

Blockchain, Cryptocurrency, and the Quest for Financial Stability in Morocco

Blockchain, Cryptomonnaie et la Quête de la Stabilité Financière au Maroc

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Abstract:

The study explains how blockchain and cryptocurrency are transforming the Moroccan financial landscape. It tries to comprehend how these developing technologies, with their promises of decentralization and increased efficiency, may shape Morocco's future financial stability. The article begins by introducing the reader to the fundamental ideas of blockchain and cryptocurrency. A thorough literature analysis recounts past and contemporary studies on the subject, providing a context against which Moroccan progress is judged. Morocco's approach to blockchain and cryptocurrencies has been cautious yet forward-thinking. While these technologies offer prospects for increased transparency, diversification of financial assets, and transactional efficiency, they also create problems. Notably, the volatile nature of bitcoin prices, along with a nascent regulatory structure, poses serious challenges to financial stability.

The paper reveals significant gaps in current research, specifically the scarcity of studies contextualized within Morocco's distinct socioeconomic setting. These deficiencies provide a direction for future academic and policy-oriented research. To fully realize the potential of blockchain and cryptocurrencies in Morocco, a balanced strategy is required—one that actively supports innovation while remaining within a regulated legal framework. The realities of such a strategy are investigated, providing policymakers and industry stakeholders with actionable insights. This study is one of the first to look into the complexities of blockchain and cryptocurrencies in Morocco, filling a critical knowledge gap. While many studies investigate these technologies on a worldwide basis, this study takes a different approach, concentrating on their consequences within Morocco's distinct socioeconomic fabric. The findings are valuable to both academics and practitioners, providing a road map for navigating Morocco's young but developing crypto-financial sector.

Keywords : Blockchain, Cryptocurrency, Financial Stability, Moroccan financial ecosystem.

ClassificationJEL : D53, E44, E52, E58, G18, G21, O33, O55

Paper type : Theoretical Research

1. Introduction

At the dawn of the 21st century, the financial sphere is undergoing an unprecedented transformation, driven by technological advancements. Blockchain technology and cryptocurrencies are at the forefront of this revolution, redefining traditional paradigms of finance and trade. While these advancements appear promising, they also present a complex set of challenges and opportunities, especially for emerging economies like Morocco. Positioned at the crossroads of Africa, Europe, and the Middle East, Morocco is favorably situated to leverage these technological advancements while cautiously navigating the uncharted waters of regulation and financial stability.

Blockchain technology, coupled with the rise of cryptocurrencies, is reshaping the contours of the global financial landscape. These innovations, although still in their infancy, have the potential to disrupt traditional financial systems, offering more transparent, secure, and decentralized transaction mechanisms.

Morocco, as a developing nation with a burgeoning economy, stands at a strategic crossroads, tasked with navigating this new landscape while ensuring financial stability for its citizens. According to Moghar Adil and Oukili Asraoui Fadi (2022), there's vast potential for blockchain and cryptocurrencies, which could significantly impact various sectors, particularly the financial one. However, this promise comes with a set of challenges. The volatility of cryptocurrencies, coupled with the lack of clear regulation, can jeopardize financial stability. Additionally, Sarita Mishra Kolhe (2022) emphasizes that the lack of regulation and the decentralized nature of cryptocurrencies might raise concerns about their use for illicit activities. On the other hand, blockchain technology, upon which cryptocurrencies are built, offers distinct advantages in terms of efficiency and transparency. The research of Md. Mainul Islam and H. In (2023) suggests that incorporating blockchain into systems like central bank digital currencies could strike a delicate balance between privacy, transparency, and regulatory compliance.

The way Morocco approaches and integrates these innovations will largely determine its economic and financial future as it strives to solidify its position as a regional financial hub. Blockchain technology, with cryptocurrencies as its primary derivative, has the potential to reshape the global financial landscape. While some view them as an opportunity to enhance financial stability, others fear they might threaten it. Morocco, with its vibrant economy and strategic position in North Africa, stands at the crossroads of this revolution.

The blockchain technology, with cryptocurrencies as its main derivative product, has the potential to reshape the global financial landscape. While some see them as an opportunity to strengthen financial stability, others fear they might threaten it. Morocco, with its dynamic economy and strategic position in North Africa, finds itself at the crossroads of this revolution.

This study aims to delve deep into the potential effects of blockchain and cryptocurrencies on Morocco's financial stability. It seeks to illuminate the benefits of these technologies while addressing the genuine concerns that surround their adoption. As Morocco stands at the crossroads of this digital revolution, the economic future of the nation hinges on a nuanced understanding of the opportunities and challenges presented by this new era.

Next, we present three fundamental questions concerning the interoperability of blockchain and cryptocurrencies that guide our analysis in the context of Morocco's pursuit of financial stability.

Research Question 1: How can blockchain and cryptocurrencies be effectively and securely integrated into the Moroccan financial ecosystem?

Contribution: A detailed exploration of the mechanisms through which Morocco can integrate these technologies, with an emphasis on security, regulation, and the promotion of innovation.

Research Question 2: What tangible benefits can Morocco derive from the adoption of cryptocurrencies, and how can they be maximized?

Contribution: An analysis of the economic and financial opportunities provided by cryptocurrencies, with recommendations on how to capitalize on these benefits.

Research Question 3: Given regulatory and security challenges, how can Morocco ensure a smooth transition to a more digitized economy?

Contribution: Strategies and recommendations for the harmonious integration of blockchain and cryptocurrencies, focusing on training, awareness, and regulation.

The subsequent sections of this article will unfold organically, starting with a comprehensive introduction and followed by a thorough review of relevant literature. This exploration will dive into the fundamental concepts of blockchain and cryptocurrency, progressing to an examination of their development within the unique context of Morocco. Regulatory considerations, the impact on financial stability, and identification of research gaps will be discussed. This journey will culminate in recommendations and implications for the future, offering a guide for Morocco to navigate the integration of blockchain and cryptocurrencies into its economic fabric.

