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Democratizing Finance: How Blockchain is making Investments More Accessible and Transparent.

Theobald Francis Kipilimba

Senior Lecturer, Department of Economics and Accounting
University of Iringa
Iringa, Tanzania
kipilimbatheo@gmail.com

Abstract: *The financial landscape has undergone significant transformations over the past few decades, driven by rapid technological advancements. Among these, blockchain technology has emerged as a revolutionary force with the potential to democratize finance, making investments more accessible and transparent. This study explored the transformative impact of blockchain technology on investment accessibility and transparency, focusing on key indicators such as Accessibility, Transparency, Cost Efficiency, and User Experience. Utilizing a sample of 80 respondents, the research employed various scales to gauge perceptions and outcomes related to these indicators. The findings revealed that blockchain technology has notably improved Accessibility by lowering entry barriers and expanding geographic reach, though challenges remain in terms of user familiarity and digital inclusivity. In the realm of Transparency, respondents acknowledged the advantages of enhanced transaction visibility and improved audit trails, but some expressed concerns about the system's ability to fully mitigate fraud risks. Cost Efficiency outcomes were mixed, with some users observing reductions in transaction and administrative expenses, while others saw limited financial benefits. Lastly, User Experience showed advancements in simplified investment processes and faster transaction speeds, although variability in user interfaces and customer support highlighted areas for improvement. Based on these insights, the study recommends enhancing user education and interface design to increase accessibility, strengthening public awareness and security measures to boost transparency, conducting targeted cost-benefit analyses to optimize cost efficiency, and investing in intuitive designs and consistent customer support to improve user experience. These recommendations aim to maximize blockchain's potential in making investments more accessible and transparent, ultimately contributing to a more inclusive and efficient financial ecosystem.*

Keywords—Blockchain Technology, Investment Accessibility, Financial Transparency, Cost Efficiency, User Experience, Enhanced Transaction Visibility, Audit Trails, Fraud Risks, Simplified Investment Processes, Faster Transaction Speeds.

1. INTRODUCTION

The financial landscape has undergone significant transformations over the past few decades, driven by rapid technological advancements. Among these, blockchain technology has emerged as a revolutionary force with the potential to democratize finance, making investments more accessible and transparent. The traditional financial system, characterized by centralized control, high entry barriers, and opaque processes, has long been criticized for its inefficiencies and exclusionary practices. Blockchain technology, with its decentralized nature, promises to address these issues and reshape the investment landscape.

Blockchain technology has emerged as a transformative force in various industries, offering decentralized, secure, and transparent solutions for data management and transactions [1]. Originally developed for cryptocurrencies like Bitcoin, blockchain has evolved into a versatile tool applicable across finance, supply chain management, healthcare, and government services [2]. Key characteristics of blockchain include decentralization, immutability, transparency, and consensus mechanisms, which address shortcomings of traditional financial institutions [2]. The technology integrates peer-to-peer networking, cryptography, and distributed consensus to create a system that eliminates the need for trusted third-party intermediaries [3]. While blockchain offers numerous benefits, such as increased efficiency, reduced costs, and enhanced security, challenges remain in scalability, interoperability, and regulatory concerns [1]. As blockchain continues to develop, interdisciplinary collaboration and regulatory frameworks will be crucial to realizing its full potential across various industries [1].

Blockchain technology is revolutionizing traditional investment models by creating new opportunities and disrupting existing structures. It enables trustless, decentralized, and secure transactions without intermediaries, potentially transforming equity markets and overcoming inefficiencies [4]. The technology is impacting business models across industries, with five archetypal patterns identified in a study of 99 blockchain ventures [5]. Major companies like Walmart, IBM, and Microsoft are already utilizing blockchain in their operations [6]. In the investment sector, blockchain addresses transparency and trust issues in traditional indirect investment methods. By creating trust-free funds and ensuring data transparency, blockchain-based protocols like Betoken, Cook, and d HEDGE are paving the way for the future of investment [7]. As the technology matures, it is expected to further innovate business models and provide new opportunities for investors and companies

alike [5, 6]. Despite Africa's potential, investment in the continent remains low due to a lack of reliable data and market infrastructure [8]. Blockchain could help overcome these barriers by providing a more robust evidence base for investors. Additionally, blockchain has the potential to re-engineer economic models and create new markets in emerging economies [9]. However, for Tanzania to fully benefit from blockchain, government and business sectors need to invest in its implementation [10].

Blockchain technology is gaining traction in Tanzania and other developing countries, offering potential solutions to various challenges. In Tanzania, blockchain could enhance healthcare systems by securely managing patient records and improving data sharing between facilities [11]. The technology also shows promise in improving supply chain operations in public procurement, though awareness and technical challenges remain barriers to widespread adoption [12]. Blockchain applications in Tanzania could extend to land registration systems, banking, and other sectors, potentially reducing corruption and increasing transparency [10]. More broadly, blockchain has the potential to promote transparency, build trust, and enhance transaction efficiency in developing countries [13]. However, successful implementation in Tanzania and similar contexts requires addressing issues such as low public awareness, technical challenges, and the need for supportive infrastructure and policies [10, 12].

Blockchain technology has the potential to revolutionize the financial industry by enabling decentralized financial services that are more transparent, innovative, and accessible [14]. By reducing transaction costs and eliminating intermediaries, blockchain can broaden financial inclusion and create new opportunities for entrepreneurs [14]. The technology's ability to generate distributed trust and provide a decentralized ledger system offers an attractive alternative to traditional centralized financial structures, which have faced challenges in maintaining public trust [15]. Blockchain applications in finance include smart contracts, efficient clearing and settlement processes, and improved identity verification systems [1]. The technology also has the potential to enhance credit reporting security and facilitate the issuance of digital securities [1]. As blockchain continues to evolve, it may reshape modern finance, creating a new landscape for innovation and entrepreneurship in the financial sector [14]).

Blockchain technology offers significant potential for democratizing finance and improving financial services in developing countries like Tanzania. It can enhance transparency, reduce fraud, and lower transaction costs in various sectors [10, 14]. In Tanzania, blockchain could address challenges in healthcare record management, land registration, and banking security [10]. The technology can also increase financial inclusion by providing open access to services and facilitating innovative business models [14]. This is particularly relevant in rural areas of Tanzania, where access to formal financial services has been limited despite financial sector liberalization [16]. In the microfinance sector, blockchain can improve efficiency, transparency, and accountability, potentially revolutionizing credit management and expanding access to financial services for underserved populations [17]. Overall, blockchain presents opportunities to overcome existing financial infrastructure limitations and promote economic development in Tanzania and other developing countries.

Decentralized Finance (DeFi) is emerging as a transformative force in financial inclusion, leveraging blockchain technology to provide accessible financial services without traditional intermediaries [14, 18]. DeFi platforms offer a range of services including lending, borrowing, and trading, potentially democratizing access to finance for underserved populations [19]. By reducing transaction costs and enhancing transparency, DeFi addresses longstanding barriers to financial inclusion [18]. However, while DeFi transactions are pseudonymous, they are not entirely anonymous and can be tracked [14]. The technology's potential for fostering economic empowerment is particularly relevant in developing economies, where traditional financial systems often exclude marginalized groups [20]. In India, despite growing interest in DeFi, regulatory uncertainties have led to cautious adoption, with policymakers exploring frameworks to balance innovation and risk management [20].

Smart contracts, enabled by blockchain technology, are self-executing agreements with the potential to revolutionize financial transactions [21]. These contracts can automate complex processes, reducing the need for intermediaries and lowering transaction costs [22]. By automating trading processes and enhancing market transparency, smart contracts may decrease moral hazard and adverse selection problems in financial markets [22]. The implementation of blockchain-based smart contracts is expected to first impact the clearing and settlement of financial securities [22]. However, the claim of significantly lower transaction costs is debatable, with some cases potentially leading to higher costs [23]. Despite this, smart contracts are seen as a solution to issues associated with traditional financial contracts, offering reduced risks, lower administration costs, and more efficient business processes across the financial services industry [24]. The adoption of smart contracts could have far-reaching implications for market structure and financial institutions [22]. The technology's ability to create smart contracts can lower transaction costs in tradable permit schemes by reducing uncertainties, decreasing complexities, and limiting opportunistic behaviors [25]. In maritime supply chains, blockchain and smart contracts can facilitate cross-organizational collaboration, decrease process times, and support the integration of small and medium-sized enterprises by reducing entry barriers [26]. However, challenges such as low awareness and technical issues need to be addressed for successful implementation in Tanzania [12]. Overall, blockchain technology presents opportunities for improving efficiency and transparency across multiple sectors in the country.

