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RWANDA BANKERS' ASSOCIATION

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Blockchain Technology
Regulation and Financial Inclusion in Rwanda.

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Abstract

This paper explores current legislative frameworks and examines how they affect the financial services industry's use of blockchain technology. With a focus on comprehending how these policies function as barriers or enablers, the study attempts to disentangle the intricacies associated with implementing blockchain technology to promote financial inclusion. The potential of blockchain technology to transform financial services and close accessibility gaps is becoming more and more apparent as it gets traction. On the other hand, the regulatory environment is crucial in determining how this revolutionary technology develops. The inquiry assesses current laws critically in an effort to determine how well they support the objectives of encouraging financial inclusion through the use of blockchain technology. Determining the obstacles that stand in the way of the broad adoption of blockchain technology is essential for formulating solutions. This study adds to a more comprehensive understanding of the challenges the financial services sector faces in utilizing blockchain technology to its fullest for inclusive financial practices by identifying regulatory roadblocks. The research also looks at legal structures that support the use of blockchain technology. Stakeholders can take advantage of a favourable environment, promoting innovation and financial inclusion, by identifying and emphasizing supportive regulations. The analysis conducted here can provide policy makers, business professionals, and tech innovators with valuable insights for improving or creating policies that facilitate rather than obstruct the use of blockchain technology in financial services. The research's ultimate goal is to provide a thorough understanding of the regulatory dynamics pertaining to blockchain technology in the financial industry. It adds to the continuing discussion on how to create legal frameworks that not only allow but actively encourage the use of blockchain technology to improve financial inclusion globally by illuminating obstacles and enablers.

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1. Introduction

In many developing economies, access to suitable financial services remains a significant obstacle (Chinaka, 2016). 1.7 billion People globally still do not have any access to banks at all, according to a new report from the World Bank Group (Abdulhakeem & Hu, 2021). The adoption of blockchain technology within the banking industry has come to light as a ground-breaking phenomenon, greatly impacting financial inclusion. Blockchain technology has shown potential not only in enhancing financial services but also in integrating previously marginalized people and communities into mainstream financial institutions (Mhlanga, 2023). The study explores blockchain technology regulations and financial inclusion in Rwanda. It is frequently assumed that blockchain is just a cryptocurrency tool. However, this decentralized ledger has many uses outside of the financial industry; the safe and fair use is what regulation aims to guarantee. By enabling underprivileged groups to access transparent financial services, adopting blockchain technology can improve financial inclusion. Blockchain technologies are also anticipated to bring unique advantages that may accelerate the adoption of new technology (Hughes et al., 2019).

Insurance offers defence against monetary losses brought on by unanticipated circumstances. Financial inclusion can prevent people from sinking further into poverty by providing low-income individuals with accessible insurance solutions that meet their needs (Hillier, 2018). Remittance services also help families in underdeveloped nations by enabling migrants to send money home to maintain stability and well-being (Yeboah et al., 2021). Having access to credit enables people and companies to manage their cash flow, make investments in their enterprises or education, and improve their standard of living (Karlan & Morduch, 2010). 31% of adult people worldwide lack access to financial services and are still without a bank account. Centralization, remoteness, intermediary expenses, and a lack of trust regarding financial institutions are some of the causes contributing to this problem (Abdulhakeem & Hu, 2021). Blockchain's decentralized network operation can enable access to financial services without depending on conventional banking infrastructure. By doing away with middlemen and simplifying procedures, blockchain can drastically lower transaction costs. Also, for those without official identification, blockchain technology can be used to construct a safe, unchangeable digital identity, amongst other benefits.

In Rwanda, financial infrastructure has been more readily available in recent times, although there are still barriers to overcome. The nation has improved financial inclusion significantly, especially with the help of initiatives like digital payment systems and mobile banking. In Rwanda, mobile money services like Airtel Money and MTN Mobile Money are extensively utilized. Through these services, customers can use their mobile phones to carry out a variety of financial operations, including bill payment, money transfers, and airtime purchases (Yumvuhore, 2022). Access to financial services has significantly improved as a result, particularly in rural areas with inadequate traditional banking systems. The Rwandan government has taken a number of steps to expand access to financial services and financial inclusion. To encourage the growth of the financial industry, for instance, the National Bank of Rwanda (BNR) has implemented regulatory measures, such as programs to increase the utilization of digital financial services (Dusengimana, 2016).

With its ability to solve a number of issues pertaining to efficiency, security, and transparency in trade transactions, blockchain technology offers the potential to greatly boost trade in Rwanda. Immutable and transparent transaction records are made possible by blockchain technology. This implies that all supplychain transactions can be transparently tracked on the blockchain, giving an insight into the flow of goods from manufacturer to customer (Sunny et al., 2020). Effective supplychain management is essential for facilitating trade for Rwanda, a country that mostly depends on exports and agriculture. Supplychain users can see the progress and condition of commodities in real time with blockchain. By reducing storage expenses for goods, providing greater accuracy in demand projections, and decreasing interruptions, this visibility enhances supply chain management.

Blockchain-based systems have the potential to offer firms in Rwanda simpler and more effective trade finance solutions. Blockchain technology may mitigate the risk for lenders and lower the cost of financing for importers and exporters by automating trade documents and establishing a transparent and safe environment for trade finance transactions (Jain & Sedamkar, 2020). Blockchain can assist Rwandan exporters in validating their conformity to worldwide standards and regulations, which would increase the commercial viability of their goods. Exporters can offer verifiable evidence of product integrity and quality to overseas consumers by logging certificates, quality inspections, and other compliance-related data on the blockchain. Ultimately, by enhancing transparency, efficiency, and security in conjunction the whole supply chain, blockchain technology has the capability to completely transform trade facilitation in Rwanda. To create and execute blockchain-based solutions tailored to the unique requirements and obstacles of Rwandan commerce, companies, government organizations, and technology suppliers will need to work together before the technology is widely used.