2. Literature Review and studies comparison

2.1. Preliminaries

As we embark on an exploration of the profound implications of blockchain technology and cryptocurrencies on Morocco's financial stability, it is essential to lay the groundwork by acquainting ourselves with fundamental terms and concepts. The disruptive potential inherent in these innovations, particularly within the financial domain, has sparked significant academic interest. Therefore, before delving into the heart of our inquiry, we must navigate through the preliminary terrain to ensure a comprehensive understanding.

Blockchain technology and cryptocurrencies stand as the linchpins of this digital revolution, reshaping traditional financial paradigms. Blockchain, a decentralized and transparent ledger, underpins the functioning of cryptocurrencies, offering secure and verifiable transactions. Cryptocurrencies, digital or virtual currencies, leverage cryptographic techniques for secure financial transactions, challenging the conventional notion of centralized financial systems.

Given the transformative potential of blockchain and cryptocurrencies, an in-depth literature review becomes imperative. Academic studies exploring their impact on financial stability, particularly within the Moroccan context, provide essential insights. This review not only illuminates the existing landscape but also guides our understanding of the challenges and opportunities that lie ahead.

2.2. Literature Review and Empirical Insights into Blockchain and Cryptocurrencies

In exploring the vast array of research on blockchain technology and cryptocurrencies, valuable insights emerge that deepen our comprehension of how they impact financial stability. Several key studies contribute significantly to this body of knowledge and as we delve into the expansive body of literature surrounding cryptocurrencies, we encounter a crucial nexus where the complex interrelationship between these digital assets and the broader scope of monetary policies comes to the fore.

Empirical studies have provided valuable insights into their multifaceted impacts across various sectors. The seminal work of Nakamoto (2008) introduced Bitcoin, the pioneering decentralized digital currency, which laid the groundwork for subsequent empirical analyses. Empirical research, such as the studies by Foley, Karlsen, and Putniņš (2019), has revealed

the significant role of cryptocurrencies in financing illicit activities, shedding light on the darker side of their usage.

One of the prominent findings pertains to the transformative potential of blockchain technology. Research by Mancini-Griffoli et al. (2018) delves into the realm of central bank digital currencies (CBDCs), elucidating how these innovations can enhance transparency and efficiency in financial transactions. Additionally, the empirical evidence showcases the promise of blockchain in enabling financial inclusion, as highlighted in studies exploring its impact on unbanked populations (Mancini-Griffoli et al., 2018; Nakamoto, 2008).

However, empirical analyses also underscore the challenges intertwined with cryptocurrencies. Volatility remains a prevalent concern, as evidenced by substantial price fluctuations observed in cryptocurrencies like Bitcoin (Foley et al., 2019). These price swings not only impact the perceived stability of cryptocurrencies but also raise questions about their viability as investment vehicles (Yermack, 2015).

Regulatory uncertainties and the potential for facilitating illicit transactions through cryptocurrencies have also been focal points of empirical investigation (Gensler, 2019; Shadab, 2017). Studies have scrutinized the regulatory landscape, emphasizing the need for frameworks that balance innovation with the prevention of illicit activities and consumer protection.

Moreover, the evolution of central bank digital currencies (CBDCs) has emerged as a significant area of research interest. Garratt, Ritter, and Schlag (2018) delve into the quest for minimally invasive technology, exploring how CBDCs might be integrated into existing monetary systems while ensuring regulatory oversight and stability.

To present these empirical findings comprehensively, empirical data sets and statistical analyses have been utilized. Various research methodologies, such as econometric models and regression analyses, have been applied to evaluate the relationships between cryptocurrency volatility, market behavior, and regulatory implications (Foley et al., 2019; Yermack, 2015).

2.3. The Monetary Policy Landscape

Before delving into the specifics of cryptocurrency, it is imperative to contextualize this exploration within the broader monetary policy framework. Monetary policy, traditionally governed by central banks, plays a fundamental role in influencing economic parameters such as inflation, interest rates, and money supply. Central banks, through monetary policy tools, aim to maintain stability and foster economic growth. In the vast domain of monetary policy, traditionally governed by central banks, seminal studies such as those by Taylor (1993) and Svensson (1997) underscore the fundamental role these institutions play in shaping economic parameters. Armed with an arsenal of diverse monetary policy tools, central banks endeavor to maintain stability and nurture economic growth.

Taylor's groundbreaking study (1993) meticulously examined the practical implications arising from the balancing act central banks face between discretionary decision-making and adherence to predefined policy rules in the realm of monetary policy. His work focused on elucidating the advantages associated with clear, predictable rules in fostering and preserving economic stability. Svensson's contribution (1997) expanded the horizon of inflation targeting, a monetary policy approach where central banks fine-tune their strategies to achieve a specific inflation rate. His study delved into potential extensions of this approach, shedding light on its role in maintaining economic equilibrium.

2.3.1. Cryptocurrency: A Disruptive Element

Cryptocurrencies, decentralized digital assets, introduce a disruptive element into this established monetary policy landscape. Unlike traditional currencies, cryptocurrencies operate independently of central bank control, relying on blockchain technology for secure and

transparent transactions. The decentralized nature challenges the conventional tools and mechanisms wielded by central banks. The emergence of cryptocurrencies, epitomized by the likes of Bitcoin and Ethereum, signifies a disruptive force within the established landscape of monetary policy. Nakamoto's seminal paper (2008) introduced a decentralized digital currency—Bitcoin—that operates autonomously, leveraging blockchain technology for secure and transparent transactions. This revolutionary concept of decentralized currency challenged traditional notions of monetary control, fostering debates on regulatory frameworks and their adaptation to these novel financial instruments.

2.3.2. Regulatory Challenges and Responses

The disruptive nature of cryptocurrencies has precipitated regulatory challenges on a global scale. The emergence of cryptocurrencies has precipitated a series of regulatory challenges for monetary authorities. The absence of a central authority poses difficulties in implementing traditional monetary policy tools, such as interest rate adjustments or money supply regulation. As a result, regulators worldwide are grappling with the task of adapting their frameworks to accommodate this novel financial paradigm.

