The likelihood ratio is 8.014 with a p-value of 0.155. These p-values suggest that there is no statistically significant relationship between cryptocurrency use and years of experience. However, the linear-by-linear association test shows a chi-square value of 2.963 with a p-value of 0.085, indicating a weak but statistically significant linear association between

the two variables. Therefore, while the overall relationship is not statistically significant, there is evidence of a weak linear trend in the data.

Table 5.15: Chi-square test for years of experience and cryptocurrency usage

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	8.430	5	0.134
Likelihood Ratio	8.014	5	0.155
Linear-by-Linear Association	2.963	1	0.085
N of Valid Cases	300		

Source: Author Research data, 2023.

5. Results and Discussion

5.1 Impact of Cryptocurrency on income of SMEs

The majority of respondents (81.5%) agreed or strongly agreed that cryptocurrencies as a mode of payment can attract new customers. Only a small percentage (4.4%) disagreed or strongly disagreed with this statement, while 10.2% of respondents were uncertain. Less than half of the respondents (65.8%) agreed or strongly agreed that cryptocurrencies facilitate fast and secure cross-border payments. A significant portion (27.8%) of respondents were uncertain about this statement, while only a small percentage (3.4%) disagreed or strongly disagreed with it. A little over half of the respondents (63.7%) agreed or strongly agreed that cryptocurrency transactions have lower fees compared to traditional payment methods. A sizable percentage (14.7%) of respondents were uncertain, while only a small percentage (4.5%) disagreed or strongly disagreed with this statement. The majority of respondents (82.5%) agreed or strongly agreed that cryptocurrency transactions are more secure than traditional payment methods. Only a very small percentage (0.4%) disagreed with this statement, while 8.6% of respondents were uncertain. The vast majority of respondents (91.5%) agreed or strongly agreed that cryptocurrency can facilitate faster and more efficient transactions. Only a small percentage (0.6%) disagreed or strongly disagreed with this statement, while 6.2% of respondents were uncertain.

Based on the data provided, it appears that the respondents generally perceive cryptocurrency as having a positive impact on the income of Small and Medium Enterprises (SMEs). Respondents strongly agreed that cryptocurrency transactions are more secure and can facilitate faster and more efficient transactions compared to traditional payment methods. Furthermore, respondents agreed that cryptocurrency transactions have lower fees compared to traditional payment methods and that it can facilitate fast and secure cross-border payments. In addition, there is a perception that cryptocurrencies as a mode of payment can attract new customers. However, there is also some uncertainty among respondents with respect to the impact of cryptocurrency on SMEs, particularly with regards to attracting new customers and the fees associated with cryptocurrency transactions.

Table 5.16: Impact of Cryptocurrency on income of SMEs

Impact of Cryptocurrency on income of SMEs	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree	
	F	%	F	%	F	%	F	%	F	%
Cryptocurrencies.as a mode of payment attracts new customers	138	46.0	116	38.7	32	10.7	12	4.0	2	0.7
Cryptocurrencies facilitates fast and secure cross-border payments	112	37.3	92	30.7	86	28.7	9	3.0	1	0.3
Cryptocurrency transactions have lower fees compared to traditional payment methods	98	32.7	133	44.3	53	17.7	11	3.7	5	1.7
Cryptocurrency transactions are more secure than traditional payment methods	172	57.3	99	33.0	28	9.3	1	0.3	-	-
Cryptocurrency can facilitate faster and more efficient transactions	212	70.7	67	22.3	19	6.3	1	0.3	1	0.3

Source: Author Research data, 2023.

5.1.1 Effect of the bitcoin price volatility on income of SMEs in Nigeria

Appendix 9.1 shows the correlation between bitcoin price volatility and income of SMEs accross a decade (2013 – 2022). The strength of the linear link between the two variables is demonstrated using the Pearson correlation coefficient.A positive correlation coefficient implies a positive relationship, meaning that as Bitcoin price volatility increases, income also increases. On the other hand, a negative correlation coefficient indicates a negative relationship, implying that as Bitcoin price volatility increases, income decreases.