Blockchain technology's transparency has the potential to mitigate information asymmetries in financial markets, but its impact is complex. While the shared ledger can reduce

adverse selection and moral hazard for good market participants, it may also incentivize bad actors to exploit disclosed information [27]. The concept of trust asymmetry emerges in blockchain systems, where trust dynamics become a crucial factor in determining intrinsic value [28]. Blockchain's immutability, traceability, and verifiability offer opportunities for improved auditing and regulatory compliance, potentially automating processes and enhancing assurance [29]. However, challenges remain in transitioning from traditional to blockchain-based frameworks, including operational concerns and adherence to existing auditing standards. Despite these complexities, blockchain's transparent ledger allows all participants to view and verify transactions, which could lead to a more level playing field in financial markets [27, 29]. In Tanzania, blockchain adoption could address challenges in healthcare, land registration, and banking by improving security, transparency, and fraud prevention [10]. The technology's immutability and consensus mechanisms ensure the creation of tamper-proof records accessible by all network participants [30]. A blockchain-based solution has been proposed to tackle the issue of counterfeit educational certificates in Tanzania, addressing challenges such as manual procedures, unverifiable credentials, and susceptibility of centralized storage systems [31]. However, the implementation of blockchain technology in Tanzania is still lagging behind other African countries, highlighting the need for increased investment and adoption across various sectors [10].

Blockchain technology presents significant opportunities in finance, including enhanced transparency, security, and efficiency in asset management and international financial operations [32, 33]. However, its adoption faces numerous challenges. Regulatory uncertainties and the need for standardized frameworks pose significant hurdles [33, 34]. Technological complexities, such as scalability issues and the need for specialized knowledge, impede widespread implementation [32, 34]. Security concerns related to digital asset custody and protection also demand careful consideration[32]. Moreover, the integration of blockchain requires a paradigm shift in organizational structures and industry practices, necessitating education and collaboration among stakeholders [32, 35]. Despite these challenges, blockchain adoption is considered inevitable, with potential to revolutionize various aspects of finance, including cross-border payments and trade finance [33, 35].

Blockchain technology and cryptocurrencies face significant adoption challenges in Tanzania's financial sector. Despite potential benefits like instant international transfers and low transaction costs [36], several hurdles persist. These include regulatory uncertainties, technological complexities, and the need for widespread education [37]. The volatility of cryptocurrencies, security vulnerabilities, and concerns about illegal activities raise doubts about stability and security [34, 37]. Low adoption rates are attributed to ICT-related challenges and limited public awareness [37]. However, blockchain technology offers potential improvements in healthcare record management, land registration transparency, and banking security [10]. To overcome these obstacles and realize blockchain's full potential in finance, continued research, regulatory clarity, and collaboration among financial institutions, technology providers, and regulators are essential [34]. Additionally, establishing cryptocurrency education in schools and reviewing monetary policies could facilitate adoption [36].

In Tanzania, the traditional financial system has been marked by centralized control, high entry barriers, and opaque processes, leading to significant disparities in financial inclusion and limiting investment opportunities for many individuals, particularly those from marginalized or less affluent backgrounds. This lack of accessibility and transparency perpetuates economic inequalities, hindering the country's overall economic development. Blockchain technology, with its promise of decentralization, reduced transaction costs, and enhanced transparency, offers a potential solution to these issues by democratizing finance and making investments more accessible to a broader population. However, despite its revolutionary potential, the adoption and integration of blockchain in Tanzania's financial system face numerous challenges, including regulatory uncertainties, technological complexities, security concerns, and a general lack of awareness and understanding among both the public and financial institutions. This study aimed to bridge the gap between the potential benefits of blockchain technology and its actual application in Tanzania by investigating how blockchain can make investments more accessible and transparent, identifying the key barriers to its adoption, and exploring strategies to overcome these challenges, thereby contributing to the development of a more inclusive and efficient financial system in the country.

The objective of this study was to investigate the potential of blockchain technology in enhancing the accessibility and transparency of financial investments in Tanzania. It aimed to identify the specific barriers to blockchain adoption within the country's financial sector, assess the benefits and challenges associated with its implementation, and propose strategies to effectively integrate blockchain solutions to democratize finance, ultimately fostering a more inclusive and efficient financial system in Tanzania.

The main contribution of this study lies in its comprehensive examination of how blockchain technology can transform financial investment landscapes in Tanzania. By identifying the key barriers and opportunities associated with blockchain adoption, the research provides valuable insights into enhancing financial inclusion and transparency within the Tanzanian financial sector. The findings offer practical recommendations for policymakers, financial institutions, and technology providers to develop strategies that leverage blockchain to democratize access to investment opportunities. Additionally, the study contributes to the broader discourse on financial technology's role in emerging markets, offering a model for other nations facing similar challenges.

The remainder of the paper is organized as follows: Methodology is in section 2, results and discussions are

presented in section 3 while conclusion and recommendations are in section 4.

2. METHODOLOGY

This study adopted a mixed-methods approach to investigate how blockchain technology impacts financial investment accessibility and transparency in Tanzania. The research design was cross-sectional, focusing on collecting data at a specific point in time to assess current perceptions and experiences related to blockchain in the Tanzanian financial sector. A sample size of 80 participants was selected through stratified random sampling to ensure a diverse representation of stakeholders, including financial professionals, blockchain experts, investors, and policymakers. This sampling technique aimed to capture a broad range of perspectives on the implementation and effects of blockchain technology.

Data collection involved two primary methods: surveys and in-depth interviews. The survey comprised a structured questionnaire designed to gather quantitative data on participants' views regarding the accessibility and transparency of financial investments facilitated by blockchain technology. The survey included Likert scale and closed-ended questions to quantify attitudes and perceived benefits or challenges. Concurrently, qualitative data were collected through semi-structured interviews with 20 participants from the sample, allowing for detailed exploration of personal experiences and expert opinions on the practical implications of blockchain technology in the investment sector.

Data analysis combined statistical and thematic approaches. Survey data were analyzed using descriptive statistics to identify general trends and patterns in responses, while thematic analysis was applied to interview transcripts to uncover recurring themes and deeper insights. Ethical considerations were carefully addressed, including obtaining informed consent, ensuring confidentiality, and allowing participants to withdraw at any stage of the study. Although the study's small sample size and potential response biases may limit generalizability, the methodology provided a comprehensive understanding of blockchain's role in democratizing financial investments in Tanzania.

3. RESULTS AND DISCUSSION

The purpose of this study was to explore the transformative potential of blockchain technology in the financial sector, specifically focusing on its impact on investment accessibility and transparency. This section presents and analyzes the findings derived from a sample of 80 respondents who provided insights into their experiences and perceptions regarding blockchain technology and its influence on the financial investment landscape. Through a combination of quantitative and qualitative data, this study examined various dimensions such as the level of blockchain adoption, perceived benefits and challenges, and the overall impact on democratizing financial investments.

3.1 Demographic information of the respondents

In this study a sample of 80 respondents was carefully selected to provide a broad range of perceptions on the impact of blockchain technology in the financial sector. This section presents an overview of the demographic characteristics of the participants, including age, gender, educational background, occupation, and geographic location.

3.1.1 Age of the respondents

The age distribution of the study as indicated in table 1, in which the age group of 18-24 years, which represented 15 respondents in the study, provided a snapshot of young adults navigating the early stages of their careers and financial independence. This demographic, accounting for 18.8% of the total sample, was characterized by its members' recent transition from academia to the professional world. Their engagement with blockchain technology was likely influenced by their exposure to digital innovations through their educational experiences and the prevalent trends in technology and finance. Many individuals in this age bracket were relatively open to exploring new financial tools and platforms, showing a readiness to experiment with emerging technologies like blockchain. Their responses revealed a keen interest in the potential of blockchain to democratize financial investments and enhance accessibility. Given their formative stage in the workforce, their perspectives often reflected optimism and a forward-thinking attitude towards integrating blockchain into their financial practices.

The 25-34 years age group, which constituted the largest segment of the sample with 30 respondents, provided a comprehensive view of how blockchain technology was perceived by young professionals in the midst of their careers. Representing 37.5% of the sample, this group typically included individuals who had accumulated several years of work experience and were more engaged in complex financial decision-making. Their established careers and increasing financial responsibilities made them a critical audience for assessing the practical applications and benefits of blockchain technology. The responses from this age group highlighted a nuanced understanding of blockchain's potential to enhance transparency and efficiency in financial transactions. Their insights were shaped by a balance of practical experience and openness to technological innovation, offering valuable feedback on the integration of blockchain into mainstream financial practices.

The age group of 35-44 years, with 20 respondents representing 25.0% of the sample, provided an experienced perspective on the study's focus on blockchain technology in financial investments. This demographic typically consisted of mid-career professionals who had established their roles within their respective industries and were familiar with traditional financial systems.