Renowned figures such as Roubini (2018) and Gensler (2019) have highlighted the absence of a centralized authority as a significant impediment in implementing traditional monetary policy tools in the context of cryptocurrencies. Regulatory bodies worldwide, including the Financial Stability Oversight Council (FSOC) and the Financial Stability Board (FSB), are grappling with the task of reshaping their frameworks to accommodate this innovative financial paradigm. Md. Mainul Islam and H. In's work (2023) contributes to this discourse by scrutinizing central bank digital currencies built on blockchain technology. Their suggestions concerning regulatory compliance and the delicate balance between privacy and transparency provide valuable considerations for integrating digital currencies into traditional banking systems.

2.4. Impact on Money Supply and Inflation

One of the key facets of cryptocurrency's interaction with monetary policy lies in its potential impact on money supply and inflation. Cryptocurrencies often operate on a capped supply model, challenging the traditional concept of inflation dynamics influenced by central bank decisions. Insights from studies conducted by Foley et al. (2019) and Yermack (2015) illuminate how cryptocurrencies might impact money supply and inflation dynamics. Cryptocurrencies often operate on a capped supply model, challenging the conventional understanding of inflation influenced by central bank policies. Understanding the implications of this divergence is imperative in comprehending the broader economic stability implications.

2.4.1. Central Bank Digital Currencies (CBDCs)

In response to the disruptive potential of cryptocurrencies, central banks across the globe are exploring the concept of Central Bank Digital Currencies (CBDCs). Works by Mancini-Griffoli et al. (2018) and Garratt et al. (2018) delve into how CBDCs, backed by central authorities, aim to harness the benefits of blockchain technology while retaining regulatory oversight. Understanding the dynamics of CBDCs provides valuable insights into how traditional monetary institutions are adapting to this evolving financial landscape.

2.4.2. The Moroccan Context

Drawing the discourse closer to a specific context, Morocco faces unique challenges and opportunities in integrating cryptocurrencies into its monetary policy framework. While specific studies on Morocco within this context are limited, insights from broader discussions, such as Gladys's observations (2020) on global cryptocurrency adaptations, Ayesha Afzal

(2019), in which the author delves into the risks associated with cryptocurrencies and proposes regulatory solutions, laying a foundational understanding. Also, Afzal emphasizes the potential benefits of distributed ledger technology for developing nations, suggesting applications like microfinance and identification systems. Sarita Mishra Kolhe (2022) examines the influence of cryptocurrency volatility on financial stability, it emphasizes the potential negative impact of cryptocurrency volatility on financial stability, especially in emerging economies. This study highlights the challenges posed by volatile cryptocurrencies, particularly in emerging economies such as Morocco, where ensuring transaction security becomes a pressing concern.

While Adil and Fadi's study (2022) offers nuanced perspectives on public opinion regarding cryptocurrencies in Morocco. Their insights underscore the challenges faced by Moroccan regulators as they navigate this new financial landscape while striving to maintain stability. These studies gather the essential elements to look for about the risks, transaction security concerns, public opinion, and regulatory challenges faced by emerging economies like Morocco in adopting cryptocurrencies. Understanding these intricacies becomes pivotal in shaping policy frameworks for sustainable financial stability. Understanding how the dynamics of cryptocurrencies intersect with Morocco's unique economic landscape becomes crucial in shaping policy frameworks for sustainable financial stability.

Given the increasing interest and discussions worldwide on CBDCs, including in countries neighboring Morocco, such as Tunisia's exploration of a digital dinar, Moroccan policymakers and financial authorities may be monitoring these developments closely. Thus, while Morocco does not have a concrete example of a CBDC in operation as of now, it remains a part of the larger global conversation surrounding digital currencies, considering the evolving financial landscape and technological advancements.

2.5. Studies comparison and relationship

The exploration of cryptocurrency volatility stands out as a key focus in both Afzal and Mishra Kolhe's research. Afzal's viewpoint revolves around the challenges this volatility poses in terms of regulations, while Mishra Kolhe delves into its direct effects on the stability of financial systems. The capped supply model inherent in many cryptocurrencies introduces a unique dimension to the traditional understanding of inflation. Studies by Ciaian et al. (2016) and Urquhart (2016) contribute insights into how this departure from conventional inflation dynamics influences economic stability, posing challenges and opportunities for policymakers.

Moreover, regulatory solutions represent another significant aspect explored in these studies. Afzal delves deeply into enhancing oversight measures, echoing the sentiment found in the research by Md. Mainul Islam and H. In. These scholars advocate for a seamless integration of digital currencies within traditional banking systems through improved regulatory frameworks which needs a regulatory adaptation. Shadab (2017) emphasizes the need for adaptive regulation that strikes a balance between fostering innovation and safeguarding financial stability. This aligns with the ongoing discourse within global regulatory bodies.

Understanding user behavior towards cryptocurrencies emerges as another shared area of interest. Jariyapan et al. shed light on how the pandemic has influenced these behaviors, whereas Adil and Fadi offer a broader perspective on public sentiment, particularly within the context of Morocco.

In these studies, various interconnections among these variables become apparent. Mishra Kolhe highlights the potential adverse consequences of cryptocurrency volatility on financial stability. Conversely, Afzal (2019) suggests that with well-thought-out regulations, trust in cryptocurrencies can be nurtured. Additionally, Jariyapan et al. emphasize that as perceived

risks associated with cryptocurrencies increase, the willingness of individuals to engage with them may diminish. Also, Afzal (2019) and Md. Mainul Islam and H. In (2023) delve into regulatory solutions and propose ways to improve oversight and integrate digital currencies with traditional banking systems. These relationships between volatility, regulation, user sentiment, and intent to use cryptocurrencies offer a multifaceted understanding of this evolving financial landscape.

2.6. Theoretical model suggestion

This dual exploration of cryptocurrency within the realm of monetary policy offers a comprehensive understanding of the challenges and opportunities at the intersection of these two domains. As we peer into the future, considerations from studies by Osterrieder et al. (2020) and Chiu et al. (2021) on technological advancements in finance and central bank digital currencies inform our anticipation of the evolving landscape. Morocco, with its unique economic context, stands at the cusp of navigating these dynamics, with potential implications for its monetary policy frameworks and financial stability. From these insights, one could conceptualize a theoretical model. This model would posit cryptocurrency volatility as a primary factor influencing both regulatory responses and financial stability. These regulatory actions, in turn, shape public trust and perceptions, ultimately determining the adoption rates of these digital assets. External and internal factors, ranging from global occurrences like pandemics to the specific economic health of a nation, further influence this dynamic. Overall, as Morocco navigates the integration of cryptocurrencies, the balance between embracing innovation and ensuring financial stability becomes crucial.

