The Impact of Blockchain Technology on Financial Inclusion: A Study on the Role of Decentralized Finance (DeFi) in Expanding Access to Financial Services

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Abstract

Blockchain technology has the potential to significantly advance financial inclusion, by providing decentralized financial solutions, such as Decentralized Finance (DeFi) platforms, which can ultimately be beneficial to the unbanked and underbanked populations across the globe. The decentralized nature of blockchain is a beacon of hope for bridging the financial access gap in developing and emerging economies where the traditional banking infrastructure is limited, or even non-existent. This is a conceptual paper that compiles a collection of literature around blockchain technology and financial inclusion. This paper discusses the potential to lower the barriers to financial services and transaction costs as well as increase financial literacy enabled by blockchain-based solutions (i.e. cryptocurrencies, smart contracts and digital wallets) through a systematic review of key studies, market reports and case examples identified from various regions. The state of the art paper which builds on the relevant literature on blockchain and fintech for financial inclusion. Focusing on cryptocurrencies, smart contracts, and digital wallets, this paper analyses the extent to which blockchain-based solutions may minimize financial service barriers, service transaction costs and improve financial literacy, through a review key study, market reports and case examples across different regions. It emphasizes how blockchain technology has the potential to empower these disadvantaged communities with affordable, secure, and accessible financial products. However, it does also stress the importance of guidelines to help ensure the safe and effective implementation of blockchain solutions. The objective of this paper is to offer a conceptual framework that connects the motivations for financial inclusion and the role of blockchain solutions with the ultimate objective of enabling policymakers, financial institutions, and technology developers to adopt and tailor blockchain solutions aligned to the global financial systems of developing economies.

Keywords: Blockchain Technology, Financial Inclusion, Decentralized Finance, DeFi, Cryptocurrencies, Smart Contracts, Peer-to-Peer Lending, Financial Services, Emerging Markets

Introduction and background related to the study

Blockchain technology, which is a decentralized digital ledger system, has become a game changer in the financial space, providing us with innovative solutions to the decades-old challenge of financial inclusion. Due to factors like absence of infrastructure, high transaction costs and bank requirements, financial systems have historically excluded considerable portions of the world population particularly in developing countries (Narula & Dunning, 2010). Nevertheless, this new trend in financial or financial activities are characterized by requiring banks or secondary organizations to serve as intermediaries, whereas blockchain technology would be able to reshape this type of systems by making them more secure and at lower costs and by ensuring an easier and transparent access to financial services to the unbanked and underbanked citizen or populations that often find it impossible to access financial products and services, for example (Chuen & Deng, 2017). Blockchain supports decentralized finance (DeFi) platforms that provide peer-to-peer transactions, remittance services, and microfinancing, providing access to financial resources to even the most remote individuals or those in regions with little financial infrastructure. An example of this is Bitcoin and

Ethereum, which have been a solution for escaping traditional banks and giving individuals in places where banking systems are poorly developed, access to sending, receiving or storing of money efficiently and securely (Puschmann, 2017). Moreover, due to one of the advantages of blockchain solutions - smart contracts which are a form of digital contract that executes automatically, transparency and an absence of trust of transactions, which can be a mechanism for those who have no access to classical banking services (Gans, 2019). Financial exclusion has always been a prevailing issue within the global economy; however, with the rapid emergence of new technologies like decentralized finance (DeFi) and blockchain applications, there is an increase in interest around how these innovations are being touted as solutions to the financial inclusion gap, especially in developing countries. According to the World Bank, more than 1700 million people across the globe are likely to be unbanked, as many of these large numbers of individuals exist in developing countries where formal financial services are little or no access possible (Pereira & Oliveira, 2020). As such, blockchain-based solutions are emerging as an opportunity to democratize financial services, allowing underserved populations the power to access things like savings accounts, credit, insurance, and investments without the dependence on a third-party bank. Also, in a rapidly digitizing world, blockchain is starting to be considered as a building block for the provision of truly inclusive and responsible growth and development (Scholtens, 2017). While the formal property rights and blockchain technology adoption is growing, little empirical evidence exists on a direct impact of blockchain technology adoption on financial inclusion especially in developing countries characterized by high proportions of unbanked population. Despite a strong theoretical basis for the blockchain-based solutions to alleviate financial inclusion, very few studies empirically evaluate how DeFi platforms and blockchain-based financial services can actually enhance access to financial products in real numbers (Gómez, 2017). Additional empirical research is needed to test the effectiveness, sustainability, and sources of diverse types of blockchain-based solutions for financial inclusion across different socioeconomic contexts, as claims of potential grow faster than evidence of effectiveness.