Table 1: Showing demographic information of the respondents

Demographic Characteristic	Category	Frequency (n)	Percentage (%)
Age			
	18-24 years	15	18.8
	25-34 years	30	37.4
	35-44 years	20	25.0
	Above 44 years	15	18.8
Gender			
	Male	45	56.2
	Female	35	43.8
Educational Background			
	Advanced level or below	10	12.5
	Certificate/Diploma	10	12.5
	Undergraduate	35	43.8
	Graduate	25	31.2
Occupation			
	Student	15	18.8
	Employed	45	56.3
	Self-employed	10	12.5
	Unemployed	5	6.2
	Retired	5	6.2

Their responses reflected a cautious approach towards new technologies, influenced by their extensive experience with established financial practices. This age group's insights revealed a preference for proven, reliable systems and a need for clear demonstrations of blockchain's benefits and integration into existing financial frameworks. Their reaction accentuated the importance of addressing potential challenges and proving the practical value of blockchain technology to encourage its adoption among more experienced professionals.

The above 44 years age group, consisting of 15 respondents or 18.8% of the sample, represented seasoned professionals with extensive experience in their fields. This demographic's responses were shaped by a long history of engagement with traditional financial systems and a more conservative approach to adopting new technologies. Their insights highlighted a degree of skepticism towards blockchain technology, stemming from a preference for established financial practices and a cautious attitude towards rapid technological changes. Despite this, their response was important for understanding the barriers to adoption and the requirements for integrating blockchain into traditional financial practices. Addressing their concerns and demonstrating blockchain's practical benefits were essential steps in fostering greater acceptance and facilitating its integration into their financial activities.

3.1.2 Gender of the respondents

In Table 1 of the study, the demographic distribution of respondents based on gender revealed an insightful division between male and female participants. The study sample consisted of 80 individuals, with 45 males and 35 females contributing their perspectives on the impact of blockchain technology on financial investments.

The male respondents, totaling 45, represented a substantial majority within the study. This group comprised professionals from a variety of sectors, including finance, technology, and

academia. Their responses reflected a broad engagement with and understanding of blockchain technology. Many male participants indicated that they were well-versed in the technological innovations driving blockchain and were keenly interested in its applications within financial markets. Their feedback often highlighted the potential of blockchain to enhance transparency, reduce transaction costs, and streamline investment processes. Additionally, they addressed practical challenges such as regulatory uncertainties and the need for robust technological infrastructure. The insights provided by the male respondents were critical in understanding the perceived benefits and hurdles of blockchain technology from a predominantly male perspective, contributing significantly to the study's overall findings.

The female respondents, numbering 35, brought a diverse and valuable perspective to the study. This group included professionals and experts across various fields who were interested in the implications of blockchain technology for financial investments. Female participants expressed a strong interest in how blockchain could democratize access to financial resources and enhance overall transparency in investment processes. Many highlighted the potential of blockchain to address gender disparities in investment opportunities and to create more inclusive financial systems. Despite their enthusiasm, female respondents also noted challenges such as the need for greater education on blockchain technology and the importance of addressing gender biases within the tech sector. Their contributions underscored the potential benefits of blockchain for fostering financial inclusivity and highlighted areas where additional efforts were needed to support broader adoption and equitable access.

3.1.3 Educational Background of Respondents

In the study, the educational background of the respondents was a crucial factor in understanding their perspectives on blockchain technology's impact on financial investments. The demographic breakdown revealed a diverse range of educational qualifications among the 80 participants, which provided valuable insights into how education influenced their views and experiences with blockchain technology.

According to table 1, 10 respondents held qualifications at the advanced level or below. This group represented those with educational backgrounds up to high school or equivalent qualifications. Their responses highlighted a more foundational understanding of blockchain technology and financial investments. Despite their limited formal education in higher studies, many in this category demonstrated an eagerness to learn about technological advancements and their implications for the financial sector. Their feedback often reflected practical, on-the-ground experiences and a basic understanding of blockchain's potential benefits and challenges. The insights from this group were instrumental in showcasing the need for accessible educational resources that could bridge the knowledge gap and foster greater inclusivity in discussions about emerging technologies.

Another 10 respondents held certificates or diplomas, representing a mid-level educational attainment. This group included individuals who had pursued vocational training or specialized courses related to finance, technology, or business. Their educational background provided them with a more applied understanding of blockchain technology and its applications in financial investments. Participants with certificates or diplomas often shared practical insights into how blockchain could be integrated into various financial systems and highlighted the importance of ongoing professional development. They also pointed out specific areas where further education could enhance their understanding of blockchain and its potential benefits. Their contributions highlighted the value of specialized training and the role of continuing education in adapting to technological innovations.

The largest segment of respondents, numbering 35, held undergraduate degrees. This group included individuals with formal education in fields such as finance, economics, computer science, and business administration. Their responses provided a well-rounded perspective on blockchain technology, reflecting a strong grasp of both theoretical concepts and practical applications. Many participants with undergraduate degrees discussed the transformative potential of blockchain in enhancing transparency, security, and efficiency within financial markets. They also addressed various challenges, including regulatory concerns and the need for technological infrastructure. Their insights were particularly valuable in assessing the academic and professional perspectives on blockchain technology and identifying areas where further research and development could be focused.

Finally, 25 respondents had advanced graduate degrees, including master's and doctoral qualifications. This group comprised individuals with extensive academic and professional experience in their respective fields. Their advanced education provided them with a deep understanding of blockchain technology and its implications for financial investments. Responses from this group often included detailed analyses of blockchain’s impact on financial systems, regulatory frameworks, and investment strategies. They also emphasized the importance of interdisciplinary approaches to fully leverage blockchain technology and address its complexities. The insights from graduate-level respondents were crucial for understanding the high-level implications of blockchain technology and for exploring advanced research areas in the field.

Generally, the varied educational backgrounds of the respondents contributed significantly to the study, offering a broad range of insights and highlighting the varied levels of understanding and engagement with blockchain technology in the context of financial investments.

3.1.4 Occupation of Respondents

The occupational distribution of the respondents provided valuable insights into the diverse professional backgrounds and experiences influencing their perspectives on blockchain technology and its impact on financial investments. With a sample size of 80 participants, the study included a wide range of employment statuses, each contributing differently to the understanding of the research topic.

As per table 1, 15 respondents categorized as students represented a segment of individuals still engaged in formal education. Their perspectives were particularly valuable for understanding how emerging technologies, such as blockchain, are perceived by the next generation of professionals. These participants often approached the subject from a theoretical standpoint, influenced by their academic studies and coursework. Their responses revealed a high level of curiosity and openness to new technologies, with many expressing enthusiasm about the potential for blockchain to revolutionize financial systems and investment practices. Despite their lack of professional experience, students frequently highlighted their eagerness to learn more about practical applications and future career opportunities involving blockchain technology.

The largest group, consisting of 45 respondents who were employed, represented a broad array of professionals actively engaged in various sectors, including finance, technology, and business. These participants brought practical insights into how blockchain technology could intersect with their professional roles and responsibilities. Their responses were informed by hands-on experience and real-world applications of technology in their work environments. Many employed respondents discussed the impact of blockchain on their industry practices, noting how the technology could enhance transparency, efficiency, and security in financial transactions. They also highlighted the need for organizational adaptation to integrate blockchain solutions effectively and the importance of staying informed about technological advancements to maintain a competitive edge in their respective fields.

The 10 self-employed respondents contributed a unique perspective, as they operated their own businesses or freelanced in various capacities. Their experiences with blockchain technology were often shaped by their entrepreneurial endeavors and the specific needs of their businesses. These participants frequently discussed how blockchain could provide innovative solutions for managing financial transactions, securing contracts, and improving operational efficiencies in their enterprises. Their insights often reflected a practical understanding of blockchain applications in a business context, emphasizing the potential for technology to drive growth and streamline processes. Self-employed individuals also highlighted challenges related to the adoption of new technologies, including cost considerations and the need for specialized knowledge to implement blockchain solutions effectively.

The 5 respondents classified as unemployed represented individuals currently seeking employment or transitioning between jobs. Their perspectives on blockchain technology were influenced by their status as job seekers or those in career flux. Many of these participants expressed interest in understanding how blockchain could impact job opportunities and the broader employment landscape. They often viewed blockchain technology as a potential catalyst for creating new job roles and career paths, particularly in emerging fields related to digital finance and technology. Their responses highlighted the importance of educational and training programs to equip job seekers with the skills needed to capitalize on blockchain-related opportunities and remain competitive in a rapidly evolving job market.

The 5 retired respondents brought a wealth of experience and a historical view to the study. Having completed their professional careers, these individuals approached blockchain technology from a reflective standpoint, often drawing comparisons between past and current technological advancements. Their responses typically focused on the transformative potential of blockchain and its implications for future generations. Many retired participants discussed the evolution of financial systems and the potential for blockchain to address long-standing issues related to transparency and efficiency. Their insights underscored the importance of understanding technological trends and their impact on societal and economic developments, even after leaving the workforce.