3. Cryptocurrency and Blockchain

3.1. Cryptocurrency

Although they are a means of payment, cryptocurrencies are digital (virtual) currencies that are not yet strictly regulated by law in most states. Many people, including IT professionals and programmers, are not well-acquainted with this topic, and the general public often confuses the terms blockchain and bitcoin. The emergence of bitcoin gave birth to the utopian idea that mathematics and physics can solve social problems (M. Lukinović, 2019). Notable figures such as Satoshi Nakamoto (2008), Andreas M. Antonopoulos (2014), Chris Burniske, (2017) and others have shared their thoughts and explanations on what cryptocurrencies are and how they work. Definitions vary based on differences in technical, economic, social, and regulatory domains.

For example, Nakamoto emphasized decentralization and the absence of intermediaries in his famous Bitcoin white paper (2008), where he described Bitcoin as "a peer-to-peer electronic cash system" that allows direct online payments between parties without going through a financial institution. Similarly, Narayanan et al. describe cryptocurrency as "a currency system."

Since the emergence of Bitcoin in 2008, the diversity of cryptocurrencies has increased. Today, there is a variety of cryptocurrencies, each with its unique characteristics and objectives. (1) **Major cryptocurrencies**, like Bitcoin, created by Satoshi Nakamoto, continue to be the most decentralized digital currency for peer-to-peer exchanges. Litecoin, created by Charlie Lee in 2011, is often viewed as a faster alternative to Bitcoin. On the other hand, Ethereum, introduced by Vitalik Buterin in 2015, brought (2) **smart contracts and decentralized applications**, revolutionizing the world of cryptocurrencies. (3) **Privacy coins** like Monero and Zcash ensure transactions are conducted anonymously. By being pegged to fiat currencies like the US dollar, stablecoins like Tether offer stable value. (4) **Utility tokens**,

like Binance Coin, often represent access to specific services, while (5) **non-fungible tokens (NFTs)** signify ownership of unique items, especially in the artistic domain. Finally, (6) exchange cryptocurrencies like Ripple and Stellar were created to facilitate fast global financial transactions. This vast cryptocurrency ecosystem continues to evolve, offering various solutions for different needs.

3.2. Blockchain

According to G. Caldarelli and J. Ellul (2021), blockchain is a technology that allows for the creation of transparent and flawless protocols that operate without intermediaries. It is at the heart of decentralized finance (DeFi), aiming to use this technology to transform conventional financial products. Because of the decentralization concept, the blockchain, which uses cryptocurrency, is a paradigm shift in how data is stored, retrieved, and verified. A distributed database contains the history of all exchanges between its users since its inception. Each block of this database contains a set of transactions.

A block is added to the chain in a linear and chronological manner once validated. Cryptographic methods secure each addition, ensuring the integrity and immutability of the data. This technology focuses on payment clauses in construction contracts and ensures the security of financial transactions (Rowaid Ibrahim, Ahmed A. Harby, Mohamed Salem Nashwan, A. Elhakeem ,2022). Without taxes and with payments much easier on a national scale, all transactions are much faster than bank transactions. It has evolved into several variants to meet various needs, but its decentralized and transparent nature offers innovative prospects while raising questions about its scalability, regulation, and integration into existing systems :

3.2.1. Public Blockchain:

The public blockchain is an open platform where anyone can join and participate in the network. It is completely transparent, meaning every transaction is public, and any participant can verify it. Bitcoin, created in 2008 by a person or organization under the pseudonym Satoshi Nakamoto, is the first and most famous example of a public blockchain. Typically, the consensus process of this type of blockchain is decentralized, allowing anyone to participate in validating transactions.

3.2.2. Private Blockchain:

Unlike the public blockchain, the private blockchain is reserved exclusively for an organization or a group of actors. Access is limited, and permissions are managed centrally. Companies frequently use these blockchains for internal applications where privacy and control are essential. While the original idea of the blockchain is decentralized and public, various researchers and companies have developed the private blockchain concept to meet specific needs.

3.2.3. Consortium Blockchain:

This variety is a compromise between private and public blockchains. In a consortium blockchain, network responsibility is shared among several pre-approved organizations. This allows for the combination of the transparency of public blockchains and the control of private blockchains. Groups and initiatives like R3 and its product Corda have popularized the consortium blockchain concept.

3.2.4. Hybrid Blockchain:

As its name suggests, the hybrid blockchain combines components of both private and public blockchains. It allows users to choose which transactions are private and which are made

public. Although not invented by a single creator, platforms like Dragonchain have embraced and promoted the hybrid blockchain concept.

3.3. Relationship between Cryptocurrency and Blockchain

Blockchain technology is the foundation of cryptocurrency. Blockchain technology, which has potential far beyond cryptocurrencies, is what makes bitcoin so great. Every cryptocurrency transaction is recorded on the blockchain, ensuring transparency and security for each transaction. Moreover, adding a smart contract to the blockchain would facilitate the automation of several processes.