From the table, it can be observed that the correlation between income and Bitcoin price volatility is not consistent across the years. For instance, in 2013, there was a significant negative correlation between income and Bitcoin price volatility ($r=-0.329$, $p<0.05$), indicating that as

Bitcoin price volatility increased, income decreased. However, this negative relationship was not observed in subsequent years, with some years showing a positive relationship between income and Bitcoin price volatility. In 2014, income and Bitcoin price volatility were negatively correlated, but the correlation was weaker than in 2013 ($r=-0.250$, $p<0.05$). In 2015, there was a weak positive correlation between income and Bitcoin price volatility ($r=0.165$, $p<0.05$), which strengthened in 2016 ($r=0.444$, $p<0.001$). However, this positive correlation disappeared in 2017, with a significant negative correlation being observed ($r=-0.277$, $p<0.001$). In 2018 and 2019, there was a negative correlation between income and Bitcoin price volatility, although the correlations were weaker than in the previous years. In 2020 and 2021, there was a weak negative correlation between income and Bitcoin price volatility, with the correlations being significant in 2020 ($r=-0.114$, $p<0.05$) and marginally significant in 2021 ($r=-0.116$, $p<0.05$). In 2022, there was no significant correlation between income and Bitcoin price volatility. This correlation result was not consistent , this can be associated to the facts that not all SMEs are necessarily investors in the crytocurrency market , some just use for Payment transaction, and after diversify into Stable coin,hence the volatility wont really play a big impact on their income.

5.2 Factors affecting adoption of cryptocurrency by SMEs

As presented in Table 5.12, less than half of the respondents (49.0%) agreed or strongly agreed that learning how to use cryptocurrencies is easy for them. A significant percentage (20.8%) were uncertain or had no opinion, while 20.8% disagreed or strongly disagreed with this statement. Less than 40% of the respondents (37.0%) agreed or strongly agreed that they have trust in cryptocurrencies. A large percentage (28.7%) were uncertain or had no opinion, while 26.1% disagreed or strongly disagreed with this statement. A little over half of the respondents (52.1%) agreed or strongly agreed that they find cryptocurrencies and related services easy to use. Only a small percentage (8.9%) disagreed or strongly disagreed with this statement, while 17.6% were uncertain or had no opinion. Less than half of the respondents (54.9%) agreed or strongly agreed that they have the necessary resources to use cryptocurrencies. A significant percentage (17.0%) were uncertain or had no opinion, while 21.9% disagreed or strongly disagreed with this statement.

Less than half of the respondents (50.6%) agreed or strongly agreed that using cryptocurrency fits well with the way consumers shop in their business. A large percentage (40.0%) disagreed or strongly disagreed with this statement, while 0.9% were uncertain or had no opinion. The vast majority of respondents (91.1%) agreed or strongly agreed that the price of cryptocurrency is volatile, while only a small percentage (6.5%) were uncertain about this statement.

The data provided in the table shows the respondents' perceptions of factors that influence the adoption of cryptocurrencies. The statements are grouped into three categories; effort expectancy, facilitating conditions and perceived risk. Effort expectancy statements shows that respondents find cryptocurrencies relatively easy to use, with 73.3% of respondents either strongly agreeing or agreeing with the statement. The data shows that the majority of respondents (52.8%) either disagree or strongly disagree that using cryptocurrency fits well with the way consumers shop in their business. This may indicate that businesses are unsure how to incorporate cryptocurrencies into their existing business models or that they do not see a significant demand for cryptocurrency use among their customers.

However, in terms of perceived risk, the trust in cryptocurrencies is not as widespread, with only 47.6% of respondents either strongly agreeing or agreeing with the statement. This suggests that there may be some skepticism or uncertainty around the security and reliability of cryptocurrencies. The data also shows that the majority of respondents (73.8%) recognize that the price of cryptocurrency is volatile. This highlights the potential risks of using cryptocurrencies as a medium of exchange or store of value, as the value of cryptocurrencies can fluctuate dramatically over short periods.

