

The Future of Blockchain Technology and its Application and Challenges with Regard to International Migration within the African Union

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Abstract

This paper explores the potential application and challenges of blockchain technology in addressing the complex issues surrounding international migration within the African Union (AU). It provides an overview of blockchain technology, its features, and potential applications. The paper delves into the pressing challenges faced by the AU concerning international migration, including illegal migration, human trafficking, and the absence of secure and efficient systems for processing and tracking migrants. By utilizing blockchain technology, this paper examines how these challenges can be mitigated through secure and transparent identity verification, improved movement tracking, and enhanced access to services. Furthermore, this paper discusses the existing literature on the topic, highlighting blockchain technology's potential benefits and challenges in the context of international migration within the AU. The paper concludes with recommendations for future research and the adoption of blockchain technology to address the challenges of international migration within the AU.

Key words: blockchain technology, international migration, African Union, identity verification, human trafficking, security

J.E.L. classification: F22, F24, F55, L86, L96, M15, O31, O33, O34, O38, O43

1. Introduction

International migration is an increasingly significant global phenomenon with profound social, economic, and political ramifications. Within the African Union, international migration presents unique challenges, including issues such as illegal migration, human trafficking, and inadequate systems for processing and tracking migrants. The African Union Commission (AUC) recognizes the need for innovative solutions to effectively address these challenges and promote safe and orderly migration within the continent. Blockchain technology, characterized by its decentralized, transparent, and secure nature, holds promising potential in addressing these challenges by providing a robust platform for verifying migrants' identities, tracking their movements, and facilitating their access to essential services. This paper aims to comprehensively explore blockchain technology's potential application and challenges in addressing the complex issues associated with international migration within the AU, and provide recommendations for its adoption and implementation.

2. Literature review

The blockchain phenomenon has witnessed significant evolution since its inception with Bitcoin. Blockchain technology has expanded beyond cryptocurrencies, with smart contracts and various blockchain types contributing to its versatility. The potential implications of blockchain span across

multiple sectors, promising enhanced transparency, efficiency, and security. However, addressing challenges related to scalability, interoperability, and regulations is crucial for widespread adoption. As blockchain technology continues to mature, its transformative potential is likely to be realized in diverse industries, leading to a paradigm shift in how businesses and societies operate.

Citing Drescher (2017, P.580), Gideon (*et al*, 2020) in the paper titled, The Use of Blockchain Technology in Identity Storage and Management, state that, *before* the introduction of Blockchain technology, various organizations such as governments and related agencies, private companies, small and large scale businesses, commercial banks, airlines, and hotels had databases that have been at the receiving end of hackers; and of course, internet experts and web developers have been battling with the issues bordering on security breaches and compromise of their databases and emails; aside from identity and credit card frauds, with malicious intent.

Blockchain technology has emerged as a revolutionary concept with the potential to disrupt various industries and transform traditional processes. Initially introduced as the underlying technology for cryptocurrencies like Bitcoin, blockchain has evolved beyond its initial applications and is now being explored for diverse use cases. This paper provides an overview of the blockchain phenomenon, its evolution, and its potential implications for various sectors. It delves into the key features and underlying principles of blockchain technology, explores its evolution over time, and discusses its potential future directions.

2.1. Key features and principles of blockchain technology

Blockchain is a decentralized, distributed ledger that records transactions across multiple nodes in a network. It is characterized by several key features and principles that contribute to its uniqueness. Firstly, blockchain is immutable, meaning that once a transaction is recorded on the blockchain, it cannot be altered or tampered with, ensuring data integrity (Swan, 2015). Additionally, blockchain relies on cryptographic techniques to secure transactions and ensure privacy and authentication (Nakamoto, 2008). Consensus mechanisms, such as proof of work or proof of stake, enable agreement among network participants on the validity of transactions (Antonopoulos, 2014). These features collectively create a transparent, secure, and decentralized platform.

2.2. Evolution of blockchain technology

The evolution of blockchain technology can be traced back to the introduction of Bitcoin in 2008 by an anonymous person or group known as Satoshi Nakamoto. Bitcoin introduced the concept of a decentralized digital currency, powered by blockchain technology. However, it was the underlying technology of blockchain that captured widespread attention and spurred further exploration. Over time, researchers and innovators recognized the potential of blockchain beyond cryptocurrencies, leading to the development of alternative blockchain platforms with enhanced functionalities.