Smart contracts, or autonomous agreements with the contents of the agreement specifically put into code, are made possible by blockchain technology. Trade transaction operations including payment settlements, import clearance, and conformance checking can all be streamlined with smart contracts. This process of automation cuts expenses, expedites transaction processing, and eliminates the need for mediators (Akhnoukh, 2023). By offering a safe and irreversible record of trade documents, such as invoices, bills of lading, and certificates of origin, blockchain technology assists with speeding up the customs and border control procedures. Cross-border trade becomes more efficient and rapid as a result of the reduction in the time and paperwork required for customs clearance.

By giving underprivileged groups, such as those living in rural or isolated locations, access to financial services, blockchain technology can improve financial inclusion (Mhlanga, 2023). Blockchain technology has the potential to lower costs and promote availability to financial services by enabling safe, transparent, and effective transactions (Nguyen, 2016). In doing so, the circular economy is promoted. By extending the life of goods and materials through recycling, reuse, and other methods, the circular economy seeks to reduce waste and optimize the value of resources. The following gaps exist in literature:

I. There is a research vacuum regarding the potential use of blockchain technology in the current financial system to enhance or replace the antiquated SWIFT network (Abdulhakeem & Hu, 2021).

II. Gap also exists in the research on regulations of blockchain (Ramchandra et al., 2022).

III. Rwanda has been utilizing several strategic techniques to foster a digital economy, similar to other countries lagging behind in creating an economy centred on knowledge. Reviewing Rwanda's standing in relation to the leading nations in digitalization reveals a significant disparity in terms of 3D printing, cloud computing, automation and robots, digital platforms, and policy flexibility. Because of the inadequate infrastructure and inadequate laws pertaining to the digital economy, the nation is finding it difficult to adjust to digitalization (Kwizera, 2020).

IV. Regulations that support the expansion of digital financial services in rural areas must to be created and revised. Policymakers need to make sure that laws encourage competition, innovation, and consumer protection (Mugisha, 2024).

Adoption of blockchain technology for financial inclusion is heavily influenced by the regulatory environment. In Rwanda's efforts to promote financial inclusion in particular, regulation is essential for blockchain technology to become widely used. In the absence of regulation, problems like market manipulation, fraud, and money laundering spread widely and threatens security and confidence (Werbach, 2018). Investment and creativity may be discouraged by inconsistent practices brought about by a lack of legal frameworks. Clear rules and standards provided by regulatory agencies provide consumer protection, promote a stable environment for financial transactions, and promote blockchain adoption (Igbinenikaro & Adewusi, 2024). For these reasons, a regulated environment is necessary to reduce risks, improve transparency, and foster trust among users and other blockchain ecosystem stakeholders.

In order to determine potential obstacles or enablers for the integration of blockchain technology in financial services, the current study delves into the regulatory frameworks that are in place at the moment. The aim of the study is to investigate the current regulatory frameworks to identify any barriers or facilitators to the deployment of blockchain technology in the financial services industry.

The study would address the following objectives:

1. To assess the existing regulatory frameworks governing financial services and recognises how they may impact the integration of blockchain technology.
2. To analyse the possible challenges hindering the seamless integration of blockchain technology within the current financial services landscape.
3. To investigate the regulatory enablers that could facilitate the successful incorporation of blockchain technology into financial services, identifying supportive policies and frameworks.
4. To examine the perceptions and attitudes of key stakeholders, including regulators, financial institutions, and users, towards the integration of blockchain technology in financial services.
5. To examine how blockchain technology regulation affects financial inclusion in Rwanda.

The study would address the following research questions:

1. How can the existing regulatory frameworks governing financial services be assessed in relation to their potential impact on the integration of blockchain technology?
2. What are the possible challenges that hinder the seamless integration of blockchain technology within the current banking sector?
3. Who are the regulatory enablers that could facilitate the successful incorporation of blockchain technology into financial services? What supportive policies and frameworks are identified?
4. What are the perceptions and attitudes of key stakeholders, such as regulators, financial institutions, and users, in relation to the integration of blockchain technology in financial services?
5. How does blockchain technology regulation affect financial inclusion in Rwanda?

The study would address the following research hypotheses:

1. Current regulatory frameworks pose significant challenges to the integration of blockchain technology in financial services.
2. Adapting and updating regulatory frameworks will facilitate the successful integration of blockchain technology in financial services.
3. Standardizing international regulatory standards will enhance the global integration of blockchain technology in financial services.
4. Blockchain technology regulation will enable financial inclusion in Rwanda.

2. Review of Literature

2.1. Stakeholder and Players in Financial Inclusion in Rwanda

One of the pillars of socio-economic development is financial inclusion, which is based on giving people and community's access to a broad range of financial services regardless of their location or level of income (Abimbola et al., 2018). Efforts to address these issues are a part of larger financial inclusion programs, which seek to give everyone access to reasonably priced, high-quality financial services that will help their target markets achieve their financial needs. For distant areas that typically rely on agriculture as their primary source of income, the lack of financial inclusion is typically worse (Chinaka, 2016). Blockchain technology is particularly notable as a driver of innovation and accessibility as the financial ecosystem struggles with the need to address socioeconomic gaps (Toufaily et al., 2021). Blockchain is a decentralized, transparent, and secure system of information that stores transactional records (Puthal et al., 2018). Using open-source software, this technology enables the decentralized management of transaction data on a global network of computers.