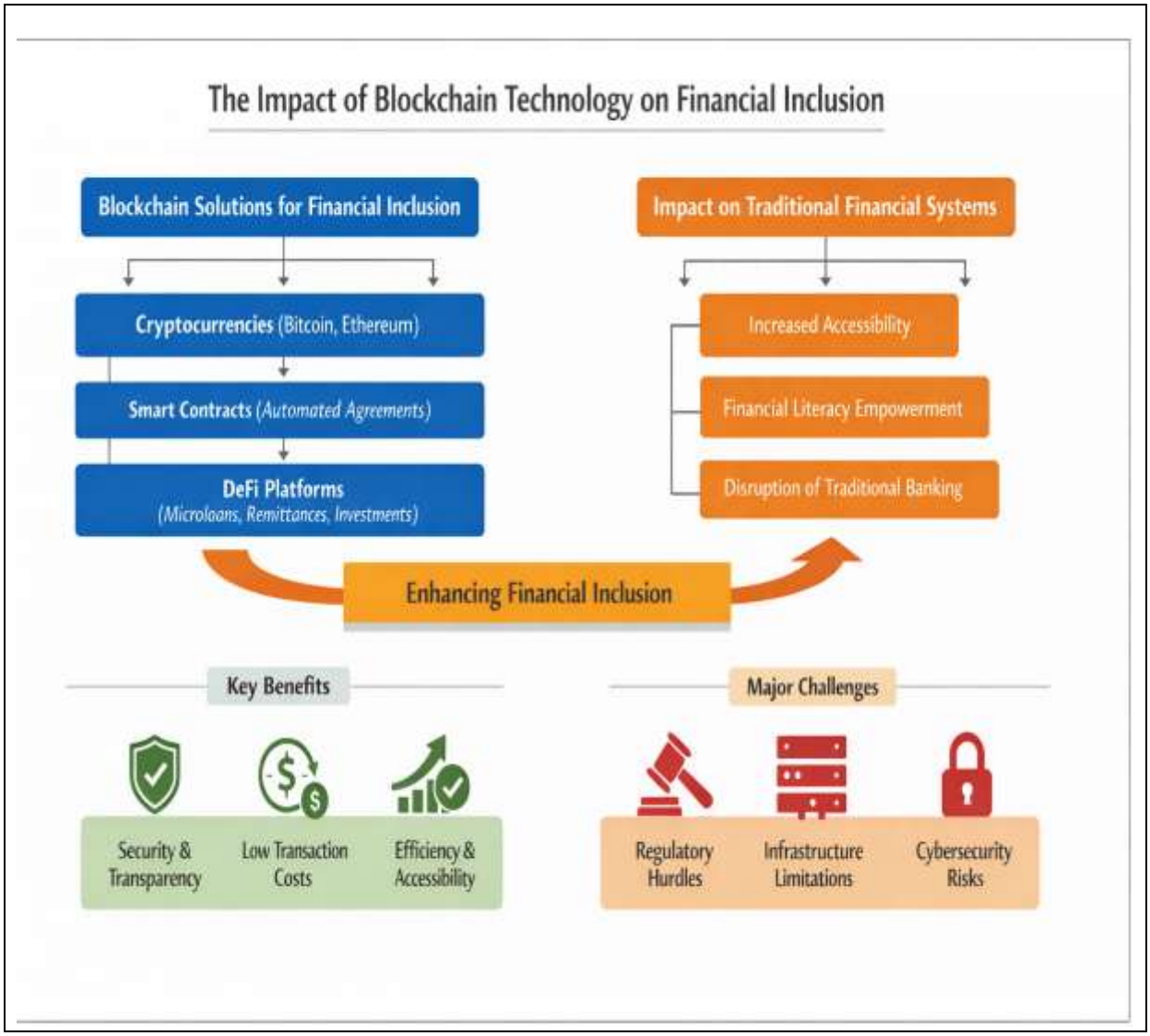
Literature Review

Blockchain technology is a potential solution to raise financial inclusion because it enables financial services to reach populations that are unbanked and underbanked in areas with little or no access to traditional banking systems. This ability of blockchain to process peer-to-peer transactions, essentially means that people can transfer money and achieve financial services without these intermediaries, which in many developing areas are neither accessible nor affordable (Narula & Dunning, 2010). Blockchain technology has enabled the rise of decentralized cryptocurrencies such as Bitcoin and Ethereum, which provide an alternative to traditional currency-based transactions that is more secure, cheaper, and more decentralized (Puschmann, 2017). In addition, services such as digital wallets and other applications based on blockchain allow people to put money into their pockets, with the ability to pay and manage money around the world, carved through the racks of huge values, levels of services these large financial sectors can offer (Gómez, 2017). Within this framework, blockchain has been championed as a solution to global financial exclusion due to its promise of low-cost, trustworthy access to financial products and services (Pereira & Oliveira, 2020), a plight impacting over 1.7 billion people who remain without access to formal financial services. The proliferation of DeFi platforms, in turn, further illustrated how blockchain was able to deliver full financial stack – to people who had previously been excluded from it. Using the blockchain to enforce transactions and contracts, DeFi platforms are decentralized; there are no more centralized intermediaries and users can conduct microloans, remittances, and investments amongst and to each other (Chuen & Deng, 2017). This allows people living in small towns to access fund