One significant development in the evolution of blockchain technology is the emergence of smart contracts. First proposed by Nick Szabo in 1994, smart contracts are self-executing agreements with predefined rules and conditions coded directly into the blockchain. They enable automated and trustless transactions, removing the need for intermediaries and enhancing efficiency (Szabo, 1997). Smart contracts have expanded the scope of blockchain applications to areas such as supply chain management, healthcare, and decentralized finance (DeFi).

Furthermore, the evolution of blockchain technology has seen the emergence of different blockchain types, including public, private, and consortium blockchains. Public blockchains, like Bitcoin and Ethereum, are open and permissionless, allowing anyone to participate and verify transactions. Private blockchains, on the other hand, restrict access and control to a select group of participants, offering enhanced privacy and scalability. Consortium blockchains combine elements of public and private blockchains, allowing a predefined set of participants to maintain the network (Swan, 2015).

2.3. Potential Implications and Future Direction

The potential implications of blockchain technology are vast and extend to various sectors. In finance, blockchain has the potential to revolutionize payment systems, streamline cross-border transactions, and enable financial inclusion for the unbanked population (Tapscott & Tapscott, 2016). The supply chain industry can leverage blockchain for enhanced traceability, transparency, and authenticity verification (Iansiti & Lakhani, 2017). Healthcare can benefit from blockchain's secure storage and sharing of medical records, while the energy sector can explore blockchain for efficient energy trading and grid management (Lamport, Shostak, & Pease, 1982).

As blockchain technology continues to evolve, there are several challenges that need to be addressed. Scalability, interoperability, and regulatory frameworks are some of the key areas requiring attention to unlock the full potential of blockchain (Swan, 2015). Additionally, privacy concerns and energy consumption associated with proof-of-work consensus mechanisms need to be carefully managed (Swan, 2015).

Blockchain technology's decentralized, transparent, and secure nature offers considerable potential in addressing the challenges of international migration within the AU. Numerous studies have highlighted the benefits and opportunities associated with blockchain technology in this context.

Adebayo et al. (2020) conducted a comprehensive study on the potential application of blockchain technology to address the challenges of international migration within the AU. They emphasized the secure and transparent systems facilitated by blockchain for verifying migrants' identities, tracking their movements, and improving their access to services. The study also highlighted challenges related to regulatory frameworks and stakeholder collaboration, recommending the establishment of a multi-stakeholder governance framework to ensure the successful implementation of blockchain technology in the migration context.

Oyedare et al. (2019) focused on the potential application of blockchain technology in managing refugees within the AU. Their study highlighted the benefits of blockchain in securely and transparently managing refugees' identities, tracking their movements, and facilitating access to essential services. The study emphasized the need for increased stakeholder awareness, capacity building, and collaboration to overcome the challenges associated with blockchain adoption in the context of refugee management.

Furthermore, the European Parliament (2018) published a report emphasizing the benefits of blockchain technology in the migration sector. The report stressed the potential of blockchain technology to provide secure and transparent systems for verifying migrants' identities, tracking their movements, and facilitating access to services. It also highlighted challenges such as regulatory frameworks, interoperability, and data privacy that need to be addressed for successful implementation.

3. Findings

Blockchain technology offers several key advantages for addressing the challenges of international migration within the AU. One such advantage is secure identity verification, which can mitigate issues related to illegal migration and human trafficking. Blockchain-based identity systems can provide tamper-proof and verifiable identities, reducing the risk of identity fraud and facilitating reliable identification of migrants. This would enhance border control measures, ensuring only authorized individuals cross borders, and strengthening efforts to combat human trafficking.

Another potential application of blockchain technology is the improved tracking of migrants' movements. By utilizing distributed ledger technology, blockchain can enable real-time monitoring of migrants, providing accurate and transparent information about their location and movement patterns. This can help in managing migration flows, enhancing border security, and enabling timely responses to emergencies or humanitarian crises.

Blockchain technology also has the potential to enhance migrants' access to essential services. By creating a decentralized and interoperable platform, blockchain can facilitate the secure and efficient exchange of migrants' data between different stakeholders, such as government agencies, international organizations, and service providers. This would streamline administrative processes,

reduce bureaucracy, and ensure that migrants receive necessary support and services, including healthcare, education, and employment opportunities.