A wide range of stakeholders and organizations are involved in Rwanda's financial inclusion environment, and utilizing blockchain technology to improve accessibility to financial services is a major focus (Mugisha, 2024). Government agencies including the Ministry of Finance and Economic Planning (MINECOFIN) and the National Bank of Rwanda (BNR) are spearheading the initiative (Kaniba, 2001). These organizations are essential in establishing rules and putting plans into action to foster financial inclusion by utilizing cutting-edge technologies like blockchain. Another important group of stakeholders are commercial banks and microfinance organizations. Their responsibility is to use blockchain-based solutions to reach more under-banked and unbanked people and promote greater financial inclusion. These banks hope to establish safe and effective channels for lending, savings, and transactions by collaborating with blockchain developers and digital companies.

The goal of financial inclusion in Rwanda is also greatly aided by Non-Governmental Organizations (NGOs) and Foreign Development organizations (Rwamigabo, 2017). Additionally, the rise of mobile network providers and fintech companies rejuvenates Rwanda's financial inclusion ecosystem. These flexible organizations take advantage of the decentralized nature of blockchain technology to provide affordable and easily navigable solutions, such peer-to-peer lending platforms and mobile wallets, to meet the demands of a wide range of consumers. The relationship between blockchain technology and financial inclusion in Rwanda underscores the need for stakeholders to work together to close the gap that exists between underprivileged regions and the traditional banking industry.

The National Bank of Rwanda (BNR) and the Ministry of ICT and Innovation are mainly in charge of regulating blockchain technology and financial inclusion in Rwanda with the goal of ensuring safe, inclusive financial services and digital transformation in the country (Umuhoza, 2023). Rwanda is well-positioned to make major advancements toward equitable economic development by embracing creativity and cooperation. With an open financial system, Rwanda offers opportunities in the cross-border features of blockchain technology. When compared to traditional banking systems and remittance providers, blockchain can lower transaction fees for cross-border payments. The time required to transmit and receive money can be greatly decreased by achieving real-time or almost immediate cross-border transactions (Finken & Finkemeyer, 2019). Blockchain technology can improve the supply chain's traceability and transparency of items, which can lower fraud and guarantee product authenticity. It can also give authorities unchangeable, transparent financial transaction records, which will improve the effectiveness of compliance monitoring. In order to promote commerce and economic progress, blockchain can help the East African Community (EAC) and other regional organizations integrate economically more (Wilhelm, 2019).

The decentralized and transparent nature of blockchain technology presents a promising opportunity to transform conventional financial institutions and expand financial services accessibility to underserved and unbanked communities (Gupta & Jain, 2023). The revolutionary potential of blockchain technology has been a focus point for researchers and regulators alike in the constantly changing financial services industry. Now that there is an integration of technology and financial inclusion, it is more important than ever to examine and understand the legal frameworks that now either support or hinder the use of blockchain in the financial services industry (Chang et al., 2020).

2.2 Challenges in the Financial Sector in Rwanda

Similar to many developing nations, Rwanda's financial sector faces a number of obstacles that limit its stability and expansion (Mwega, 2016). Insufficient availability of financial services is a major problem, especially in rural areas with lack of infrastructure and banking facilities. The absence of accessibility impedes the ability of individuals and businesses to receive necessary financial products including insurance, savings accounts, and loans, which in turn hinders attempts to reduce poverty and promote economic development. The relatively modest size of Rwanda's financial market presents another difficulty. The market's small size may limit consumer access to a wide range of financial services and products, as well as competition and innovation (Mutandwa & Kwiringirimana, 2015). This may lead to increased financial services expenses and a shortage of specialized products to satisfy the various demands of various customer groups.

Concerns regarding the stability and regulation of the financial sector are also very important. The financial system in Rwanda is still developing, and it is important to make sure that it is adaptable to unexpected events like unstable regions or worldwide recessions. To do this, regulatory frameworks need to be strengthened, risk management techniques need to be improved, and transparency and accountability must be fostered. Stability and trust among investors are also maintained by recognizing that reaching unbanked or under-banked populations is difficult when using the conventional banking infrastructure. Fin-tech innovations, however, provide chances to get around these obstacles by offering substitute avenues for delivering financial services, like digital payments and mobile banking. In the study by Ramchandra et al. (2022), the effect of blockchain technology on the banking industry was evaluated. How the banking industry is poised to undergo a significant transformation through the use of blockchain technology was highlighted. It was found that blockchain technology appears to be a possible technology that can be used in addressing the issues of banks' inefficiencies by impeding third parties, raising bank efficiency, and cutting costs. It was revealed that elimination of third parties contributes to the efficiency and customer transparency of the transactions. A gap in the study is on how regulatory framework supports or discourages the adoption of blockchain technology.

The current study delves into the regulatory frameworks that are in place at the moment. To sum up, resolving these issues in Rwanda's financial system calls for cooperation between the government, financial institutions, regulators, and other interested partners. To create a more open, sturdy, and long-lasting financial system that supports Rwanda's goals for economic growth and development, attempts must be made to increase the availability of financial services, improve awareness of finance, encourage rivalry in the markets, reinforce supervision by regulators, and adopt fin-tech innovations.