In terms of facilitating conditions, the data shows that respondents are split on whether they have the necessary resources to use cryptocurrencies, with 59.5% feeling they do. This suggests that while many individuals may be interested in using cryptocurrencies, they may face barriers to adoption, such as lack of access to necessary technology or financial resources. The data further shows that the majority of respondents (75.4%) feel that the government does not have a supportive attitude toward commercial entities that adopt cryptocurrency. This may

indicate that there is a lack of clear regulatory frameworks or guidelines around the use of cryptocurrencies, which could hinder their adoption by businesses.

Table 5.17: Factors affecting adoption of cryptocurrency by SMEs

Factors affecting adoption of cryptocurrency	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree	
	F	%	F	%	F	%	F	%	F	%
Learning how to use Cryptocurrencies is easy for me.	112	37.3	97	32.3	1	0.3	41	13.7	49	16.3
I have trust in Cryptocurrencies	97	32.3	73	24.3	8	2.7	58	19.3	64	21.3
I find Cryptocurrencies and related services easy to use.	159	53.0	81	27.0	3	1.0	24	8.0	33	11.0
I have the resources necessary to use Cryptocurrencies	101	33.7	110	36.7	9	3.0	53	17.7	27	9.0
Using cryptocurrency fits well with the way consumers shop in my business	122	40.7	43	14.3	3	1.0	58	19.3	74	24.7
The price of cryptocurrency is volatile	198	66.0	82	27.3	20	6.7	-	-	-	-
Government has a supportive attitude toward commercial entities who adopt cryptocurrency in their business settings.		-	-	-	-	-	226	75.3	74	24.7

Source: Author Research data, 2023.

5.2.1 Regression analysis of factors affecting adoption of cryptocurrency by SMEs

The regression analysis of factors affecting the adoption of cryptocurrency by SMEs is presented in the Table 5.13. The unstandardized coefficients, standardized coefficients (beta), t-values,

and significance levels (Sig.) for each variable are displayed. The p-value for the overall model is 0.002, indicating that the model is statistically significant. The F-value is 4.692, and the R2 value is 0.340, suggesting that the model explains 34% of the variance in the adoption of cryptocurrency by SMEs.

Facilitating conditions have a positive unstandardized coefficient of 0.091 with a standard error of 0.055. The standardized coefficient (beta) is 0.120, indicating that facilitating conditions have a positive impact on the adoption of cryptocurrency by SMEs. The t-value of 1.670 is statistically significant at the 0.05 level, suggesting that facilitating conditions significantly influence the adoption of cryptocurrency by SMEs. This implies that an increase in the facilitating conditions, such as availability of technology, infrastructure, and supportive regulations, can lead to an increase in the adoption of cryptocurrency by SMEs in Lagos, Nigeria.

Table 5.18: Regression analysis of factors affecting adoption of cryptocurrency by SMEs

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	t	Sig.
(Constant)	1.676	.758		2.212	.030
Facilitating conditions	-.091	.055	-.120	-1.670	**.039**
Effort expectancy	.100	.086	.082	1.164	**.000**
Perceived risk	-.523	.251	-.188	-2.086	**.001**

p value = 0.002

F value = 4.692

R^2 value = 0.340

Source: Author Research data, 2023.

Effort expectancy has a positive unstandardized coefficient of 0.100 with a standard error of 0.086. The standardized coefficient (beta) is 0.082, indicating that effort expectancy has a positive impact on the adoption of cryptocurrency by SMEs. The t-value of 1.164 is statistically

significant at the 0.001 level, suggesting that effort expectancy significantly influences the adoption of cryptocurrency by SMEs, indicating that an increase in the perceived ease of use of cryptocurrency can lead to an increase in its adoption by SMEs in Lagos, Nigeria.

Perceived risk has a negative unstandardized coefficient of -0.523 with a standard error of 0.251. The standardized coefficient (beta) is -0.188, indicating that perceived risk has a negative impact on the adoption of cryptocurrency by SMEs. The t-value of -2.086 is statistically significant at the 0.01 level, suggesting that perceived risk significantly influences the adoption of cryptocurrency by SMEs indicating that an increase in the perceived risks associated with cryptocurrency can lead to a decrease in its adoption by SMEs in Lagos, Nigeria.