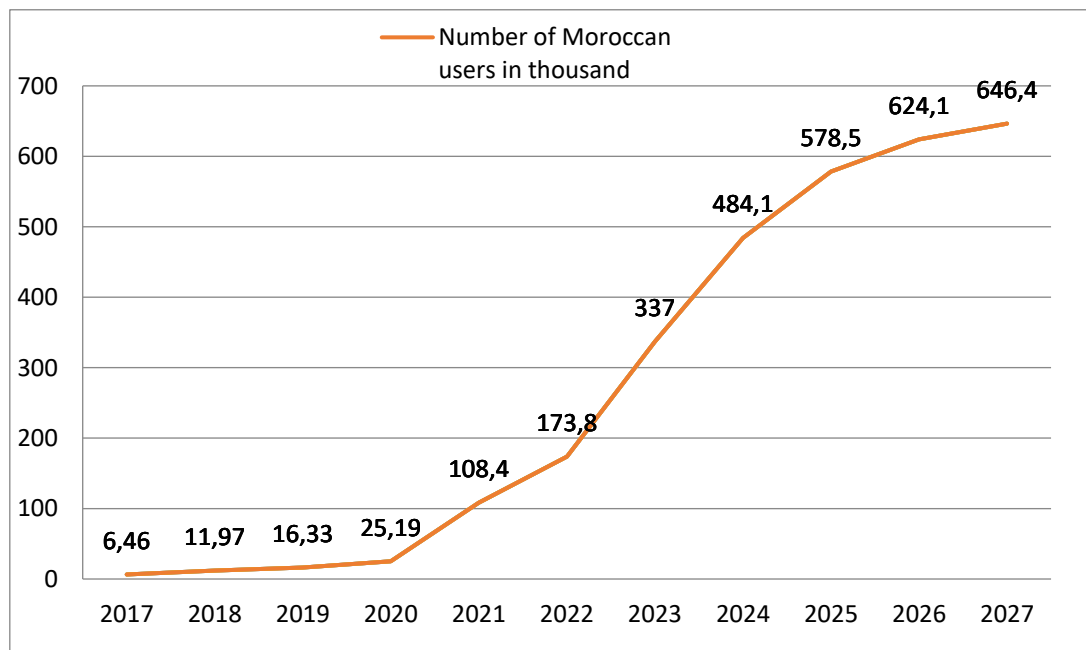
4. Development of Blockchain and Cryptocurrencies in Morocco

4.1 The rise of blockchain in Morocco

From a demographic perspective, most cryptocurrency users fall within the age range of 20 to 30 years old. In Morocco, a study conducted by Synergia (2022) found that over half of Bitcoin users are under 30. This trend is even more evident in Sub-Saharan Africa, where this figure might go up to 70%. It's worth noting that Africa is the youngest continent globally, with an average age of 19, considerably younger than the U.S average age of 38, as highlighted by a UN report from December 8, 2022. In urban settings, cryptocurrency usage seems predominantly located in major cities like Casablanca. Economically, the continent's limited access to traditional banking, especially in Sub-Saharan areas, combined with high inflation rates in certain nations, are key driving factors.

In Morocco, interest in blockchain technology has grown because of its potential uses in various areas such as finance, real estate, health, and public administration. Several startups in Morocco are actively exploring the use of blockchain to enhance transaction transparency, efficiency, and security. For example, Maarefah, a Moroccan startup that uses blockchain technology to certify and verify degrees, and Mchain, focusing on developing blockchain-based solutions for various sectors in Morocco. They are looking for solutions in finance, health, education, and others.

Graph 1: Total of Moroccan users of cryptocurrency to april 2023 update and future insights



source: statistica.com

Innovation in the fintech sector is a key driver of economic growth and financial inclusion. Initiatives such as creating technological hubs and incubators dedicated to blockchain have emerged, fostering research, development, and innovation in this field. Morocco has launched initiatives to develop Smart Cities in the country, like Casa Smart City and Mohammed VI Green City, and tech business parks like Casablanca's Technopark and Rabat's. Furthermore, workshops, seminars, and conferences are regularly organized to raise awareness and educate professionals and the general public about the advantages and challenges of blockchain.

Some Moroccan banks have started exploring opportunities offered by blockchain technology to enhance banking services, especially regarding transaction security and cost reduction, though it's still at an early stage.

However, this adoption has met challenges. Moroccan regulators have expressed concerns about the potential use of cryptocurrencies for fraud and money laundering.

4.2 Cryptocurrency: a future technological solution

Morocco has witnessed increasing adoption of cryptocurrencies in recent years, especially among the youth and tech entrepreneurs. In the mid-2010s, their popularity grew in tandem with the global trend. The investment potential and the benefits of decentralized transactions offered by currencies like Bitcoin have attracted Moroccans, especially the tech-savvy younger generation.

So far, Morocco has adopted a cautious approach towards the cryptocurrency industry, relying on guidelines provided by larger countries and multilateral organizations like the IMF and the World Bank, with ambiguous statements and a lack of clear legal framework. Awaiting clearer exemplary international legal frameworks similar to its economic situation, Morocco fears losing control of its monetary policy due to price volatility and illicit activities after capital flight, as well as financial decentralization that could jeopardize the central bank and banking sector's control over liquidity markets. However, the country must also consider the potential benefits of blockchain technology, especially in areas of international payments, digital identification, and transparent government transactions.

5. Cryptocurrency Regulation in Morocco

Even though the actual Market Authority clearly banned the use of cryptocurrencies in 2017 and 2021, their introduction was not immediate. A number of Moroccans continued to turn to cryptocurrencies for transactions, investments, and speculations despite these bans. However, the approach to Bitcoin and other cryptocurrencies remains critical, and using these cryptocurrencies could lead to penalties.

In June 2022, Abdellatif Jouahri, the head of Bank Al-Maghrib, initiated an initiative to regulate the use of cryptocurrencies in Morocco. According to Henri-Louis Védie, an expert in the field, Jouahri follows the ideas of several of his European counterparts by considering cryptocurrency restrictions while recognizing the benefits of blockchain. The technology could serve as a foundation for proper cryptocurrency regulation. Védie highlights Jouahri's awareness of the situation in Morocco: despite their prohibition, cryptocurrencies saw a remarkable increase of 120% between July 2021 and June 2022.

According to the Policy Center for the New South (PCNS), in 2022, more than one million Moroccans held cryptocurrencies, contributing to a GDP per capita of \$8,612, a momentum that eludes controls from financial entities on both national and international levels.

In Morocco, the Electronic Transactions Act, enacted in 2007 to secure these transactions and protect consumers, and the Personal Data Protection Act (Law 09-08), created to protect individuals' personal data, restrict the cryptocurrency sector. Concerning secure data

collection and storage, this law might apply to cryptocurrency transactions. Law No. 43-05, enacted in 2007, established a framework to combat money laundering in Morocco and resulted in the creation of the ANRF, a central authority responsible for monitoring suspicious financial transactions. Also, Law No. 12-18, enacted in 2018, aims to strengthen Morocco's measures against money laundering and terrorist financing, with potential implications for the cryptocurrency sector.