2.3 Regulatory structures and the use of blockchain technology to promote financial inclusion in Rwanda

In Rwanda, regulatory frameworks are crucial in forming the country's financial environment and assuring security, stability, and inclusion (Biedermann, 2016). The Rwandan government has demonstrated a proactive approach towards promoting financial inclusion by enacting law that enable financial services accessibility for every citizen, with a special focus on those residing in economically disadvantaged communities. The following are some of the primary regulations and policies relating to blockchain technology and financial inclusion in Rwanda:

1. *Financial inclusion initiative:*

As part of its larger plan for economic development, the Rwandan government has made financial inclusion a priority. In an effort to improve financial accessibility, the National Bank of Rwanda has implemented initiatives that include the development of agent banking networks in rural areas and the promotion of digital financial services (Mugisha, 2024).

2. *Cryptocurrency Regulation*

In order to reduce the dangers related to money laundering, fraud, and safety for consumers, the Central Bank of Rwanda (BNR) has adopted a methodical approach to cryptocurrency regulation. Cryptocurrency trading platforms and service providers must register with the BNR and adhere to know-your-customer (KYC) and anti-money laundering (AML) laws (Barr et al., 2021)..

3. *Data Privacy and Security*

As blockchain technology becomes more widely used, data security and privacy are becoming more important in order to safeguard customers' financial and personal data. Regulations are in place, in order to ensure that blockchain-based platforms follow global standards for cyber-security and data protection (Wilhelm, 2019).

Using blockchain technology to enhance financial inclusion within current regulatory frameworks is one novel approach. With its unchangeable record system and open structure, blockchain technology is a possible tool for improving financial inclusiveness in Rwanda. Regulatory agencies are able to reduce operating expenses, simplify procedures, and decrease dangers connected to conventional financial systems by utilizing blockchain technology (Yeoh, 2017). Also, consumers are more trusting of blockchain due to its open structure and unbreakable nature, which creates an atmosphere that is favourable for financial inclusion. To take full advantage of the revolutionary potential of blockchain technology and guarantee that it adheres to current laws, Rwanda is adapting its regulatory institutions to support blockchain-based financial services. Regulatory bodies work together with fintech companies and other relevant parties to create solid regulations that strike the right equilibrium between safety for customers, creativity, and regulatory monitoring.

There are opportunities and challenges associated with Rwanda's hovering regulatory void and the blockchain technology's rapidly expanding potential for speeding up financial inclusion (Maimbo, 2020). The lack of specific legislative frameworks suited to this cutting-edge technology's unique applications in Rwanda creates an intricate environment as it develops momentum, especially in transforming financial services. The safety of consumers, economic stability, and regulatory compliance are at jeopardy due to the lack of comprehensive legislation specifically designed for blockchain technology. Improper use, fraud, and even financial system instability are possible in the absence of explicit regulations. Furthermore, the lack of clarity concerning legislative frameworks may discourage investment and creative thinking in blockchain-based solutions, impeding their ability to significantly improve financial inclusion.

Although blockchain has the capacity to considerably boost financial inclusion in Rwanda, unclear regulatory environment poses a significant obstacle (Adewale & Oyewole, 2023). To close this regulatory gap, policymakers in Rwanda must give the greatest emphasis to creating a strong regulatory framework that promotes innovation while minimizing risks. Know-your-customer (KYC) regulations, anti-money laundering (AML) procedures, data privacy, smart contract standards, and blockchain application-specific conflict resolution procedures should all be covered under this framework. To create rules that effectively balance innovation and risk management, government agencies, financial institutions, technology developers, and other stakeholders must work together. Through strategic engagement with the blockchain community and utilization of global regulatory experiences' best practices, Rwanda can create an environment that is beneficial to the responsible implementation of blockchain technology, hence advancing financial inclusion.

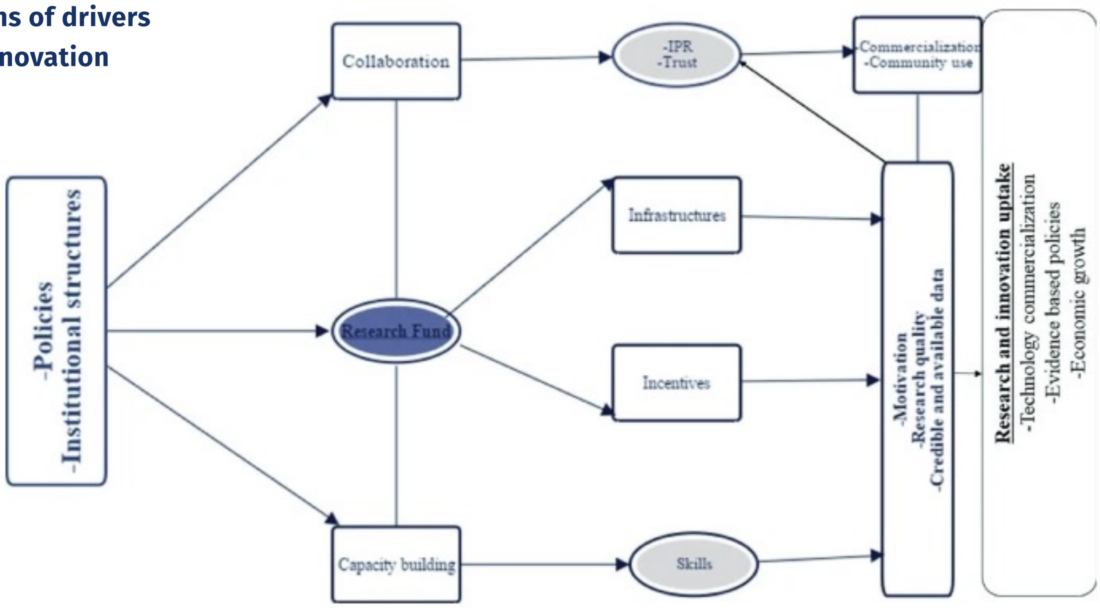
The study analyses the regulatory frameworks that oversee the financial services sector in various jurisdictions as it probes more into this analysis. Through a thorough examination of the legal, policy, and compliance environments, the study aim to pinpoint the subtle obstacles that stand in the way of the smooth implementation of blockchain technology. At the same time, it aims to highlight regulatory frameworks that serve as enablers, creating an environment that is favourable to the broad implementation of blockchain solutions. Understanding the dynamic interaction between regulatory frameworks and technological innovation is emphasized in particular in this study. By doing this, it sheds light on how regulatory uncertainty or transparency affect financial institutions', entrepreneurs', and other stakeholders' desire to invest in and use blockchain-based solutions. Furthermore, the study investigates how cooperative efforts, laws and regulations could support the development of a favourable atmosphere for the investigation and application of blockchain technology in the financial services industry.