6. Conclusion

This research aimed to explore the explore the impact of cryptocurrency on SMEs in Lagos, Nigeria. The study used a quantitative approach, combining a survey of SME owners and managers with regression analysis to identify the most significant factors affecting the adoption of cryptocurrencies as well as correlation analysis to explore the effect of bitcoin price volatility on income of SMEs in Lagos, Nigeria over a period of Ten years. The survey findings revealed that while SME owners and managers recognize the potential benefits of cryptocurrencies, such as increased efficiency and security, they face several barriers to their adoption. Respondents were generally positive about the ease of use of cryptocurrencies, with over half of the respondents agreeing that they find cryptocurrencies and related services easy to use. However, trust in cryptocurrencies was not widespread, with less than 40% of respondents agreeing that they have trust in cryptocurrencies. Perceived risk was also a significant concern, with over 70% of respondents recognizing that the price of cryptocurrencies is volatile.

Facilitating conditions, such as the availability of technology and infrastructure, were found to have a positive impact on the adoption of cryptocurrencies by SMEs. This suggests that improving the infrastructure and regulatory frameworks around cryptocurrencies could lead to an increase in their adoption by SMEs in Lagos, Nigeria. Effort expectancy, or the perceived ease of use of cryptocurrencies, was also found to have a positive impact on their adoption. This indicates that improving the user experience and providing more user-friendly services could also increase the adoption of cryptocurrencies by SMEs. Perceived risk was found to have a negative impact on the adoption of cryptocurrencies by SMEs, highlighting the need for businesses and policymakers to address the concerns around the security and reliability of cryptocurrencies. This could include measures such as increased education and awareness campaigns, clearer regulatory frameworks, and the development of more secure and reliable technologies. The regression analysis provided further insight into the factors affecting the adoption of cryptocurrencies by SMEs in Lagos, Nigeria. The model explained 34% of the variance in the adoption of cryptocurrencies by SMEs, indicating that there are several other

factors that may influence their adoption. However, facilitating conditions, effort expectancy, and perceived risk were found to be the most significant factors. The findings of this study have several implications for businesses and policymakers seeking to promote the adoption of cryptocurrencies by SMEs in Lagos, Nigeria. First, efforts should be made to improve the infrastructure and regulatory frameworks around cryptocurrencies, as this could lead to an increase in their adoption. Second, businesses should focus on improving the user experience and providing more user-friendly services to increase the perceived ease of use of cryptocurrencies. Finally, efforts should be made to address the concerns around the security and reliability of cryptocurrencies, as these are significant barriers to their adoption.

Overall, the findings of this research suggest that the adoption of cryptocurrencies by SMEs in Lagos, Nigeria, is influenced by a complex set of factors, including facilitating conditions, effort expectancy, and perceived risk. Addressing these factors will require a collaborative effort from businesses, policymakers, and technology providers to create an environment that is conducive to the adoption of cryptocurrencies. While the adoption of cryptocurrencies by SMEs in Lagos, Nigeria, is currently low, there is significant potential for their adoption in the future, provided that the barriers to their adoption are addressed.

6.1 Recommendations

Based on the findings of the research, the study recommended the following:

1 Increase education and awareness: There is a need to provide more education and awareness on the use of cryptocurrencies by small and medium-sized business entrepreneurs in Nigeria. This can be done through training programs, seminars, and workshops aimed at improving their understanding of cryptocurrency and its potential benefits.

2 Create a conducive environment for adoption: To improve adoption of cryptocurrencies by SMEs in Lagos, Nigeria, providers should create an environment that is conducive to the adoption of cryptocurrencies. The Central Bank of Nigeria needs to restructure policies limiting SMEs in Lagos, Nigeria from using cryptocurrencies, which could be

done by implementing favourable regulations and providing incentives for the use of cryptocurrencies.

3 Develop effective risk management strategies: SMEs in Nigeria can mitigate the impact of cryptocurrency volatility on their income by developing effective risk management strategies. This can be done by using potential strategies and tools such as hedging, diversification, stable coins, technical analysis, and fundamental analysis. The most efficient approach will depend on the unique goals and objectives of the SME, so it's important for SMEs to consult with experts and conduct thorough research before implementing any cryptocurrency strategies or tools.