4. Migration within the African Union

Migration is a significant phenomenon within the African Union (AU) as people move within and across borders for various reasons, such as economic opportunities, education, family reunification, and seeking refuge from conflicts or natural disasters (UNECA, 2020). The AU recognizes the importance of managing migration effectively to promote the well-being of migrants, address humanitarian challenges, and harness the potential benefits of migration for development. The AU has developed frameworks such as the Migration Policy Framework for Africa and the Migration Governance Framework to guide member states in formulating comprehensive migration policies and implementing coordinated approaches (African Union Commission, 2018).

The AU also emphasizes regional cooperation, information sharing, and capacity building to address the challenges associated with migration, including irregular migration, human trafficking, and migrant rights violations (IOM, 2019). By focusing on collaborative efforts, the AU aims to create a conducive environment for safe, orderly, and regular migration within the continent, fostering social cohesion and inclusive growth. The above is a daunting task given the nature of migration by itself.

Migrants differ in their motives, interests and modalities in leaving countries of origins and settling in others. Others migrate illegally, making their tracking and accounting by the countries of origins and the hosting counterparts difficult, if not impossible. Even when legal, their reception in the new countries is difficult to chronicle due to unavailability of comprehensive data at embassies and, at worst, the receiving countries – especially the unofficial types. The categories of different migrants are also difficult to profile; thus, to cluster them as a homogeneous congregation would feed the system with inaccurate data. Some of the obvious categories of migrants that may be easy to profile are within the following pockets, namely labour and political refugees. The most complex category to identify and track properly are arts practitioners. This group includes, but is not limited to, musicians, actors, authors, scholars and so forth.

5. Challenges in implementation

However, the adoption of blockchain technology in the context of international migration within the AU presents several challenges. One critical challenge is the need for robust regulatory frameworks. Clear legal frameworks that address data protection, privacy, and governance are essential to ensure blockchain technology's responsible and ethical use in managing migration. The development of regulatory frameworks should involve collaboration between governments, international organizations, and relevant stakeholders to establish blockchain implementation standards, protocols, and guidelines.

Another challenge is the interoperability of blockchain systems. The seamless exchange of data across different blockchain platforms is crucial to realizing the full potential of blockchain technology in managing migration. Interoperability standards and protocols should be developed to ensure that blockchain systems can communicate and share information effectively, thereby enabling efficient collaboration and information sharing among stakeholders.

Additionally, there is a dire need for stakeholder awareness and capacity building. Government officials, policymakers, and relevant stakeholders should be educated about the potential of blockchain technology and its practical implementation in managing migration. Training programs, workshops, and awareness campaigns can help build knowledge and capacity among stakeholders, fostering a conducive environment for the adoption and integration of blockchain technology into existing migration management systems.

6. Recommendations

Based on the discussion, the following recommendations are proposed:

- i. Research to be conducted in the migration spectrum so as to enable the technology to deal with its various dimensions and dynamics.
- ii. Establishment of a multi-stakeholder governance framework: The AU, in collaboration with member states, should establish a governance framework that brings together governments, international organizations, technology experts, and civil society to drive the adoption and responsible implementation of blockchain technology in managing migration within the continent.
- iii. Development of a robust regulatory framework: Clear legal frameworks should be developed to address data protection, privacy, and governance issues associated with blockchain technology. Governments should work together to establish standards, protocols, and guidelines that ensure blockchain technology's responsible and ethical use in managing migration.
- iv. Foster interoperability: Efforts should be made to develop interoperability standards and protocols that allow seamless data exchange between different blockchain platforms. This will enhance collaboration, information sharing, and the overall effectiveness of blockchain-based migration management systems.
- v. Promote stakeholder awareness and capacity building: Governments, policymakers, and relevant stakeholders should be provided with training and awareness programs to enhance their understanding of blockchain technology and its potential application in managing migration. This will facilitate informed decision-making and foster a supportive environment for blockchain adoption.

7. Conclusion

Blockchain technology holds significant promise for addressing the challenges associated with international migration within the African Union. By leveraging its decentralized, transparent, and secure nature, blockchain can enhance identity verification, movement tracking, and migrants' access to services. However, the successful adoption and implementation of blockchain technology in the context of migration management require robust regulatory frameworks, interoperability standards, and stakeholder awareness. By embracing blockchain technology and addressing the associated challenges, the African Union can achieve safer, more secure, and more efficient migration processes, ultimately contributing to the socioeconomic development and well-being of the continent.

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