2.4 Regulatory Framework Analysis in Rwanda

The study looks at Rwandan regulatory frameworks that are impacted by blockchain technology, with a particular emphasis on consumer protection, legal clarity, compliance requirements, financial access, anti-money laundering measures, and innovation assistance. It assesses the ways in which these rules impact financial inclusion, encouraging fair access to financial services via blockchain developments. Beyond just guaranteeing legal compliance, Rwanda's regulatory system impacts the country's commercial environment, investment environment, and general economic progress (Behuria & Goodfellow, 2016).

Figure 1: perceptions of drivers for research and innovation uptake in Rwanda

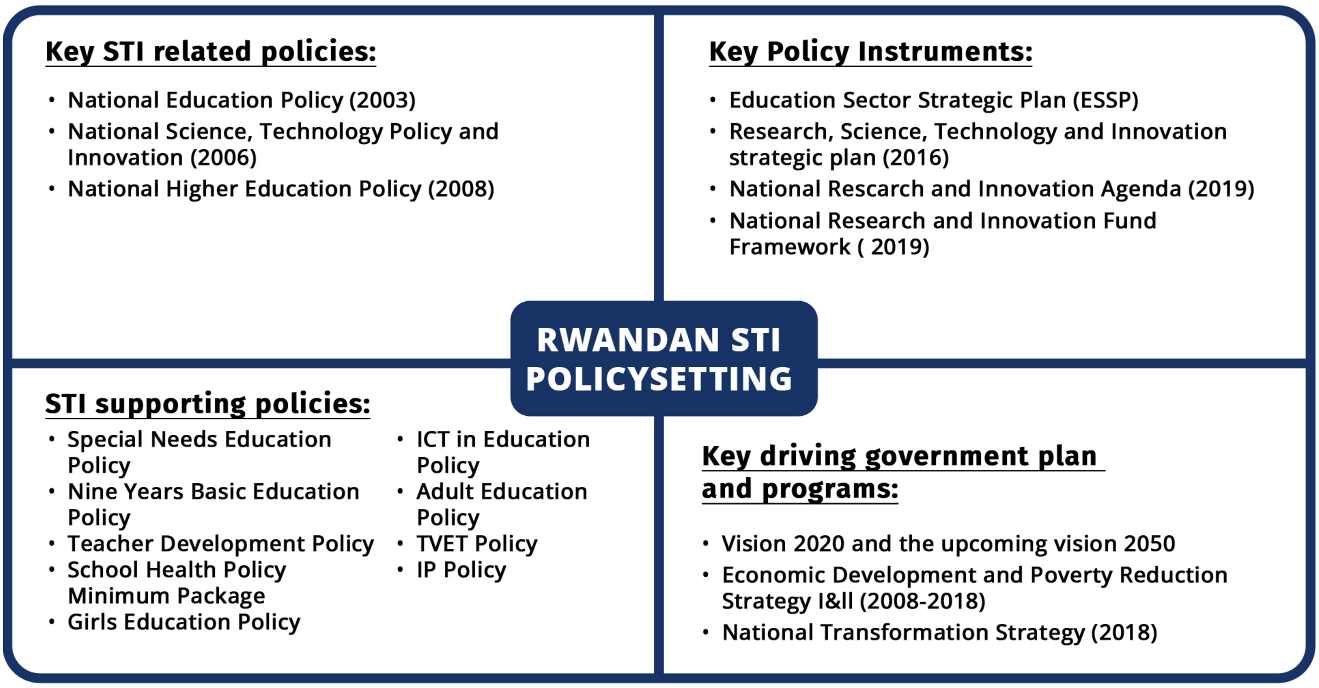
Source: (Yongabo, 2021)



The regulatory structure promotes investment, fosters innovation, and promotes entrepreneurship by offering clarity and certainty. In addition, it promotes sustainable development objectives by guaranteeing the safety of customers, employees, and the environment. The regulatory framework in Rwanda provides standards, rules, and guidelines that are designed to ensure public interests are protected, growth is stimulated, and conformity is ensured (Bonde et al., 2015). Rwanda's regulatory structure is based on its government's commitment to improving accountability, efficiency, and openness. As the principal regulatory authority in charge of managing trade, investment, and business operations in the nation, the Rwanda Development Board (RDB) is essential in this respect. The RDB makes it easier to register firms, grant authorizations, and uphold regulatory standards by using digital platforms and simpler procedures, thereby reducing administrative challenges and enhancing ease of doing business.