3.2 Accessibility

The study investigated how blockchain technology impacted the accessibility of financial services, focusing on key sub-indicators such as lower entry barrier, broder investor reach, geographical reach, and inclusivity. Figure 1 illustrated the components of the accessibility indicator, highlighting the multi-faceted approach needed to evaluate the effectiveness of blockchain in democratizing finance. By breaking down accessibility into these specific areas, the study provided a slightly different analysis of how blockchain lowered barriers and promoted wider participation in financial markets. This detailed examination of accessibility sub-indicators was fundamental for understanding the full potential of blockchain technology in creating a more inclusive and equitable financial system.

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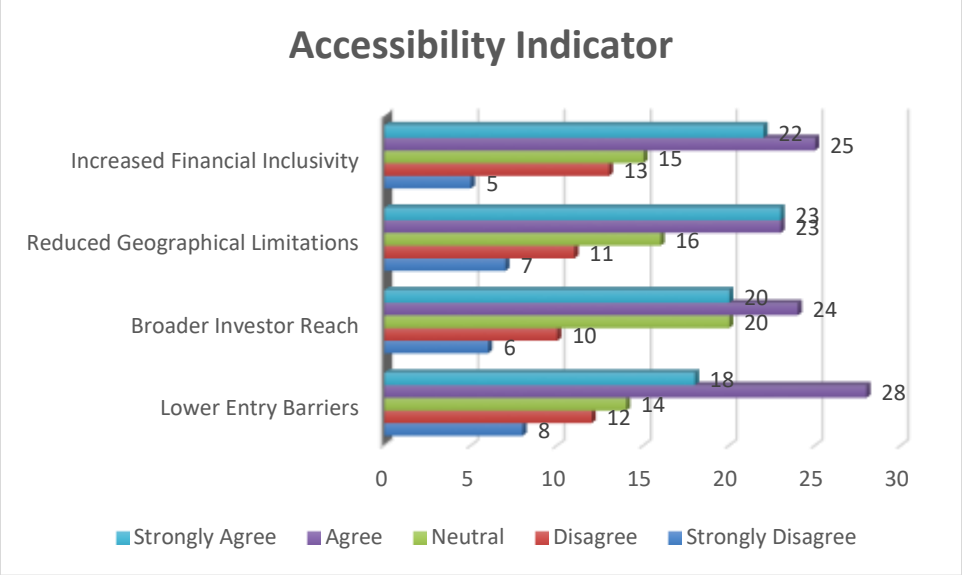

Figure 1: Showing the responses regarding accessibility's sub indicators

3.2.1 Lower Entry Barriers

The data presented in figure 1 reflected the perceptions of 80 respondents regarding how blockchain technology lowered entry barriers to financial investments. This analysis aimed to understand various viewpoints, ranging from strong disagreement to strong agreement, on the impact of blockchain in democratizing finance. Eight respondents strongly disagreed that blockchain technology significantly lowered entry barriers to financial investments. These individuals likely harbored deep skepticism about the accessibility and inclusivity of blockchain-based financial services. Their perception might have been influenced by a lack of trust in new technologies, concerns about cybersecurity, or experiences with financial losses. Such respondents might have perceived blockchain as complex and inaccessible, particularly if they had limited technical skills or faced significant barriers to understanding and using blockchain platforms. One respondent expressed:

> *"...Blockchain investments seem too complex and risky for the average person. The technology is still too new and not user-friendly enough for widespread adoption..."*

Twelve respondents disagreed with the notion that blockchain effectively lowered entry barriers. While they acknowledged some potential benefits, they felt these were not substantial enough to make a meaningful difference for most people. These respondents might have recognized some efforts to simplify blockchain technology but believed these efforts fell short of creating truly inclusive financial opportunities. Concerns about initial setup costs, the volatility of cryptocurrencies, and regulatory uncertainties might have influenced their views. A typical respondent's feedback highlighted the perceived gaps in accessibility:

> *"...Although there are some promising aspects, blockchain investments still feel out of reach for many due to the high initial costs and technical knowledge required..."*

Fourteen respondents held neutral views on the impact of blockchain in lowering entry barriers to investments. These individuals neither agreed nor disagreed, indicating uncertainty or a lack of strong opinion on the matter. Their neutral stance could stem from limited personal experience with blockchain technology, a balanced view of its pros and cons, or a wait-and-see attitude towards its long-term viability. Such respondents might have seen both potential and challenges in blockchain but remained cautious in forming a definitive judgment. One neutral respondent shared a balanced view:

> *"...I see the potential in blockchain, but I'm not sure if it has truly made investing more accessible for the average person yet..."*

Twenty-eight respondents agreed that blockchain had successfully lowered entry barriers to financial investments. These respondents saw tangible benefits in the use of blockchain, such as reduced transaction fees, faster settlement times, and the ability to participate in global financial markets. They might have experienced firsthand the democratizing effects of blockchain technology, especially in terms of easier access to investment platforms and opportunities that were previously out of reach. One respondent highlighted the positive changes they observed:

> *"...Blockchain has opened up investment opportunities for me that I wouldn't have had access to otherwise. The lower fees and ease of use have been game-changers..."*

Eighteen respondents strongly agreed with the statement, expressing robust belief in the effectiveness of blockchain in democratizing financial investments. These individuals likely experienced significant personal or professional benefits from blockchain technology, such as access to decentralized finance (DeFi) platforms, opportunities for fractional ownership, and greater transparency in investment processes.

Their strong agreement suggested a high level of confidence in blockchain's potential to transform the financial landscape and make investments more inclusive. One respondent's enthusiastic endorsement reflected this viewpoint:

> *"…Blockchain has revolutionized my investment experience. The ability to invest with lower costs and greater transparency has been incredibly empowering…"*

The range of responses indicated diverse opinions on the role of blockchain in lowering entry barriers to financial investments. Understanding these perceptions was essential for policymakers, developers, and financial institutions aiming to enhance the accessibility and inclusivity of blockchain technology. By addressing the concerns of those who disagreed or were neutral, stakeholders could work on simplifying blockchain interfaces, improving education on blockchain technology, and ensuring robust security measures. Meanwhile, leveraging the positive experiences of those who agreed or strongly agreed could help promote the benefits of blockchain, fostering wider adoption and trust in the technology. In short, analyzing these views provided valuable insights for developing targeted strategies to democratize finance through blockchain, ultimately contributing to a more inclusive and accessible financial system.

3.2.2 Broader Investor Reach

Traditionally, investing has often been associated with a limited audience, excluding individuals who may not have significant capital or financial experience. The data presented in Figure 1 reflected the perceptions of 80 respondents regarding how blockchain technology enabled a broader investor reach in financial markets. This analysis aimed to capture various viewpoints, from strong disagreement to strong agreement, on the role of blockchain in expanding access to investment opportunities. Six respondents strongly disagreed that blockchain technology significantly broadened investor reach in financial markets. These individuals likely harbored a deeply pessimistic view of blockchain's ability to make financial markets more inclusive. Their perceptions might have stemmed from personal experiences of exclusion from traditional financial systems, skepticism about new technologies, or a belief that blockchain remains inaccessible to the average person. One respondent articulated this sentiment:

> *"…Blockchain investments seem tailored for tech-savvy individuals. There's a significant gap between the promise of broad accessibility and the reality for people like me who aren't tech experts…"*

Ten respondents disagreed with the notion that blockchain effectively expanded investor reach. While they acknowledged some potential benefits, they felt these were not substantial enough to make a meaningful difference for most people. Their views might have been shaped by perceived barriers such as the complexity of blockchain technology, regulatory uncertainties, and the volatility of cryptocurrencies. These respondents might have recognized efforts to broaden access but believed these efforts were insufficient. A typical respondent's feedback highlighted:

> *"…although blockchain has opened some new doors, the majority of people I know still find it too complicated and risky to get involved in..."*

Twenty respondents were neutral on the impact of blockchain in broadening investor reach. These individuals neither agreed nor disagreed, indicating uncertainty or a lack of strong opinion on the matter. Their neutral stance could have been due to limited personal experience with blockchain, a balanced view of its pros and cons, or a wait-and-see attitude towards its long-term potential. One neutral respondent explained their position:

> *"…i see the potential benefits of blockchain, but I haven't seen enough real-world evidence to convince me that it significantly expands investment opportunities for the average person..."*

Twenty-four respondents agreed that blockchain technology had successfully broadened investor reach. These respondents saw tangible benefits in the use of blockchain, such as reduced transaction fees, faster settlement times, and the ability to participate in global financial markets. They might have experienced firsthand the democratizing effects of blockchain, particularly in terms of easier access to investment platforms and opportunities that were previously out of reach. One respondent expressed:

> *"…blockchain has definitely made it easier for me to invest in global markets. The lower fees and faster transactions have opened up opportunities I wouldn't have had before..."*

Twenty respondents strongly agreed with the statement, expressing robust belief in the effectiveness of blockchain in broadening investor reach. These individuals likely experienced significant personal or professional benefits from blockchain technology, such as access to decentralized finance (DeFi) platforms, opportunities for fractional ownership, and greater transparency in investment processes. Their strong agreement suggested a high level of confidence in blockchain's potential to transform the financial landscape and make investments more inclusive. One respondent's enthusiastic endorsement encapsulated this perspective:

> *"…blockchain has revolutionized my investment opportunities. The transparency and ease of access have allowed me to invest in ways I never thought possible before…"*

These range of responses indicate diverse opinions on the role of blockchain in broadening investor reach in financial markets. Understanding these perceptions was essential for policymakers, developers, and financial institutions aiming to enhance the accessibility and inclusivity of blockchain technology. By addressing the concerns of those who

disagreed or were neutral, stakeholders could work on simplifying blockchain interfaces, improving education on blockchain technology, and ensuring robust security measures. Meanwhile, leveraging the positive experiences of those who agreed or strongly agreed could help promote the benefits of blockchain, fostering wider adoption and trust in the technology. In summary, analyzing these views provided valuable insights for developing targeted strategies to democratize finance through blockchain, ultimately contributing to a more inclusive and accessible financial system.

3.2.3 Reduced Geographical Limitations

The data presented in Figure 1 illustrated the respondents' views on how blockchain technology reduced geographical limitations in investment opportunities. This analysis aimed to capture a range of opinions, ranging from strong disagreement to strong agreement, regarding blockchain's role in mitigating geographical constraints. Seven respondents strongly disagreed that blockchain technology had significantly reduced geographical limitations in investment. These individuals likely harbored a deeply skeptical view about the technology's capacity to democratize access to investment opportunities. Their skepticism might have stemmed from personal experiences of continued barriers in accessing global investment markets, doubts about blockchain's effectiveness, or a belief that technological innovations had yet to overcome substantial geographical obstacles. One respondent shared:

> *"…despite blockchain's promises, I still find it difficult to access international investment opportunities. The technology hasn't really changed my ability to invest beyond local markets…"*

Eleven respondents disagreed with the assertion that blockchain effectively reduced geographical limitations. While they acknowledged some progress, they felt that the impact was limited or unevenly distributed. Their disagreement could have been influenced by ongoing challenges such as regulatory restrictions, the digital divide, or persisting issues with cross-border transactions. One respondent expressed this viewpoint:

> *"…blockchain has made some strides, but there are still significant hurdles when it comes to investing across borders. I think more needs to be done to truly overcome geographical barriers..."*

Sixteen respondents were neutral regarding blockchain's effectiveness in reducing geographical limitations. These individuals might have had mixed experiences or a balanced view of the technology's impact. Their neutrality could reflect a lack of significant personal engagement with international investments, uncertainty about blockchain's long-term effects, or a wait-and-see attitude towards emerging technologies. One neutral respondent stated:

> *"…I haven't noticed a huge change in my investment options due to blockchain. It hasn't made much difference for me in terms of accessing global markets..."*

Twenty-three respondents agreed that blockchain technology had successfully reduced geographical limitations. These respondents saw tangible benefits from blockchain, such as easier access to international investment platforms, lower barriers to entry, and enhanced transparency in global financial transactions. They might have experienced firsthand the advantages of blockchain in broadening investment horizons. One respondent commented positively:

> *"…blockchain has definitely opened up new investment opportunities for me. I can now participate in markets that were previously out of reach due to geographical restrictions..."*

Twenty-three respondents strongly agreed with the statement, reflecting a robust belief in blockchain's role in overcoming geographical barriers. These individuals likely saw substantial benefits from blockchain technology, such as seamless cross-border transactions, broader access to global investment opportunities, and enhanced financial inclusivity. Their strong agreement suggested a high level of confidence in blockchain's potential to transform the investment landscape. One respondent's enthusiastic endorsement captured this perspective:

> *"…I strongly agree that blockchain has significantly reduced geographical limitations. It has allowed me to invest globally with ease, something that was very challenging before..."*

The range of responses regarding blockchain's impact on geographical limitations revealed varied opinions among respondents. Knowing these perspectives was crucial for assessing the effectiveness of blockchain in making investments more accessible. By addressing the concerns of those who disagreed or remained neutral, stakeholders could focus on improving regulatory frameworks, enhancing digital infrastructure, and promoting wider adoption of blockchain technology. Meanwhile, leveraging the positive experiences of those who agreed or strongly agreed could help further advocate for the benefits of blockchain, encouraging broader acceptance and investment in this transformative technology. In general, analyzing these views provided valuable insights for developing strategies to maximize blockchain's potential in reducing geographical limitations and democratizing financial opportunities.

3.3.4 Increased Financial Inclusivity

The data presented in figure 1 revealed respondents' views on how blockchain technology contributed to increased financial inclusivity. This aspect of the study focused on assessing

whether blockchain had effectively expanded access to financial services for previously underserved populations.

Five respondents strongly disagreed with the notion that blockchain technology had significantly enhanced financial inclusivity. Their responses suggested a deep skepticism about the transformative impact of blockchain on broadening financial access. These individuals might have experienced continued barriers in accessing financial services or perceived that blockchain's benefits were not reaching those most in need. One respondent expressed:

> *"…I strongly disagree that blockchain has made a real difference in financial inclusivity. The technology seems to benefit mostly tech-savvy individuals and not those who actually need financial services the most…"*

Thirteen respondents disagreed with the statement, indicating that while they acknowledged some improvements, they believed blockchain had not substantially enhanced financial inclusivity. Their disagreement could stem from persistent challenges such as limited awareness, inadequate infrastructure, or the ongoing digital divide that prevented many from fully benefiting from blockchain innovations. A respondent shared:

> *"…I disagree that blockchain has greatly improved financial inclusivity. While there are more options available, many people still struggle with basic access issues, particularly in rural or low-income areas…"*

Fifteen respondents were neutral regarding the impact of blockchain on financial inclusivity. Their neutrality might have resulted from a lack of personal experience or detailed information about blockchain's effects. These respondents might have been unsure about the technology's impact due to mixed signals or insufficient data. One respondent noted:

> *"…I'm neutral about blockchain's impact on financial inclusivity because I haven't seen significant changes in my own financial access. It's hard to tell how much of a difference it has made so far…"*

Twenty-five respondents agreed that blockchain had positively influenced financial inclusivity. These respondents likely experienced some benefits from blockchain, such as increased access to financial services, enhanced transparency, or lower transaction costs. They might have seen blockchain as a tool that opened up new opportunities for underserved populations. One respondent mentioned:

> *"…I agree that blockchain has contributed to better financial inclusivity. It has made it easier for people like me to access financial services that were previously out of reach…"*

Twenty-two respondents strongly agreed with the statement, reflecting a robust belief in blockchain's role in increasing financial inclusivity. These individuals likely observed significant improvements in their ability to access financial services, view blockchain as a major enabler for previously marginalized groups, or had firsthand experiences with enhanced financial opportunities. One respondent elaborated:

> *"…I strongly agree that blockchain has significantly increased financial inclusivity. I've seen how it has allowed many people, including those in underserved communities, to access financial services and opportunities that were not available before…"*

The diverse range of responses regarding blockchain's impact on financial inclusivity highlights varied perceptions among respondents. Understanding these viewpoints is crucial for evaluating the effectiveness of blockchain in expanding access to financial services. By addressing the concerns of those who disagreed or remained neutral, stakeholders could work to improve blockchain implementations, ensure broader access, and address infrastructural or educational gaps. Meanwhile, leveraging the positive feedback from those who agreed or strongly agreed could help promote the benefits of blockchain, encourage further adoption, and support initiatives aimed at enhancing financial inclusivity. Overall, analyzing these perspectives provided valuable insights for developing strategies to maximize blockchain's potential in democratizing financial services and fostering a more inclusive financial landscape.

3.3 Transparency Indicator

The study on blockchain's impact on investment accessibility and transparency assessed various aspects of transparency. This indicator was crucial for understanding how blockchain technology influenced the openness and clarity of financial transactions and information. The study analyzed the transparency indicator, focusing on sub-indicators such as Enhanced Transaction Visibility, Improved Audit Trails and Accountability, and Reduced Fraud Risks, as depicted in Figure 2. This examination aimed to assess how blockchain technology contributed to increased transparency within financial transactions and regulatory compliance.