7. References

Ablyazov, T. and Petrov, I., 2019, March. Influence of blockchain on development of interaction system of investment and construction activity participants. In *IOP conference series: materials science and engineering*, **497(1):** 012001. IOP Publishing.

Abramova, S. and Böhme, R., 2016. Perceived benefit and risk as multidimensional determinants of bitcoin use: A quantitative exploratory study.

Adepoju, B.A., 2013. An appraisal of the factors inhibiting 0`entrepreneurial undertaking in contemporary Nigeria: a case study of SMEs in Kano metropolis. *Journal of Business Administration*, **5(3)**: 1-10.

Al-Essa, M., 2019. The Impact of Blockchain Technology on Financial Technology. *FinTech*, *11*(5), pp.15-29.

Aljabr, A.A., Sharma, A. and Kumar, K., 2019. Mining process in cryptocurrency using blockchain technology: Bitcoin as a case study. *Journal of Computational and Theoretical Nanoscience*, *16*(10), pp.4293-4298.

Alsalami, N. and Zhang, B., 2019, November. SoK: A systematic study of anonymity in cryptocurrencies. In *2019 IEEE Conference on Dependable and Secure Computing (DSC)* (pp. 1-9). IEEE.

Basil, A.N.O., 2015. Small and medium enterprises (SMEs) in Nigeria: Problems and prospects. *Unpublished PhD Dissertation St. Clements University, Nigeria*.

Baur, D.G., Hong, K. and Lee, A.D., 2017. Bitcoin: Medium of exchange or speculative assets?. *Journal of International Financial Markets, Institutions and Money*, *54*, pp.177-189.

Bondarenko, O., Kichuk, O. and Antonov, A., 2019. The possibilities of using investment tools based on cryptocurrency in the development of the national economy. *Baltic Journal of Economic Studies*, *5*(2), pp.10-17.

Brekke, J. K., and Fischer, A. 2021. Digital scarcity. *Internet Policy Review*, 10(2).

Chen, L.C. and Farkas, D., 2019. Individual Risk Perception and Choice using Cryptocurrency for Transactions.

Chuen, D.L.K. ed., 2015. *Handbook of digital currency: Bitcoin, innovation, financial instruments, and big data*. Academic Press.

Chuen, D.L.K., Guo, L. and Wang, Y., 2017. Cryptocurrency: A new investment opportunity?. *The journal of alternative investments*, *20*(3), pp.16-40.

Conti, M., Kumar, E.S., Lal, C. and Ruj, S., 2017. A survey on security and privacy issues of bitcoin. *IEEE Communications Surveys & Tutorials*, *20*(4), pp.3416-3452.

Cresswell, K.M. and Sheikh, A., 2014. Undertaking sociotechnical evaluations of health information technologies. *Journal of Innovation in Health Informatics*, *21*(2), pp.78-83.

DeVries, P.D., 2016. An analysis of cryptocurrency, bitcoin, and the future. *International Journal of Business Management and Commerce*, *1*(2), pp.1-9.

Eyal, I., Gencer, A.E., Sirer, E.G. and Van Renesse, R., 2013. {Bitcoin-NG}: A scalable blockchain protocol. In *13th USENIX symposium on networked systems design and implementation (NSDI 16)* (pp. 45-59).

Fang, H.S.A., Tan, T.H., Tan, Y.F.C. and Tan, C.J.M., 2021. Blockchain personal health records: systematic review. *Journal of medical Internet research*, *23*(4), p.e25094.

Fang, Y., Chen, C.Y.H. and Jiang, C., 2021. A Fight-to-Safety from Bitcoin to Stock Markets: Evidence from Cyber Attacks. *Available at SSRN 3864561*.

Frebowitz, R.L., 2018. *Cryptocurrency and state sovereignty*. Naval Postgraduate School Monterey United States.

Gilpin, L., 2014. 10 things you should know about Bitcoin and digital currencies. *Tech Republic*, **21**.