Key areas like telecommunications, energy, banking, and healthcare are regulated by industry-specific regulators in addition to the RDB. The responsibility for guaranteeing equal treatment, safeguarding consumers, and complying to industry standards falls on these regulatory bodies. In this vein, the Rwanda Utilities Regulatory Authority (RURA) regulates the electricity and telecommunications industries, licensing operators, establishing prices, and keeping an eye on service quality in order to encourage affordability and efficiency (Karamuka, 2014). In order to boost competitiveness and stimulate trade, Rwanda also integrates its regulatory framework with worldwide and regional standards. Rwanda integrates its legislation with those of its neighbours and trading partners as a member of the East African Community (EAC) and a party to several global treaties. Rwanda's appeal as an investment destination is increased by this arrangement, which also promotes regional unity and eases cross-border trade.

Figure 2: Policy setting in Rwanda



Source: (Yongabo, 2021).

Rwanda also gives regulatory changes the most attention in order to take advantage of emerging possibilities for development and address growing difficulties (Ansoms, 2008). To adapt to changing demands, the government periodically analyses current laws, gets input from interested parties, and proposes new legislation. In addition to preserving the rule of law and safeguarding the interests of the public, this pre-emptive approach to regulation guarantees flexibility and response to changing economic trends.

The regulatory framework of Rwanda is distinguished for its transparency, efficiency, and conformity to global norms (Abbott, P., & Sapsford, 2021). The regulatory framework is essential to Rwanda's socio-economic development strategy because it protects public interests, encourages competition, and creates a favourable business climate. Rwanda seeks to significantly improve its regulatory environment to promote sustainable growth and prosperity through on-going reforms and stakeholder engagement.

2.5 Compliance requirements

The implementation of blockchain technology in Rwanda for financial inclusion is greatly influenced by the country's current policies (Mugisha, 2024). To improve financial services accessibility for its residents, particularly those residing in economically disadvantaged areas, the nation has demonstrated a strong desire to utilize cutting-edge technologies. But there are differences in how current laws support or obstruct the use of blockchain technology. Regarding the adoption of emerging technologies, such as blockchain, Rwanda has shown itself to be proactive. The administration has demonstrated its approval for programs that use technologically advanced solutions to advance financial inclusion. In an effort to better understand blockchain technology and investigate its possible uses in the financial industry, regulatory bodies have shown intent for engagement with the industry's stakeholders.

Furthermore, Rwanda has put in place a number of programs to foster an atmosphere that is favourable to blockchain development (Korpela, 2018). These include creating regulatory certainty on the use of blockchain and crypto-currencies technology, encouraging collaborations between the public and private sectors to promote innovation in financial services, and setting up working directory for fin-tech start-ups to test their blockchain-based solutions in an environment that's secure. But despite these initiatives, there are still issues that could prevent blockchain technology from being widely used for financial inclusion. The requirement for more regulatory transparency and safety is one of these issues. Even while Rwanda has made advances in establishing regulations regarding various areas of blockchain technology and cryptocurrencies, there might still be gaps in regulation that allow for doubt or concern and impede certain stakeholders from fully adopting blockchain solutions.

Furthermore, the distributed structure of blockchain technology may not always be succinctly harmonized with the current regulatory system. To maintain adherence and safeguard consumers, certain legal responsibilities, such Know Your Customer (KYC) and Anti-Money Laundering (AML) protocols, might need to be altered to make allowances for the special features of blockchain-based financial services. The widespread use of blockchain technology in Rwanda is further hampered by issues with infrastructure and technological readiness (Distor et al., 2023). Even while the nation has made progress in enhancing its digital amenities more funding for tandem and technological expertise are still required to enable the successful deployment of blockchain solutions for financial inclusion. Although Rwanda has made progress in integrating blockchain technology for financial inclusion, more has to be done to improve infrastructure and technical capabilities, resolve regulatory issues, and harmonize rules with the decentralized nature of the technology. Rwanda can further unleash the blockchain's capacity to promote financial inclusion and give its people access to reasonably priced and effective financial services by tackling these issues.

2.6 Financial Stability and Risk Management

Through the development of the financial services value chain, FinTech is upending established institutions and generating efficiency improvements. The potential for innovation in the financial sector to result in improved services, more accessibility, and increased efficiency is a major factor driving interest in fin-tech. This innovation entails revolutionizing every facet of the provision of fundamental financial sector services, including risk sharing, payment settlement, and facilitation of borrowing & saving, and capital allocation. Furthermore, the infrastructure and market structure that currently support the delivery of these services in the financial market may undergo significant changes as a result of this process (International Monetary Fund, 2019).

As stipulated by Jameaba (2023), the advent of digitalization has facilitated the emergence of flexible and adaptable open banking frameworks that strengthen financial services providers' collaborations. These models have been made possible by advancements in back-end and front-end technologies, a diversified customer base, enhanced customer experience leverage capacity, and the creation and implementation of financial innovations to bolster competitiveness. However, despite all of its advantages, the majority of banks have not yet implemented blockchain technology because of the on-going uncertainty surrounding the technology's adoption, deployment, and daily operations. The lack of understanding of the blockchain technology business case, regulatory uncertainty, fear of risk, and a number of blockchain-based cryptocurrency exchanges and assets' failures have all contributed to the reduction in blockchain technology acceptance. The consequences of Decentralize Ledger Technology from a legal standpoint are essentially unexplored. In reality, it appears more likely that legal issues than ones related to technology, if any, would impede the adoption of blockchain-based solutions in Africa and around the world (Wilhelm, 2019).