6. The Impact of Cryptocurrency on Morocco's Financial Situation

The decentralized nature of cryptocurrencies could help strengthen their resilience against financial shocks. However, their intrinsic volatility raises questions about their ability to maintain a stable financial situation. In Morocco, where the real economy and financial system are closely linked, widespread use of cryptocurrencies could have significant implications.

6.1 Opportunities

6.1.1. Financial Inclusion

A significant opportunity for Morocco's socio-economic progress lies in financial inclusion. Although many advances have been made in the financial sector, a large portion of Morocco's population remains excluded from conventional financial services. According to a report published by the HCP in 2022, Moroccans opened 3.9 million new bank accounts, a 6% increase from the previous year. But nearly 53% of adults in Morocco have an active bank account. Blockchain technology has significant potential to bridge this gap. Blockchain can facilitate access to services such as savings accounts, loans, and money transfers without the need for a traditional financial institution, offering decentralized and secure financial services. This is particularly relevant for rural populations and socially marginalized groups often distant from banking infrastructures.

6.1.2. Diversification

Cryptocurrencies offer a unique diversification opportunity for investors in Morocco, a country with a growing economy and a young, tech-savvy population. Moroccan investors have traditionally focused on traditional assets like real estate, gold, and local stocks. However, with the emergence of cryptocurrencies and blockchain technology, they now have access to a global asset class that is largely uncorrelated with traditional financial markets. Morocco's financial institutions see this as an opportunity to expand their range of services, attract new clients, and position themselves as leaders in a constantly evolving field.

6.1.3. Innovation

Most cryptocurrencies are based on blockchain technology, which is not just digital currency. It has significant potential to transform the financial sector. Blockchain could play a pivotal role in Morocco, where the government and the private sector are actively seeking to promote innovation and digital transformation. It could be used to develop faster and less expensive payment systems, facilitate international money transfers, or provide financial inclusion solutions to a portion of the population without access to traditional banking services. Moreover, with the emergence of fintechs in Morocco, blockchain could promote innovation by offering new tools and platforms to create innovative financial products and services.

6.1.4. Protection Against Inflation

Many developing and emerging countries have faced inflation and monetary instability issues, especially due to the economic effects of the COVID-19 pandemic. Cryptocurrency, as a

decentralized digital value, is seen as an alternative to offer protection against inflation in this context. For instance, Bitcoin, due to its deflationary nature, can be used as a safe haven to protect wealth in unstable economic situations.

A study by Ahmet Efe (2020) indicated that cryptocurrencies, especially Bitcoin, might challenge the global dominance of the U.S. dollar, the currency controlling most of the world's physical and financial flows. Moreover, according to this study, numerous countries have begun working on creating their national official cryptocurrency to bypass traditional global economic and financial standards and reduce inflation.

The liberalization of the Dirham in Morocco could offer opportunities to bolster monetary stability and diversify means of protection against inflation. This could also encourage financial creativity. He emphasized that cryptocurrencies, especially Bitcoin, could potentially challenge the global dominance of the U.S. dollar, the currency controlling most of the world's physical and financial flows. This study also suggests that many countries have started efforts to prepare their national official cryptocurrency to manipulate traditional global economic and financial rules and counter inflationary effects.

In the Moroccan context, with the decision to liberalize the Dirham, the adoption of cryptocurrencies might offer opportunities to reinforce monetary stability, while diversifying means of protection against inflation. This could also spur financial innovation by creating new goods and services to address changing economic needs.

6.2 Challenges

6.2.1. Volatility

Financial stability can be threatened by the rapid price fluctuations of cryptocurrencies. Volatility is an inherent characteristic of cryptocurrencies. Cryptocurrency prices can change rapidly and significantly in a very short time. New regulations, macroeconomic events, supply and demand variations, and news related to blockchain technology are among the reasons for this volatility. In Morocco, as in other countries, volatility can pose challenges to investors, financial institutions, and regulators. Especially if cryptocurrencies were widely used as a means of payment or store of value, high volatility can lead to significant financial losses for investors and threaten the stability of the financial system.

In 2017, according to a study from statistica.com, the Bitcoin price increased by over 1300%, moving from under \$1,000 to over \$14,000 before experiencing a significant correction. Based on the statistics, Bitcoin fell back to about \$30,000 in June 2021 after reaching a historical peak of nearly \$65,000 in April 2021. According to the Financial Stability Board (FSB) report titled "Crypto-Assets Key developments, regulatory concerns, and responses", the price volatility of cryptocurrencies is a major concern for global financial stability.

6.2.2. Security and Hacking Risk

Security risk is another significant issue for cryptocurrencies. Platforms and cryptocurrency exchanges are not immune to cyberattacks, although the blockchain technology itself is deemed highly secure due to its decentralized structure and consensus mechanism. Several cryptocurrency exchanges worldwide have fallen victim to significant hacks over time, resulting in millions of dollars in losses for investors.

Digital wallets where cryptocurrencies are stored can be hacked. Security flaws often cause significant fund losses. It's another major issue for cryptocurrencies due to security problems and hacking risks. Cryptocurrency transactions are recorded on blockchains, decentralized databases secured by cryptographic algorithms. However, malicious actors are always seeking vulnerabilities to steal funds. Over the years, many cryptocurrency exchange platforms have been hacked, leading to the loss of millions of dollars in cryptocurrency.

According to a report from cybersecurity firm CipherTrace (2019), hacks and frauds in the cryptocurrency ecosystem resulted in losses valued at over \$4.5 billion in 2019. Users and investors are continually concerned about the security of wallets, cryptocurrency exchanges, and smart contracts. To mitigate these risks, rigorous security measures are required. A study conducted by research firm Autonomous Research showed that over 10% of ICOs (Initial Coin Offerings) established in 2017 were hacked by cybercriminals.

The security of exchange platforms and cryptocurrency wallets is a significant concern in Morocco, as in other countries. A successful hack can not only result in direct financial losses but also erode confidence in the cryptocurrency ecosystem and deter potential investors. Thus, ensuring that cryptocurrency wallets, exchanges, and transactions are secure is crucial. To mitigate risks, users should use hardware wallets, strong passwords, and two-factor authentication.