and loan more easily which is impossible with traditional banks as they do not have a credit history or assets to borrow. Take the case of DeFi lending where people have been able to borrow funds or earn interest on deposits from their home deposit box, using cryptos as collateral, and take advantage of these opportunities (Gans, 2019) to access credit markets that had traditionally excluded them. Additionally, blockchain based remittance offerings are vastly more cheaper [20], circumventing the high fees charged by traditional money remittance services (Puschmann, 2017). DeFi platforms provide an opportunity to reduce the cost, efficiency, and borderless nature of financial services, representing a major advancement towards the financial inclusion of unbanked and underbanked populations. Despite all these developments, though, barriers to financial inclusion remain, particularly in respect to emerging-market individuals. Limited financial infrastructure, especially in rural regions, remains a barrier to banking access, and the fear of insecurity associated with digital currency transactions and crypto volatility presents serious threats to prospective users (Friede et al, 2015). Secure and transparent transaction are guaranteed through blockchain technology via decentralized ledger and smart contract

solutions to tackle these problems without the need of intermediation, which brings trust and reduces fraud (Scholtens, 2017). Finally, low transaction costs, which result from the absence of intermediation, could substantially lower the cost of financial services, thereby eliminating one of the major obstacles to access in low-income places. However, regulatory uncertainty, digital literacy, and network connectivity in developing regions also challenges erasing from adopting blockchain and its capabilities to solve these issues and reach financial inclusion at scale (Gomez, 2017).