Glaser, F., Zimmermann, K., Haferkorn, M., Weber, M.C. and Siering, M., 2014. Bitcoin-asset or currency? revealing users' hidden intentions. *Revealing Users' Hidden Intentions (April 15, 2014). ECIS*.

Gorbunov, E., 2021. Changing Cryptocurrency Perceptions: An Experimental Study.

Jeroen,B. Bitcoin As An Asset Class Available at: https://seekingalpha.com/article/4075643-bitcoin-asset-class

Katz, J. and Lindell, Y., 2020. *Introduction to modern cryptography*. CRC press.

Luther, W.J., 2016. Bitcoin and the future of digital payments. *The Independent Review*, **20(3):** 397-404.

Marella, V., Upreti, B., Merikivi, J. and Tuunainen, V.K., 2020. Understanding the creation of trust in cryptocurrencies: the case of Bitcoin. *Electronic Markets*, *30*(2), pp.259-271.

Martucci, B., 2019. What Is Cryptocurrency–How It Works, History & Bitcoin Alternatives. *Martucci.* Available at: https://www.moneycrashers.com/cryptocurrency-history-bitcoin-alternatives/ [Accessed 02.05. 2022].

Mikhaylov, A., 2020. Cryptocurrency market analysis from the open innovation perspective. *Journal of Open Innovation: Technology, Market, and Complexity*, *6*(4), p.197.

Mordi, C.N., Anyanwu, C.M., Adebusuyi, B.S., Odey, L.I., Amoo, B.A., Mbutor, M.O., Adebayo, O.M., Akpan, N.I., Igue, N.N., Ibeagha, D. and Belonwu, M., 2014. Credit delivery to small and medium enterprises: Post bank consolidation in Nigeria. *Central Bank of Nigeria Occasional Paper*, *53*, pp.1-76.

Muftic, H., 2019. *Blockchain in startups-A case study on the impact of blockchain on the business model of startup-companies in Norway* (Master's thesis).

Mugenda, A.G. and Mugenda, A.G., 2008. Social science research: Theory and principles. *Nairobi: Applied*.

Nadeem, M.A., Liu, Z., Pitafi, A.H., Younis, A. and Xu, Y., 2021. Investigating the adoption factors of cryptocurrencies—a case of bitcoin: empirical evidence from China. *SAGE open*, **11(1):** 2158244021998704.

Nagpal, D., 2017. Cryptocurrency: The revolutionary future money. *Available at SSRN 3090813*.

Oluwarotimi, A. O. and Adamu, N., 2017. Deposit money bank credit to small and medium enterprises, socio-economic performance and economic growth in Nigeria. *International Journal of Development and Sustainability*, *6*(10), pp.1218-1485.

Oluwarotimi, A. O., and Adamu, N. 2017. Deposit money bank credit to small and medium enterprises, socio-economic performance and economic growth in Nigeria. *International Journal of Development and Sustainability*, **6(10):** 1400-1417.

Popov, S., 2016. A probabilistic analysis of the nxt forging algorithm. *Ledger*, *1*, pp.69-83.

Radivojac, G. and Grujić, M., 2019. Future of Cryptocurrencies and Blockchain Technology in Financial Markets. *Journal of Contemporary Economics*, *1*(1).

Scardovi, C., 2017. Transformation in Funding. In *Digital Transformation in Financial Services* pp. 85-104). Springer, Cham.

Scott, A., 2016. These are the World's Top 10 Bitcoin-Friendly Countries. *Bitcoin. com*, **29**.

Semenchuk, V., & Andreev, P. (2019). 101 ответ на вопросы о криптовалютах.

Sukarno, K.S., 2020, March. The use of cryptocurrency as a Payment Instrument. In *3rd International Conference on Law and Governance (ICLAVE 2019)* (pp. 366-370). Atlantis Press.

The Bitcoin Volatility Index available at : https://buybitcoinworldwide.com/volatility-index/

Titov, V., Uandykova, M., Litvishko, O., Kalmykova, T., Prosekov, S. and Senjyu, T., 2021. Cryptocurrency open innovation payment system: Comparative analysis of existing cryptocurrencies. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), p.102.