6.2.3. Money Laundering

Although transparent, the blockchain structure allows a certain level of anonymity that can be used for illicit activities, making the traceability of individual actors complex and facilitating international transactions, thus freeing them from traditional controls of capital movements. Governments and financial authorities worldwide seek to prevent criminals from using cryptocurrencies to finance illegal activities or launder dirty money. According to the FATF, over \$2 trillion is laundered worldwide each year, with the use of decentralized finance (DeFi) and cryptocurrencies becoming increasingly concerning. According to a report from the Financial Action Task Force (FATF), an international organization combating money laundering, cryptocurrencies are increasingly being used for money laundering and terrorist financing, especially due to their pseudo-anonymous nature. The report emphasized that stricter regulations should be put in place for cryptocurrency exchange platforms and related financial service providers to monitor and report suspicious transactions and verify user identities. Thus, the report underscored the need for enhanced international cooperation to combat illicit activities related to cryptocurrencies.

6.2.4. Ties with the Traditional Banking Sector

The traditional banking sector is at the heart of the Moroccan economy and has contributed to the country's economic growth for many years. These banks have maintained financial trust through their robust structures and proven procedures. However, introducing cryptocurrencies poses an intriguing question: how can banks coexist with this new form of money? Suppose a major bank in Morocco opts to integrate cryptocurrencies into its daily operations. Initially, this could attract new clients, especially tech-savvy younger generations. However, a sudden drop in cryptocurrency value might jeopardize bank financial reserves due to their volatility. Client trust might be shaken if such an event were to occur, resulting in massive withdrawals and placing the bank in a precarious situation. If other banks had financial ties with the struggling bank, they might also be affected in such a scenario, thereby creating a domino effect on the financial system. The Central Bank of Morocco needs to take measures to stabilize the situation in this context, highlighting the importance of explicit and proactive regulation.

Introducing cryptocurrencies into Morocco's traditional banking sector might have negative consequences in several respects. On the one hand, it could give banks the opportunity to innovate, attract younger and technologically advanced clientele, and develop a variety of services. Imagine a bank in Morocco offering current accounts in dirhams and Bitcoin or offering loans or mortgages in cryptocurrency. Morocco could be seen as a leader in introducing digital currencies within the traditional banking framework.

Furthermore, due to their decentralized nature, cryptocurrencies largely elude financial regulators. If Morocco's banks began offering cryptocurrency-related services without

adequate regulation, this could expose the financial system to new risks. It's crucial for banks and regulators in Morocco to approach this new era with caution, carefully weighing potential benefits against risks. Adequate training, strict regulation, and regular monitoring are required to ensure the introduction of cryptocurrencies enhances rather than destabilizes the Moroccan banking sector.

6.2.5. Domino Effect

In the financial realm, the domino effect is defined as a chain of events where the fall or failure of one company or sector can lead to the collapse of other similar companies or sectors. This impact could manifest in various ways concerning cryptocurrencies in Morocco.

Imagine a situation where the value of a major cryptocurrency, widely used by Moroccans, plummets due to an unexpected event, maybe a significant security breach. Investors who heavily invested in this cryptocurrency could incur substantial losses. These investors might struggle to repay debts if they had taken loans to invest, thus putting financial institutions that lent them money at risk. Moreover, if Moroccan companies adopted this cryptocurrency as a mode of payment or used it in their operations, they could face financial losses, which could impact their employees, suppliers, and other stakeholders. The aftermath of this chain of events might lead to a drop in confidence in the financial system, possibly causing massive withdrawals and a general panic situation.

This might impact other sectors of Morocco's economy. For instance, if a company related to blockchain technology or cryptocurrency were to go bankrupt following this event, it might discourage other investors from venturing into this field, thus hampering innovation and growth. It's imperative that Morocco implements effective monitoring and regulatory measures, promotes financial education, and encourages a cautious and informed use of cryptocurrencies to mitigate the potential domino effect.

6.2.6. Implications for Banks

As financial innovations, cryptocurrencies have the potential to disrupt the traditional banking landscape. In Morocco, where banking is pivotal to the economy, the implications could be significant.

Consider a scenario where more and more Moroccans begin to favor cryptocurrencies over traditional banking services for various reasons, including faster transactions, greater privacy, and lower transaction fees. Bank deposits and transactions could decline significantly in such a situation. Banks might see their interest income diminish if fewer deposits were made, reducing funds available for lending. Additionally, banks might lose revenue from payment processing fees if cryptocurrencies become a prevalent payment method. Some traditional banking services, like mediation or asset management, could be replaced by innovative blockchain-based services, such as smart contracts.

However, banks are not entirely at a disadvantage. In response to this competition, Moroccan banks could be motivated to innovate and enhance their services. Moreover, they might consider partnering with blockchain startups or creating their own cryptocurrency-based products. By adopting a proactive approach, banks might not only survive this digital revolution but also leverage it to provide more efficient and customer-centric services.

It's vital that Moroccan government authorities work closely with banking institutions to ensure a smooth transition to a more digital economy while safeguarding consumer interests and preserving the country's financial stability.

7. Research Gaps

Studies on the impacts of blockchain and cryptocurrency on financial stability have mainly

focused on larger or global economies, often overlooking the unique challenges and opportunities presented by emerging markets like Morocco. Although several research works, such as those by Bonneau et al. (2015), have examined cryptocurrency complexities and their potential implications for financial systems context. They provide a comprehensive analysis of the challenges and prospects of cryptocurrencies from a global perspective, but the nuances of how these challenges manifest in the Moroccan financial landscape remain unexplored.

Narayanan et al. (2016) also discussed the potential of blockchain as a transformative technology for enhancing financial stability in developing economies, but these discussions are primarily theoretical and lack empirical evidence from countries like Morocco.

There's a significant gap in research on the specific impact of blockchain and cryptocurrency on Morocco's financial stability, necessitating further research that considers the country's unique economic and regulatory environment.