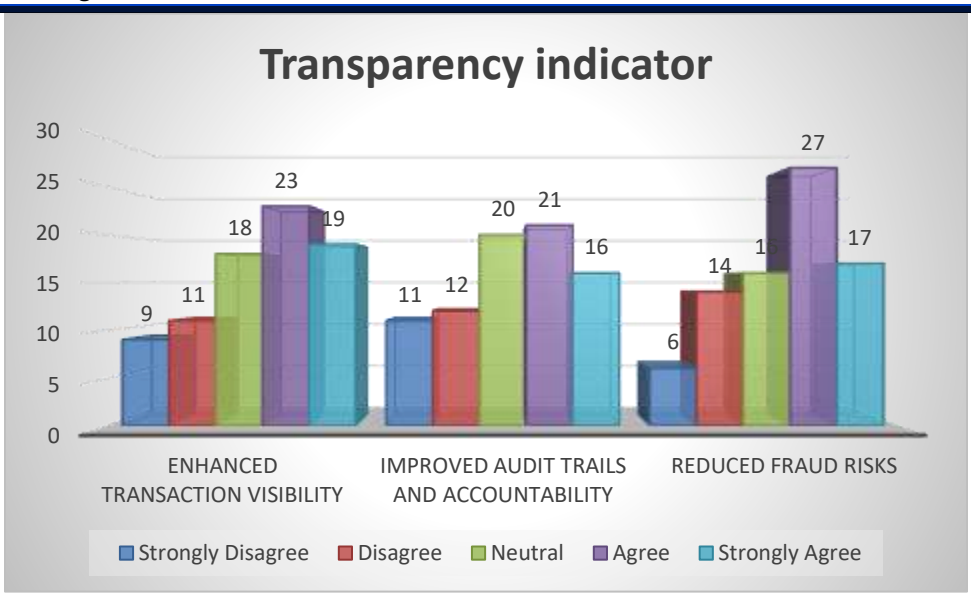

Figure 2: Showing transparency indicator and its sub indicators

3.3.1 Enhanced Transaction Visibility

The sub-indicator of Enhanced Transaction Visibility sought to determine how blockchain improved the visibility of financial transactions. The data revealed that 9 respondents strongly disagreed with the assertion that blockchain significantly enhanced transaction visibility. These respondents likely felt that, despite blockchain's inherent transparency, there were still limitations in how visible and accessible transaction details were. One respondent expressed:

> *"...I strongly disagree that blockchain has markedly improved transaction visibility. While transactions are recorded, I still find it challenging to access detailed information quickly or easily..."*

An additional 11 respondents disagreed, indicating that they acknowledged some improvements but felt blockchain had not fully resolved issues related to transaction visibility. They may have encountered practical challenges such as incomplete transaction details or complex interfaces. A respondent noted:

> *"...I disagree that blockchain has fully enhanced transaction visibility. Although it provides a record, accessing and interpreting transaction details can still be cumbersome and not as straightforward as expected..."*

The neutral category included 18 respondents who were unsure about the impact of blockchain on transaction visibility. Their uncertainty might have stemmed from a lack of personal experience or inconsistent exposure to blockchain's capabilities. One respondent stated:

> *"...I'm neutral about blockchain's effect on transaction visibility. I haven't noticed a significant difference in how easily I can view or understand transaction details..."*

Twenty three respondents agreed that blockchain had positively impacted transaction visibility. They likely observed that blockchain's transparency features allowed for better tracking and more accessible information about financial transactions. A respondent remarked:

> *"...I agree that blockchain has improved transaction visibility. It's easier to track transactions and see the details clearly, which helps in understanding the flow of funds better..."*

Finally, 19 respondents strongly agreed, reflecting a strong belief that blockchain had significantly enhanced transaction visibility. These individuals likely experienced a notable improvement in their ability to access and review transaction information. One respondent commented:

> *"...I strongly agree that blockchain has greatly improved transaction visibility. The technology allows for clear and comprehensive tracking of all transactions, making financial management more transparent..."*

The data suggested that while blockchain technology offered some advancements in transaction visibility, the improvement was not universally felt. The majority who agreed indicated a positive impact, but a notable portion remained neutral or disagreed, pointing to potential areas for further development in making transaction details more user-friendly and accessible.

3.3.2 Improved Audit Trails and Accountability

The sub-indicator of Improved Audit Trails and Accountability focused on blockchain's role in providing better audit trails and enhancing accountability in financial transactions. Data indicated that 11 respondents strongly disagreed with the statement that blockchain significantly improved audit trails and accountability. They might have experienced challenges such as incomplete audit trails or issues with the system's ability to track all relevant details accurately. One respondent shared:

> *"…I strongly disagree that blockchain has improved audit trails and accountability. Despite its advantages, I've found that tracking every detail and maintaining complete records is still problematic…"*

Twelve respondents disagreed, acknowledging some improvements but feeling that blockchain had not fully addressed audit trail and accountability concerns. They may have observed that while blockchain offered better records, there were still gaps or limitations in ensuring comprehensive accountability. A respondent noted:

> *"…I disagree that blockchain has entirely solved issues with audit trails and accountability. There are improvements, but some aspects still fall short in providing complete and reliable records…"*

A neutral stance was taken by 20 respondents, who were unsure about the effectiveness of blockchain in improving audit trails and accountability. Their indecision might have been due to limited exposure or mixed experiences with blockchain's capabilities. One respondent remarked:

> *"…I am neutral about blockchain's impact on audit trails and accountability. I haven't seen a clear improvement or decline in how audit trails are managed…"*

Twenty-one respondents agreed that blockchain had positively impacted audit trails and accountability. They likely saw blockchain's immutability and detailed record-keeping as beneficial for ensuring better tracking and responsibility in financial transactions. A respondent commented:

> *"…I agree that blockchain has improved audit trails and accountability. The technology's ability to create immutable records helps in maintaining clear and reliable trails of all transactions…"*

Sixteen respondents strongly agreed, reflecting a strong belief in blockchain's ability to enhance audit trails and accountability. These individuals likely experienced significant improvements in tracking and verifying transactions, enhancing overall financial transparency. One respondent shared:

> *"…I strongly agree that blockchain has greatly improved audit trails and accountability. The technology ensures that every transaction is recorded transparently and can be easily audited for accuracy…"*

The analysis revealed that blockchain had a favorable impact on audit trails and accountability, as evidenced by the majority who agreed. However, some respondents remained neutral or disagreed, indicating that there were still challenges in achieving comprehensive and effective record-keeping and accountability. Continued enhancements in blockchain technology could address these challenges and further strengthen its auditing capabilities.

3.3.3 Reduced Fraud Risks

The final sub-indicator, Reduced Fraud Risks, examined how blockchain technology contributed to minimizing the risk of fraud in financial transactions. As in figure 2, the data showed that 6 respondents strongly disagreed with the assertion that blockchain effectively reduced fraud risks. They might have encountered fraud cases despite blockchain's security features or felt that blockchain alone was insufficient to combat all forms of fraud. One respondent stated:

> *"…I strongly disagree that blockchain has significantly reduced fraud risks. While it offers some protection, fraud can still occur through other means or vulnerabilities…"*

Fourteen respondents disagreed, recognizing that blockchain had made some progress in reducing fraud risks but feeling that the technology had not fully addressed the issue. They might have seen partial improvements but still encountered fraud-related challenges. A respondent noted:

> *"…I disagree that blockchain has completely eliminated fraud risks. Although it helps with security, there are still instances of fraud that blockchain hasn't fully prevented…"*

The neutral category included 16 respondents who were unsure about the effectiveness of blockchain in reducing fraud risks. Their uncertainty might have been due to limited experience or varying levels of exposure to blockchain's fraud prevention capabilities. One respondent shared:

> *"…I am neutral about blockchain's impact on reducing fraud risks. I haven't observed a significant change in fraud levels and am not sure how much blockchain contributes to this…"*

Twenty-seven respondents agreed that blockchain had contributed to reducing fraud risks. They likely saw improvements in security and fewer instances of fraudulent activities due to blockchain's transparent and immutable nature. A respondent commented:

> *"…I agree that blockchain has helped in reducing fraud risks. The transparency and security features make it harder for fraudulent activities to go unnoticed…"*

Finally, 17 respondents strongly agreed, reflecting a strong belief in blockchain's effectiveness in minimizing fraud risks. These individuals likely had positive experiences with blockchain's security features, leading to a significant reduction in fraud incidents. One respondent stated:

"...I strongly agree that blockchain has substantially reduced fraud risks. The technology's ability to provide transparent and immutable records has made it much more difficult for fraud to occur..."

The findings indicated that blockchain technology had a notable impact on reducing fraud risks, as reflected in the majority of respondents who agreed. However, some respondents expressed skepticism about the technology's effectiveness in fully eliminating fraud risks. Continued advancements and broader application of blockchain's security features could further enhance its ability to combat fraud.