Conceptual Framework

This study is built upon a conceptual framework that identifies the key elements of smart contracts, cryptocurrencies, and DeFi platforms that enable financial empowerment and have a positive effect on financial inclusion by broadening access to financial services for the world's unbanked and underbanked populations. At its core, blockchain technology was built to facilitate decentralized financial systems that circumvent traditional intermediaries such as banks, granting access to people in previously underserved regions to save, lend, and transact directly without the expensive middleman (Narula & Dunning, 2010) The framework relies on smart contracts, which are self-executing contracts, with the terms of the agreement between buyer and seller being directly written into lines of code, which facilitate, verify, or enforce the negotiation or performance of a contract, thereby making transactions in a trustless environment more automated, transparent and secure, while reducing the risk of fraud and human error (Chuen & Deng, 2017). Smart contracts eliminate the requirement of intermediaries to validate your contracts therefore minimizing both the cost of implementing financial services and the complexity of it, localizing financial service to the local populations who would otherwise be cut off from banking infrastructure (Gans, 2019). In addition, cryptocurrencies have created a non-fiat alternative to currencies already in circulation in the world, with peer-to-peer methods of transferring value at virtually no cost, regardless of one border or another, in a decentralized manner, without financial intermediaries (Puschmann, 2017). Such feature proves to be very much useful in developing countries that have large amount of cross border remittances and money transfer services charge very high fees (Pereira & Oliveira, 2020). Besides cryptocurrencies, the emergence of DeFi platforms also introduces significant factor that enables financial services for unbanked people to access to microloans, insurance and investment services without reliance on commercial banks (Gómez 2017). For example, these platforms can create low-cost, transparent, and secure financial products with difficult barriers of entry for individuals in rural areas or third world country due to the high entry cost or lack of credit history using blockchain (Scholtens, 2017). Enabling peer-to-peer lending becomes possible through DeFi platforms, which allows people to lend and borrow directly with each other and replaces traditional bank intermediation, and DeFi can also support crowdfunding for small businesses or projects in underbanked areas (Gans, 2019). This not only provides accessibility but also facilitates financial literacy that blockchain technology has the potential to become not only the solution to financial inclusion but also the solution to whether or not traditional financial systems are able to fulfil a consumer demand across the world either from disruptive innovation or by the complement of blockchain finance model in areas without access or entire regions with no access to banking system. Blockchain re-postulates financial inclusion through democratization of financial services, allowing people to control their financial transactions, improve their financial literacy, and build a credit history without a traditional banking system (Pereira & Oliveira, 2020). In addition, the transparency and immutability provide blockchain transactions with an equal role of creating trust and reliability often absent in the financial system—and overcoming corruption and inefficiency [in] financial systems, which is the case in a high rate for developing economies (Scholtens, 2017). The integration of blockchain capabilities into our financial systems will be decisive to shake the foundations of traditional finance, transforming into the opposite: accessible, open-source, democratic financial ecosystems that will undoubtedly enhance the economic mobility and quality of life of populations that were systemically excluded and invisible (Friede et al., 2015).



Above image showing the impact of blockchain technology on Financial inclusion

Discussion related to the study

Integrating financial services with the help of blockchain technology holds great promise for promoting financial inclusion – it also has the potential to overcome many of the known challenges faced by the unbanked and underserved within various regions of the world. The security of blockchain-based solutions is one of their major advantages. The decentralized structure of blockchain enables that transactions get validated from multiple nodes and are not dependent on a single validator (which can easily be compromised) thereby making it less prone to fraud and hacking (Puschmann, 2017). Moreover, transactions that are stored in the blockchain are immutable, meaning that after being added to the ledger, it cannot be modified nor deleted providing data integrity and protecting it from fraud. Such a level of cryptographic trust increases a level of trust in an environment where the financial system may be corrupt or just very inefficient (Gómez, 2017). Another important advantage is transparency, where an open ledger, visible to every member of the network (consensus verification), allows users to verify the validity of transactions without being dependent on a central authority (Friede et al., 2015). Such transparency is even more crucial for financial services in developing parts of the world, where financial operations can be murky or unofficial. Blockchain enables direct peer-to-peer transaction processing, which eliminates intermediaries, therefore increasing efficiency by lowering the time and cost necessary for money transfers, loans and other financial processes (Chuen & Deng, 2017). Additionally, blockchain technology eliminates the reliance on traditional financial intermediaries (e.g., banks), which often charge a fee for processing and transferring funds, thus lowering transaction costs and making blockchain especially appealing for cross-border payments and remittances with high transaction costs (Pereira & Oliveira, 2020). The speed of blockchain transactions, coupled with this cost-reductive mechanism, can make critical financial services more accessible to groups in areas