In Rwanda, maintaining financial security in an environment of blockchain adoption requires a regulatory framework that strikes an appropriate equilibrium between innovation and risk management (Uña et al., 2023). The regulatory framework has the objective to minimize potential hazards and shortcomings while promoting the advantages of blockchain technology. The method used starts with an in-depth understanding of blockchain technology and its consequences for the financial industry. The regulatory bodies work with stakeholders and industry professionals to evaluate the possible advantages and disadvantages of blockchain adoption. This entails assessing factors including efficiency, transparency, and security. Rwandan regulators have set precise rules and specifications for blockchain-based financial services and products in order to encourage innovation and investment in the field. These rules ensure that blockchain-based enterprises comply with current financial regulations by outlining the procedures for licensing, operating, and supervising them.

The use of blockchain-based financial products and decentralized finance (De-Fi) platforms has increased rapidly in Rwanda and many other countries (Mhlanga, 2023). These recent financial innovations have some possible risks which must be properly controlled. Some of the risks are: lack of technical expertise, cybersecurity vulnerabilities, inconsistent regulations, and potential resistance from widely recognized financial institutions. Because specific regulatory frameworks on blockchain technology are still developing, compliance issues could arise. The huge importance and sensitive nature of financial transactions makes cybersecurity issues like fraud and hacking serious threats. Furthermore, a lack of competent employees may make it more difficult to deploy and maintain blockchain systems. Adoption may also be slowed by opposition from widely recognized financial institutions. Rwanda may invest in cybersecurity measures, provide training programs to develop local expertise, create clear regulatory rules, and encourage cooperation between blockchain innovators and existing financial institutions in order to reduce these risks.

3. Methodology

The desk methodology was used in this investigation. Secondary data collection is the term used to describe a desk study research strategy. Essentially, this is gathering data using already existing resources, ideally with the advantage of being less expensive than field research. Since the data was readily available through online journals and libraries, our current investigation examined previously published studies and publications.

3.1 Methods and Instruments for Data Collection: Desktop Research

Obtaining secondary data for the evaluation of blockchain technology regulation and financial inclusion in Rwanda was the main goal of the desktop research. The majority of the data come from grey literature, which includes published reports, academic databases, government websites, peer-reviewed journal publications, and academic reports. Data extraction sheets are used to collect the data.

.2 Data Collection/Cleaning & Validation

Academic libraries and internet databases both provided access to the data. Requirements for choosing pertinent data include time period, region, and particular variables of interest. In order to prepare the data for analysis or additional processing, the pertinent information is taken out of the sources that have been gathered, cleaned, and formatted. This process entails changing data kinds, standardizing formats, and addressing inaccurate or missing data. The extracted data is put through quality checks to guarantee correctness, consistency, and completeness. This includes profiling the data, comparing against established benchmarks or standards, and doing validation checks.

3.3 Data Analysis (Qualitative data)

Finding, evaluating, and reporting themes or trends in data are done through the qualitative research technique known as thematic analysis. It can help to examine and comprehend the underlying patterns and meanings in textual or visual data. Since theme analysis is adaptable, it can be used with a wide range of data sets, including written or visual data. Thematic analysis makes it simpler to identify, assess, and understand patterns in qualitative data (Castleberry & Nolen, 2018). Additionally, content analysis is utilized to methodically examine the content of the text and make deductions.

4. Results & Discussions

RQ1: How can the existing regulatory frameworks governing financial services are assessed in relation to their potential impact on the integration of blockchain technology?

The result suggests that the existing regulatory structures in Rwanda are not sufficiently flexible to accommodate the novel aspects of blockchain technology. This could point to the necessity of updating or reforming regulations to take into account the special characteristics and difficulties that blockchain presents for the financial industry. Additionally, the widespread adoption of blockchain technology in financial services is impeded by regulatory barriers. To encourage greater industry integration and innovation, regulations need to be updated or simplified.

RQ2: What are the possible challenges that hinder the seamless integration of blockchain technology within the current banking sector?

One of the main obstacles found in the study was regulatory challenges. In Rwanda, for banks wishing to implement blockchain technology, federal regulations regarding data management and financial transactions provide obstacles because adherence to current frameworks and legislation necessitates major changes. The smooth integration of blockchain is further hindered by a lack of urgency and cultural reservations in conventional banking firms. Banks face internal opposition from stakeholders who are unwilling to embrace change or who are unfamiliar with the potential advantages of blockchain technology. Economic and competitive factors were also noted by the study as challenges. Banks are reluctant to invest in blockchain technology due to the initial expenses involved in putting them into practice and the erratic nature of the return on investment. The banking industry's competitive environment, which includes a stronghold of well-established firms and the rise of fin-tech start-ups, also affects banks' inclination to use blockchain technology.

RQ3: Who are the regulatory enablers that could facilitate the successful incorporation of blockchain technology into financial services? What supportive policies and frameworks are identified?

The study reveals a number of regulatory drivers that are essential to the blockchain technology's successful adoption in the financial services industry in Rwanda. Regulatory agencies that are prepared to adapt or build novel structures in order to incorporate blockchain developments are among these enablers. Furthermore, regulations that promote innovation and assure security in the financial industry were recognized as beneficial. These policies cover issues including know-your-customer (KYC) requirements designed especially for blockchain applications, data protection, and anti-money laundering (AML) legislation. The adoption of blockchain technology is aided by frameworks that are intended to foster partnership, openness, and compatibility among all parties involved in the financial system. In summary, the results offer valuable perspectives on the regulatory environment required for the effective integration of blockchain technology in the financial services industry. They highlight the principal players, laws, and structures that are essential to the deployment and expansion of this technology.