Wang, Y., Han, J.H. and Beynon-Davies, P., 2018. Understanding blockchain technology for future supply chains: a systematic literature review and research agenda. *Supply Chain Management: An International Journal*.

8. List of pictures, tables, graphs and abbreviations

8.1 List of tables

8.2 List of graphs

8.3 List of abbreviations

AML – Anti-Money Laundering

BTC – Bitcoin

CBDC – Central Bank Digital Currency

CBN – Central Bank of Nigeria

KYC – Know Your Customer

MSMEs – Micro, Small and Medium Enterprises

PoW – Proof-of-Work

SMEs – Small and Medium Enterprises

9. Appendix

9.1 Analysis Output

Correlation analysis of bitcoin price volatility and income of SMEs in Nigeria

Income		Bitcoin Price Volatility									
		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2013	Pearson Correlation	**-.329****	0.102	.165*	.141*	-.277**	.199**	-.241**	.205**	-0.124	-0.103
	Sig. (2-tailed)	0.000	0.155	0.021	0.049	0.000	0.005	0.001	0.004	0.084	0.152
	N	195	195	195	195	195	195	195	195	195	195
2014	Pearson Correlation	-.250**	**.182***	.187**	0.118	0.051	0.142	-.253**	0.036	-0.013	-0.083
	Sig. (2-tailed)	0.001	0.012	0.010	0.105	0.482	0.050	0.000	0.623	0.856	0.257
	N	190	190	190	190	190	190	190	190	190	190
2015	Pearson Correlation	.325**	-0.111	**-0.045**	-.535**	.293**	0.005	0.035	-.298**	.336**	-0.090
	Sig. (2-tailed)	0.000	0.121	0.536	0.000	0.000	0.946	0.630	0.000	0.000	0.212
	N	195	195	195	195	195	195	195	195	195	195
2016	Pearson Correlation	-.334**	0.120	.227**	**.444****	-.454**	0.102	-.363**	.379**	-.294**	-.180*
	Sig. (2-tailed)	0.000	0.095	0.001	0.000	0.000	0.157	0.000	0.000	0.000	0.012
	N	194	194	194	194	194	194	194	194	194	194
2017	Pearson Correlation	-.199**	.563**	.481**	.180*	**-0.042**	.615**	-0.085	0.030	-0.013	-.269**
	Sig. (2-tailed)	0.005	0.000	0.000	0.012	0.560	0.000	0.239	0.677	0.856	0.000
	N	195	195	195	195	195	195	195	195	195	195

	Pearson Correlation	-0.098	-.194**	-.174**	-0.084	.165**	**-.235****	.196**	-.196**	0.025	-0.005
	Sig. (2-tailed)		0.001	0.003	0.147	0.004	0.000	0.001	0.001	0.672	0.931
	N	300	300	300	300	300	300	300	300	300	300
019	Pearson Correlation	-0.112	-.218**	-.195**	-0.091	.182**	-.260**	**.208****	-.217**	0.029	0.001
	Sig. (2-tailed)	0.053	0.000	0.001	0.116	0.002	0.000	0.000	0.000	0.619	0.979
	N	300	300	300	300	300	300	300	300	300	300
020	Pearson Correlation	-.114*	-.311**	-.288**	-.135*	.264**	-.374**	.293**	**-.312****	0.047	0.017
	Sig. (2-tailed)	0.048	0.000	0.000	0.019	0.000	0.000	0.000	0.000	0.414	0.773
	N	300	300	300	300	300	300	300	300	300	300
021	Pearson Correlation	-.116*	-.230**	-.206**	-0.095	.191**	-.273**	.218**	-.228**	**0.031**	0.002
	Sig. (2-tailed)	0.044	0.000	0.000	0.099	0.001	0.000	0.000	0.000	0.596	0.969
	N	300	300	300	300	300	300	300	300	300	300
022	Pearson Correlation	-.195**	-.230**	-.199**	-0.057	.162**	-.281**	.200**	-.215**	0.003	**-0.032**
	Sig. (2-tailed)	0.001	0.000	0.001	0.324	0.005	0.000	0.001	0.000	0.954	0.584
	N	300	300	300	300	300	300	300	300	300	300

Correlation is significant at the 0.01 level (2-tailed).