where traditional banking infrastructure is sparse, or wholly lacking. However, the extensive opportunities associated with using blockchain for financial inclusion are accompanied by obstacles and challenges. The primary challenge among them is the regulatory uncertainty of utilizing blockchain and cryptocurrencies. Clear regulation of blockchain-enabled financial services does not yet exist in many parts of the world which exacerbates legal and compliance risk by overlapping the activities of financial institutions, investors, and users. While firms must undergo innovation to stay competitive, regulatory bodies must ensure timely innovation without compromising consumer protection or market stability (Scholtens, 2017). Furthermore, another issue that has to do with technology is the lack of infrastructure and backbone that needs to be established to support the deployment of blockchain applications, especially in several developing countries. Although blockchain technology itself could transpose democratized financial options to the regions, conventional, high-speed internet access as well as digital learning would pose opposition on an adoption level in these regions where technological resources are sparse (Gans, 2019). Additionally, cybersecurity risks of blockchain systems — especially with smart contracts and in regards to cryptocurrency wallets. Increased adoption of blockchain can also be followed with the increased risk of blockchain-related cyber-attacks which can threat the security and integrity of the blockchain networks by non-digital security practice-aware users (Puschmann, 2017). Therefore, mitigation of security weaknesses as well as promoting the safe usage of blockchain forms the base for the sustainable implementation of financial solutions based on this technology. In summary, blockchain brings many advantages such as security, transparency, efficiency and cost reduction but it also faced with challenges such as regulatory uncertainty, technical infrastructures and cyber security. To help unlock blockchain as a platform for financial inclusion, these challenges will need to be solved by collaboration between governments, regulators, technology providers, and financial institutions along with the aim of putting quality financial services into the hands of underserved populations.

Conclusion

The objective of this research is to showcase the potential of blockchain technology in allowing financial inclusion, by showing how the decentralization feature of blockchain provides an effective and secure financial solutions which would provide them with the services that they lacks, especially in developing countries where there is lack of traditional banking system (Narula & Dunning, 2010). The results demonstrate that blockchain allows peer-to-peer transactions via cryptocurrencies and smart contracts while avoiding expensive intermediaries leading to lower transaction costs and an improved access to financial services like remittances, microloans, and savings accounts (Puschmann, 2017). Not only do these innovations increase accessibility to finance, they also make financial transactions more secure and transparent, key components of building trust on systems which may involve corruption and inefficiencies in traditional finance (Gómez, 2017). Specifically, DeFi (decentralized finance) platforms have been able to offer services like investment opportunities, lending, and borrowing that many individuals within emerging markets previously could not access (Chuen & Deng, 2017). Blockchain provides the ability to carry out trustless transactions between parties, which can enable greater financial literacy, and the economic opportunity that follows can contribute towards inclusive economic growth and a more robust global financial ecosystem (Gans, 2019). These findings have practical implications in terms of moving toward blockchain adoption as policymakers and financial institutions should offer clear regulations to encourage blockchain adoption and provide incentives for the companies to undertake the effort of integrating their systems based on blockchain technology into financial systems. Such that would result in wider adoption in terms of product and service accessibility in conjunction with extensive financial inclusivity, mainly in less privileged areas (Pereira & Oliveira, 2020). Finally, financial institutions can play an essential role in bringing knowledge of blockchain features and advantages into the hands of users, providing tools that facilitate secure digital transactions, while investing in digital literacy in developing markets where those tools might become more effective (Scholtens, 2017). Halting the development of blockchain protocols their integration in global financial systems would be a big mistake, so future work must target the creation of regulatory frameworks capable to solve the security and legal problems that this technology will face to be integrated safely, inclusively and efficiently also regarding its economic and social implications. In addition, the study on cross-regional and cross-financial system blockchain interoperability may generate some insights for a more integrated and scalable blockchain system that might allow real-time cross-border financial transactions consistent with global financial inclusion objectives (Friede et al 2015). Understanding behavioral economics behind user adoption, user identity, onboarding, security issues, and policy implications in various geographies will also be critical to informing future blockchain development as a tool for financial inclusion.

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