RQ4: What are the perceptions and attitudes of key stakeholders, such as regulators, financial institutions, and users, in relation to the integration of blockchain technology in financial services?

Regulators are somewhat confident about blockchain's potential for security and transparency, but they are also raising fears about regulatory compliance, particularly with regard to know your customer (KYC) and anti-money laundering (AML) standards. They stress that in order to properly manage risks; there must be defined guidelines and control. There is variation among the attitudes of financial institutions. Blockchain is perceived by some as a disruptive force that could threaten established banking structures, but it is also seen by others as a chance for innovation and cost savings through expedited procedures like smart contracts and cross-border payments. Depending on the advantages that are viewed and the willingness to engage in staff training and infrastructure, adoption may differ. Users display a combination of negativity and interest, including both consumers and enterprises. While some people are excited about blockchain-based financial services because they believe they will improve efficiency, save costs, and increase security, others are apprehensive because they worry about privacy, volatility, and the learning curve that comes with using new technologies. Trust in the organizations using the technology and in the technology itself may have a big impact on user sentiments.

RQ5: How does blockchain technology regulation affect financial inclusion in Rwanda?

Financial inclusion in Rwanda is impacted greatly by the regulatory framework surrounding blockchain technology. Strict laws may inhibit creativity and prevent blockchain solutions from being widely used. On the other hand, inclusive and well-balanced regulatory frameworks create a favourable atmosphere for financial services based on blockchain technology. According to our analysis, Rwanda's proactive approach to blockchain regulation has aided in the integration of decentralized financial systems, improving the unbanked population's access to banking services.

Also, the first hypothesis that current regulatory frameworks pose significant challenges to the integration of blockchain technology in financial services in Rwanda is accepted. The second hypothesis that adapting and updating regulatory frameworks will facilitate the successful integration of blockchain technology in financial services is also accepted; lastly, the third hypothesis that standardizing international regulatory standards will enhance the global integration of blockchain technology in financial services is also accepted. All four hypotheses are accepted.

5. Recommendations

- Establishment of an extensive policy structure suited to the application of blockchain technology in the financial industry in conjunction with regulatory agencies and other stakeholders. Regulation compliance, consumer protection, and innovation should all be balanced within this framework.
- Encourage the creation of precise and explicit rules governing blockchain technology and the financial services industry. Adoption is hampered by uncertainty; therefore removing it will promote investment and innovation in the industry.
- Initiate educational programs to raise public, policymaker, and financial institution understanding of the advantages and possible hazards of blockchain technology. This will help people comprehend the limitations and possibilities of the technology.
- Promote cooperation amongst regulators, financial institutions, tech companies, and other interested parties to jointly develop solutions that tackle regulatory issues and take advantage of blockchain's revolutionary potential for financial inclusion.
- Encourage the creation of standards for interoperability so that various financial systems and blockchain platforms can interact and transact with one another without difficulty. Standardization will encourage scalability and compatibility, which will encourage wider usage.
- Put strong data privacy and security measures in place first in order to safeguard customer information and reduce the possibility of fraud or data breaches related to blockchain technology. It is imperative to prioritize adherence to global best practices.
- Make ensuring that regulatory frameworks are accessible and meet the requirements of those who are marginalized, such as those living in remote areas and those with little access to conventional financial services. These populations shouldn't unintentionally be denied access to blockchain-based solutions because of regulations.
- To stay up with changing market dynamics and technology breakthroughs, create procedures for routinely reviewing and modifying current regulations. Encouraging innovation without sacrificing regulatory supervision requires regulatory frameworks to be agile and flexible.
- Utilizing global best practices in blockchain regulation for financial inclusion through international cooperation and knowledge-sharing projects. Rwandan regulatory strategies can be developed with the use of lessons learned from other regimes.

6. Conclusion

In summary, the study revealed the complex relationship between current laws and the application of blockchain technology to improve financial inclusion in Rwanda. After a thorough research, the study identified the barriers and facilitators that these restrictions present to the development and use of blockchain technology in the financial industry. Our findings highlight how important regulatory frameworks are in determining how blockchain innovation is shaped in the nation. Although certain policies have created a favourable atmosphere for experimentation and development, others have posed significant obstacles, varying from unclear compliance requirements to explicit prohibitions on specific blockchain applications. It is clear that blockchain technology has enormous potential to transform financial services and promote equitable economic growth in Rwanda, even in the face of obstacles from current rules. Therefore, it is imperative that regulators and legislators have continuous conversations with industry players in order to develop a cooperative strategy for improving regulatory frameworks that strike a balance between encouraging innovations and protecting the interests of consumers.

Additionally, the study highlights the significance of taking preventative measures to improve clarity regarding regulations and create a supportive atmosphere for blockchain adoption. To resolve issues and accelerate compliance procedures, this includes programs like regulatory sandboxes, focused capacity-building projects, and stakeholder meetings. Rwanda must now keep up its efforts to create an environment that is favourable to blockchain innovation in order to take advantage of the technology's revolutionary potential to promote sustainable development and financial inclusion objectives. Rwanda can lead the way in blockchain adoption in the area and create new avenues for inclusive growth and economic empowerment for all of its population by adopting a progressive regulatory strategy.

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WEF: Blockchain in Health - ***https://www.weforum.org/agenda/2021/08/how-blockchain-can-help-mitigate-covid-19-and-future-outbreaks-in-africa/***

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