The range of responses regarding the transparency indicator and its sub-indicators enhanced transaction visibility, improved audit trails and accountability, and reduced fraud risks revealed varying levels of satisfaction with blockchain's impact on transparency. These insights provide a comprehensive view of how blockchain technology has influenced financial transparency and identify areas where further improvements may be necessary. Understanding these perceptions can guide the development of more effective blockchain applications and policies to enhance transparency and security in financial transactions.

3.4 Cost Efficiency

The study evaluated the Cost Efficiency Indicator, which comprised three sub-indicators: Lower Transaction Costs, Reduced Administrative Expenses, and Lower Maintenance Costs, as illustrated in Figure 3. The responses from a sample of 80 individuals were analyzed, with results categorized into three levels: Agree, Neutral, and Disagree. The analysis provided insights into how blockchain technology impacted cost efficiency in financial operations.

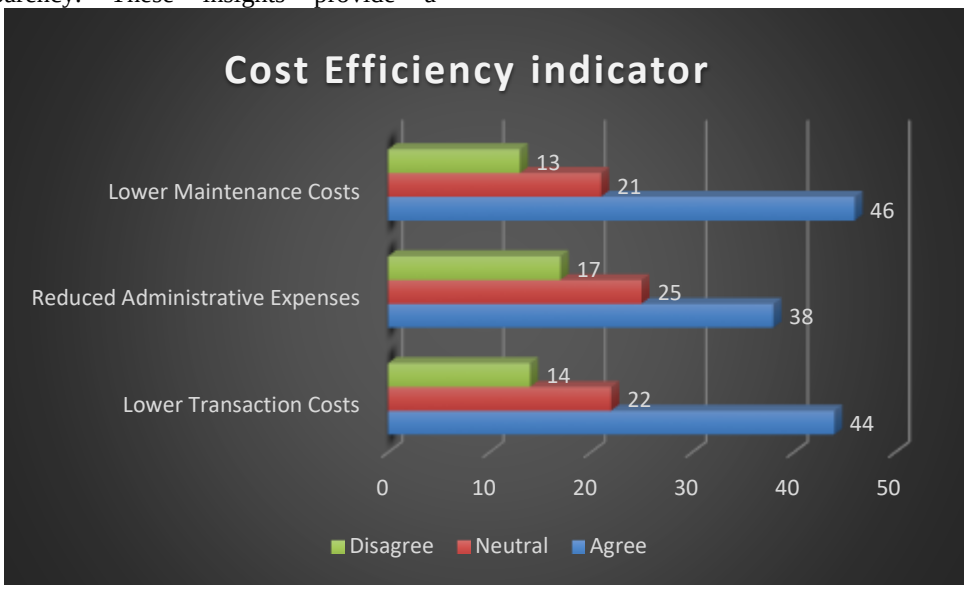

Figure 3: Showing the responses regarding cost efficiency in blockchain

3.4.1 Lower Transaction Costs

The sub-indicator of Lower Transaction Costs assessed whether blockchain technology reduced the expenses associated with financial transactions. Among the 80 respondents, 14 disagreed with the statement that blockchain effectively lowered transaction costs. These respondents likely experienced persistent or unanticipated costs despite the use of blockchain technology. One respondent noted:

"...I disagree that blockchain has significantly lowered transaction costs. Although the technology offers some cost savings, there are still fees and charges that add up..."

A group of 22 respondents were neutral about blockchain's impact on transaction costs. Their neutrality may have stemmed from either a lack of significant personal experience with blockchain or mixed observations regarding its cost-saving potential. One respondent remarked:

"...I am neutral about the extent to which blockchain reduces transaction costs. I haven't seen a major reduction in fees or charges associated with transactions..."

The majority of 44 respondents agreed that blockchain technology contributed to lower transaction costs. They observed that blockchain's efficiency and automation features led to reduced expenses in processing financial transactions. One respondent commented:

"...I agree that blockchain has helped lower transaction costs. The technology streamlines processes and reduces the need for intermediaries, which cuts down on fees..."

The data indicated that blockchain technology generally had a positive impact on lowering transaction costs, as reflected by the majority of respondents who agreed. However, the

concerns of those who disagreed or were neutral highlighted that there were still challenges in achieving significant cost reductions. Continued refinement of blockchain solutions and broader adoption could further enhance its effectiveness in reducing transaction costs.

3.4.2 Reduced Administrative Expenses

This sub-indicator evaluated whether blockchain technology led to a decrease in administrative expenses related to financial operations. Among the respondents, 17 disagreed with the statement that blockchain significantly reduced administrative expenses. These respondents may have faced persistent administrative costs or found that blockchain did not fully alleviate these expenses. One respondent shared:

> *"...I disagree that blockchain has noticeably reduced administrative expenses. Despite its capabilities, we still incur considerable costs for managing and processing transactions..."*

A total of 25 respondents were neutral regarding blockchain's impact on administrative expenses. This neutrality could reflect limited personal experience or ambiguous results in reducing administrative costs. One respondent remarked:

> *"...I am neutral about blockchain's effect on administrative expenses. I haven't observed a clear reduction in the costs associated with managing financial operations..."*

The largest group of 38 respondents agreed that blockchain had effectively reduced administrative expenses. They noted that blockchain's automation and efficiency features contributed to lowering the costs involved in managing financial processes. One respondent commented:

> *"...I agree that blockchain has helped reduce administrative expenses. The technology automates many tasks that previously required manual intervention, saving time and money..."*

The findings suggested that blockchain technology had a favorable impact on reducing administrative expenses, as indicated by the majority of respondents who agreed. Nevertheless, the concerns from those who disagreed or were neutral emphasized that there were still areas where administrative costs remained significant. Enhancing blockchain's capabilities and increasing its adoption could further help in decreasing administrative expenses.

3.4.3 Lower Maintenance Costs

This sub-indicator assessed whether blockchain technology contributed to lower maintenance costs for financial systems. Of the 80 respondents, 13 disagreed with the statement that blockchain effectively reduced maintenance costs. These respondents might have encountered ongoing maintenance expenses or found that blockchain did not fully address their cost concerns. One respondent noted:

> *"...I disagree that blockchain has reduced maintenance costs. We still face regular maintenance and operational expenses despite using blockchain technology..."*

A group of 21 respondents were neutral about the impact of blockchain on maintenance costs. Their neutrality may have been due to limited experience or mixed results in reducing maintenance expenses. One respondent shared:

> *"...I am neutral about blockchain's effect on maintenance costs. I haven't seen a significant decrease in the costs associated with maintaining our financial systems..."*

The majority of 46 respondents agreed that blockchain technology had led to lower maintenance costs. They observed that blockchain's efficiency and streamlined processes contributed to reduced expenses for maintaining financial systems. One respondent commented:

> *"...I agree that blockchain has helped lower maintenance costs. The technology simplifies system management and reduces the need for frequent updates and repairs..."*

The study revealed that blockchain technology generally had a positive effect on lowering maintenance costs, as indicated by the majority of respondents who agreed. However, the feedback from those who disagreed or were neutral pointed out that there were still areas where maintenance costs could be high. Continued advancements in blockchain technology and more widespread implementation could further reduce maintenance expenses.

The evaluation of the Cost Efficiency Indicator and its sub-indicators lower transaction costs, reduced administrative expenses, and lower maintenance costs demonstrated that blockchain technology had a mostly positive impact on cost efficiency. While the majority of respondents reported improvements in cost reductions, concerns and neutral responses highlighted areas for further enhancement. Continued innovation and broader adoption of blockchain technology are essential to fully realize its potential for reducing costs in financial operations.

3.5 User Experience

The study assessed the User Experience Indicator, which encompassed four sub-indicators: Simplified Investment Processes, Faster Transaction Speeds, Enhanced User Interfaces, and Improved Customer Support, as shown in Figure 4. The responses from 80 participants were categorized into three levels: Yes, No, and Unsure. The findings aimed to evaluate how blockchain technology affected user experience in financial operations.

3.5.1 Simplified Investment Processes

The sub-indicator of Simplified Investment Processes evaluated whether blockchain technology had streamlined investment procedures. Among the 80 respondents, 18 answered "No," indicating that they did not perceive any significant simplification in investment processes due to blockchain. These individuals might have found the technology either too complex or not sufficiently integrated into investment platforms. One respondent mentioned:

> *"...I do not believe blockchain has simplified investment processes. The technology still seems complicated and hasn't made investing any easier for me..."*

A total of 21 respondents were "Unsure" about the impact of blockchain on investment processes. Their uncertainty likely arose from a lack of clear evidence or personal experience regarding blockchain's effectiveness in simplifying investments. A respondent shared:

> *"...I'm unsure about whether blockchain has simplified investment processes. I haven't seen a clear difference in how investments are handled..."*

The majority of 41 respondents answered "Yes," affirming that blockchain had simplified investment processes. They observed that blockchain's automation and transparency features made it easier to execute and manage investments. One respondent stated:

> *"...Yes, blockchain has definitely simplified investment processes. The technology has streamlined transactions and reduced the paperwork involved..."*

The data indicated a positive impact of blockchain on simplifying investment processes, as reported by the majority of respondents who answered "Yes." However, the "No" and "Unsure" responses highlighted areas where further improvements and clearer integration could be beneficial. Enhancing user education and simplifying the technology's application could address these concerns and further streamline investment processes.