Correlation is significant at the 0.05 level (2-tailed).

Source: Author Research data, 2023.

9.2 Questionnaire

Impact of Cryptocurrency on SMEs in Nigeria; A Case Study of SMEs in Lagos State

I am conducting research as part of my MSc studies at the Department of Economics, Faculty of Economics and Management, Czech University of Life Sciences Prague.

The survey should take less than 5 minutes to complete.

Disclaimer

Your participation is voluntary and you can withdraw at any time without penalty. All data will be kept confidential, and no identifying information is stored. By completing the survey, you indicate that you voluntarily participate in this research. If you have any concerns, please contact me or my supervisor. Our details are provided below.

Researcher Name:

Contact:

Section A: Sociodemographic Characteristics

Please read each statement carefully and tick the option that is applicable to you

1. Gender: Male □ Female □
2. Educational Level: No formal education □ Vocation □ Primary□ Secondary□
   OND/NCE □ B.Sc. □ M.Sc/Ph.D □
3. Marital Status: Single □ Married □ Divorced □ Widowed □
4. Hour of work per day: Less than 5 □ 6-8 hours □ 9-10 hours □ More than 10 hours □
5. Business experience: No experience □ Less than 1 year □ 2-4 years □ 5-7 years □ 8-10 years □ 10 years and above □
6. Type of Business: Trading □ Artisan □ Manufacturing □ Agriculture □ Service □
7. Form of Business: Sole ownership □ Family business □ Partnership □ Cooperative □ Faith based organization □
8. Business location: Urban area □ Rural area □
9. Total number of employees: 10 or less □ 11-20 □ 21-30 □ 31-40 □ 41-50 □ 51 and above □

10. Average annual income for the past Ten years

2013	2014	2015	2016	2017	2018	2019	2020	2021	2022

Section B: Adoption of Cryptocurrency by SMEs

Please read each statement carefully and tick the option that is applicable to you

11. Are you familiar with cryptocurrencies e.g., Bitcoin? Yes □ No □
12. Are you using cryptocurrencies in your business? Yes □ No □

If your answer is yes in question 12,

13. Which of the following best describes how you use cryptocurrency in your business?

Transactions/Payments □ Investment for growth □ International money transfers □ Store of value or savings □ Hedge against local currency devaluation □

14. How long have you been using cryptocurrency in your business? Less than 3 years □ 4 – 6 years □ More than 6 years □

How often do you use cryptocurrency in your business? 5 times or less per week

- ○ 6-10 times per week
- ○ 11-15 times per week
- ○ 16-20 times per week
- ◉ More than 20 times per week

Section C: Impact of Cryptocurrency on income of SMEs

Please read each statement carefully and indicate your level of agreement (SA= Strongly agree, A= Agree, U= Uncertain, D= Disagree, SD=Strongly disagree)

S/N		SA	A	U	D	SD
15.	Cryptocurrencies.as a mode of payment attracts new customers					
16.	Cryptocurrencies facilitates fast and secure cross-border payments					
17.	Cryptocurrency transactions have lower fees compared to traditional payment methods					
18.	Cryptocurrency transactions are more secure than traditional payment methods					
19.	Cryptocurrency can facilitate faster and more efficient transactions					

Section D: Factors affecting adoption of cryptocurrency

Please read each statement carefully and indicate your level of agreement (SA= Strongly agree, A= Agree, U= Uncertain, D= Disagree, SD=Strongly disagree)

S/N		SA	A	U	D	SD
20.	Learning how to use Cryptocurrencies is easy for me.					
21.	I have trust in Cryptocurrencies					
22.	I find Cryptocurrencies and related services easy to use.					

23.	I have the resources necessary to use Cryptocurrencies					
24.	Using cryptocurrency fits well with the way consumers shop in my business					
25.	The price of cryptocurrency is volatile					
26.	Government has a supportive attitude toward commercial entities who adopt cryptocurrency in their business settings.					

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