8. CurrentContext

Morocco established the National Financial Intelligence Authority (ANRF) in the present context where cryptocurrencies are experiencing rapid growth. The National Financial Intelligence Authority (ANRF) has taken over from the Financial Intelligence Processing Unit (UTRF), which was established by Article 14 of Law No. 43-05 and reinforced by Law No. 12-18, and has been formalized. The ANRF's role is deemed significant as it's tasked with closely monitoring cryptocurrency-related transactions to detect any anomalies. The decentralized nature of cryptocurrencies can facilitate illicit activities, as highlighted by experts like Nakamoto (2008) and Catalini and Gans (2016), underlining the need for increased oversight (Christian Catalini, 2016).

This action aligns with international standards, such as Recommendation 29 of the FATF, and reflects global changes where FIUs play a pivotal role as a national coordinator in AML/CFT efforts. Following these measures, the Financial Action Task Force (FATF) conducted an on-site inspection from January 16 to 18, 2023, and decided to remove Morocco from enhanced monitoring, also known as the "grey list", after evaluating the alignment of the national framework with international AML/CFT standards.

At the FATF's general meeting held in Paris, France, from February 20 to 24, 2023, this resolution was adopted. The FATF and the 2022 Basel AML Index acknowledged these efforts, ranking Morocco 64th out of 128 countries in the global AML/CFT index, improving by 13 positions within a year. This shift is seen as the beginning of a new legislative and legal framework for the adoption of cryptocurrency. Morocco contributes to the realization of SDG 16, which aims to promote peaceful and inclusive societies and combat all forms of financial crime by implementing stringent AML/CFT measures.

9. Recommendation and Implications

Due to its expanding economy and young population, Morocco is ideally positioned to benefit from the advantages of cryptocurrencies. It is crucial to adopt a proactive approach in this regard. This strategy should focus on education and awareness. The country can educate its citizens on the benefits and risks of cryptocurrencies by organizing workshops and seminars. Additionally, by establishing a robust technological infrastructure and creating blockchain-specialized innovation centers, Morocco could position itself as a regional leader in this field. Global collaboration is also essential. By partnering with other nations and exchanging best practices, Morocco has the opportunity to gain insights from others' successes and failures, while tailoring these learnings to its own context.

Consequently, regulation plays a significant role in governing the use of cryptocurrencies. It's imperative for Morocco to establish a clear legislative framework that defines the responsibilities and rights of various participants in the cryptocurrency ecosystem. A licensing system for exchange platforms can ensure they operate according to high security and transparency standards. Monitoring transactions is also vital to identify and prevent illicit activities. Consumers must also be protected. Recourse mechanisms and educational resources can assist them in navigating the cryptocurrency world safely. It's important for Morocco to maintain its autonomy and be ready to adjust its regulations as the cryptocurrency industry evolves.

It's also crucial to consider recommendations from international organizations, such as the Financial Action Task Force (FATF), which has issued guidelines on how to handle risks associated with cryptocurrencies, including money laundering and terrorist financing risks. Companies operating in the cryptocurrency sector should provide comprehensive information about their operations, including the risks associated with investing in cryptocurrencies. This could help establish increased transparency and protect investors.

In summary, an effective integration of cryptocurrencies into the existing financial sector will require close collaboration between regulators, financial institutions, and industry players, along with an approach based on evidence and in-depth research.

Morocco might also consider collaborating with other countries that have significant experience in cryptocurrency regulation to gain insights from their experiences and adapt best practices to the Moroccan context. Learning from other countries' experiences can be an effective way to avoid common pitfalls and promote effective regulation (Foley, 2019, Svec, and Wang, 2019).

It would be prudent to establish comprehensive educational programs that educate the public about the nuances of cryptocurrencies, as well as the associated benefits and risks. According to a study by the OECD (2019), sound financial education can be crucial in protecting consumers against frauds and scams, which are unfortunately quite common in the cryptocurrency realm.

The government might consider collaborating with universities and industry specialists to create educational resources and specialized training. Partnerships between governments and academic institutions can be an effective way to promote innovation and education in the field of financial technologies, as highlighted by Tapscott and Tapscott (2016). To create educational programs, it would be wise to work in partnership with academic institutions and industry specialists. These modules could be incorporated into school and university curricula, thereby educating a generation well-versed in the realm of cryptocurrencies.

10. Conclusion

In navigating the complex landscape of blockchain and cryptocurrencies, Morocco finds itself at a pivotal juncture, poised between the promise of innovation and the imperative of maintaining financial equilibrium. The potential benefits are undeniable - the prospect of heightened financial innovation, streamlined transactions, and increased financial inclusivity is tantalizing. However, this promising horizon comes with its share of challenges, particularly in the realms of security and financial stability.

As Morocco stands at this crossroads, the path forward necessitates a delicate equilibrium. Embracing innovation is imperative, but it must be done with a keen eye on safeguarding financial stability and protecting consumers. Striking this balance requires more than just a cursory glance; it demands a comprehensive and nuanced approach.

Stringent regulation emerges as a cornerstone in this endeavor. The implementation of robust regulatory frameworks is essential to mitigate risks, foster responsible innovation, and ensure

that the benefits of blockchain and cryptocurrencies are realized without compromising the financial integrity of the nation.

Continuous training plays a pivotal role in preparing stakeholders for the nuances of this evolving financial landscape. Education and awareness initiatives can empower individuals, businesses, and regulatory bodies to make informed decisions, effectively navigate potential risks, and harness the benefits that these technologies bring.

Furthermore, collaboration, both on a national and international scale, is paramount. In an era where borders are increasingly porous concerning digital innovations, forging alliances and sharing best practices can fortify Morocco's position in the global cryptocurrency landscape. Collaborative efforts can contribute not only to the development of effective regulatory frameworks but also to the creation of an ecosystem that encourages responsible innovation.

By strategically positioning itself and proceeding with caution, Morocco has the opportunity not only to adapt to the cryptocurrency era but also to emerge as a significant player in this burgeoning sector. The journey ahead is undoubtedly challenging, but with a commitment to innovation, robust regulation, continuous education, and collaborative engagement, Morocco can navigate this dynamic terrain and sculpt a future where the benefits of blockchain and cryptocurrencies are harnessed for the collective good.

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