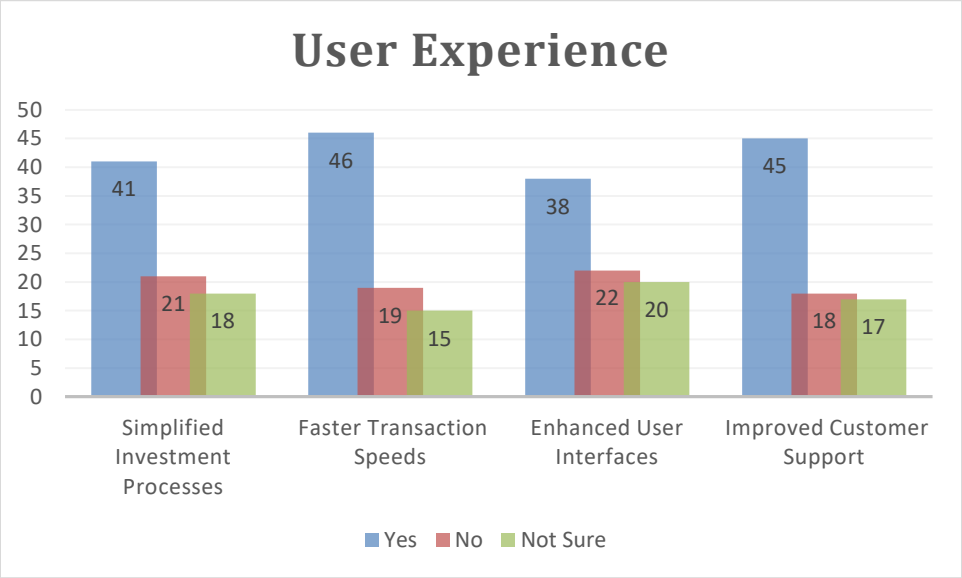

Figure 4: Showing the responses regarding user experience indicator

3.5.2 Faster Transaction Speeds

This sub-indicator measured whether blockchain technology contributed to faster transaction speeds. Of the 80 respondents, 15 answered "No," suggesting that they did not experience a notable improvement in transaction speeds with blockchain. This could indicate issues with blockchain implementation or other factors affecting transaction speed. One respondent commented:

> *"...No, I haven't noticed any improvement in transaction speeds with blockchain. Transactions still seem to take as long as they did before..."*

Another 19 respondents were "Unsure" about the impact of blockchain on transaction speeds. Their uncertainty might stem from mixed experiences or a lack of noticeable change in transaction times. A respondent said:

> *"...I'm unsure whether blockchain has made transactions faster. I haven't observed a significant difference in the speed of transactions..."*

The largest group of 46 respondents answered "Yes," indicating that they experienced faster transaction speeds due to blockchain technology. They reported that blockchain's efficient processing and elimination of intermediaries led to quicker transactions. One respondent noted:

> *"...Yes, blockchain has definitely made transactions faster. The technology has reduced delays and improved processing times significantly..."*

The study found that blockchain technology had a significant positive effect on transaction speeds, as evidenced by the majority of "Yes" responses. However, the concerns from those who answered "No" or "Unsure" pointed to the need for further enhancements and clearer benefits. Improving

blockchain's scalability and efficiency could help address these issues and optimize transaction speeds.

3.5.3 Enhanced User Interfaces

This sub-indicator evaluated whether blockchain technology improved user interfaces. Among the respondents, 20 answered "No," suggesting that they did not perceive any enhancement in user interfaces due to blockchain. These individuals might have found the user interfaces to be either outdated or insufficiently improved. One respondent commented:

> *"…No, I haven't seen any enhancements in user interfaces with blockchain. The interfaces still seem cumbersome and not very user-friendly…"*

A total of 22 respondents were "Unsure" about the improvement in user interfaces with blockchain. Their uncertainty could be due to inconsistent experiences or a lack of exposure to improved interfaces. A respondent said:

> *"…I'm unsure whether blockchain has led to enhanced user interfaces. I haven't noticed a significant change in the design or functionality of interfaces…"*

The majority of 38 respondents answered "Yes," confirming that they found blockchain technology to have enhanced user interfaces. They observed that blockchain's design improvements and better integration led to more intuitive and user-friendly interfaces. One respondent shared:

> *"…Yes, blockchain has improved user interfaces. The technology has made interfaces more intuitive and easier to navigate…"*

The data suggested a generally positive impact of blockchain on user interfaces, as indicated by the majority of "Yes" responses. Nevertheless, the "No" and "Unsure" responses highlighted areas where further improvements could be made. Enhancing the design and functionality of blockchain applications could address these concerns and further improve user experience.

3.5.4 Improved Customer Support

This sub-indicator assessed whether blockchain technology contributed to better customer support. Among the respondents, 17 answered "No," indicating that they did not experience any enhancement in customer support due to blockchain. These individuals might have found that blockchain did not significantly impact the quality of support provided. One respondent commented:

> *"…No, blockchain hasn't improved customer support. I still experience the same level of support issues and delays as before…"*

A total of 18 respondents were "Unsure" about the impact of blockchain on customer support. Their uncertainty could result from varied experiences or a lack of clear improvements in support services. A respondent shared: "…I'm unsure whether blockchain has improved customer support. I haven't noticed a significant difference in the quality of support I receive…"

The largest group of 45 respondents answered "Yes," affirming that blockchain technology had improved customer support. They noted that blockchain's transparency and efficient data handling led to better and more responsive customer service. One respondent said:

> *"…Yes, blockchain has definitely improved customer support. The technology has made it easier to track issues and resolve them more quickly…"*

The study revealed that blockchain technology had a positive effect on customer support, as reported by the majority of respondents who answered "Yes." However, the concerns from those who answered "No" or "Unsure" suggested that further improvements and clearer benefits could enhance support services. Improving blockchain's support features and integration could address these concerns and optimize customer service.

The assessment of the User Experience Indicator and its sub-indicators simplified investment processes, faster transaction speeds, enhanced user interfaces, and improved customer support demonstrated a generally positive impact of blockchain technology on user experience. While most respondents reported benefits, those who answered "No" or "Unsure" highlighted areas for further development and clearer benefits. Addressing these concerns through continuous improvements and better integration could enhance the overall user experience with blockchain technology.

4. CONCLUSION AND RECOMMENDATIONS

The study investigated the impact of blockchain technology on key indicators including accessibility, transparency, cost efficiency, and user experience, based on feedback from 80 participants. Accessibility emerged as a crucial factor, with respondents indicating mixed experiences regarding the ease of accessing and navigating blockchain-based systems. While improvements were noted, particularly in the reduction of geographical limitations, significant barriers remained, especially for users unfamiliar with digital platforms. To enhance accessibility, the study recommends the development of more user-friendly interfaces and educational programs that bridge the digital divide, ensuring that diverse user groups can effectively engage with blockchain technologies.

In terms of Transparency, the study found that blockchain's potential for improving transaction visibility and accountability was recognized by many respondents. Enhanced transaction visibility and improved audit trails were frequently noted as benefits, although some skepticism and uncertainty persisted regarding the effectiveness of these features in reducing fraud risks. The recommendations include strengthening public awareness campaigns about blockchain's transparency benefits and ensuring robust security measures to build trust. Additionally, integrating

blockchain with existing systems to create seamless audit trails and increase user confidence is essential.

Regarding Cost Efficiency, the responses indicated varied perceptions of blockchain's impact on transaction costs, administrative expenses, and maintenance costs. While some respondents observed reductions, others did not see significant changes. The study suggests conducting detailed cost-benefit analyses for different blockchain applications to identify specific areas where cost efficiencies are most evident. Moreover, it recommends exploring targeted implementations that address particular cost issues and promoting case studies that demonstrate successful reductions in transaction and administrative costs.

For User Experience, the study highlighted both improvements and ongoing challenges. Faster transaction speeds and simplified processes were noted as positive outcomes, yet user interface enhancements and customer support varied significantly in effectiveness. To improve user experience, it is crucial to invest in designing intuitive interfaces and streamlining blockchain systems to enhance speed and efficiency. Consistent and high-quality customer support should be established to address user issues promptly and effectively. Implementing these recommendations can help maximize the benefits of blockchain technology and ensure a more seamless and satisfactory user experience.

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