

Blockchain Technologies & SDG 3: Imperatives For Revamping Health Management Information Systems in Developing Countries

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Abstract—This paper appraises the state of sustainable development goal (SDG) 3 in developing countries to ascertain their performance level as the target date for the SDG draws nigh. In carrying out this objective, the researchers interrogated the state of the health sector in the targeted regions and observed with dismay that it is in a very fragile state with tendencies to degenerate further if not attended to with utmost urgency. One major area we have observed the sector is lagging is the absence of a robust health management information system. In the healthcare industry, the patient's electronic health records (EHR) system is currently faced with the issue of weak security and privacy. This informs our recommendation of integrating blockchain technologies to serve as a remediation tool for the sector. The broad implementation of blockchain in healthcare will provide consumers with broader access to their information, enhance the reliability and confidentiality of electronic health records, increase the accessibility of healthcare services, and lower costs. Adopting a qualitative methodology, we leveraged secondary data sources to study the subject matter empirically. We strongly believe that if developing countries can borrow a leaf from their developed counterparts, their health systems will be revamped and their SDG 3 goal achieved within the shortest time frame.

Keywords— Sustainable development goal, Blockchain, Blockchain technologies, Health management information system, Health sector

I. INTRODUCTION

To state that SDG 3 in developing countries is in a precarious state will be an attempt, to put it mildly, as the health segment of most states has been weakened due to many factors. The quantum of negatives recorded in this sector has made it abundantly clear that the health sector in developing countries requires reforms to measure up with its contemporaries in more developed societies. According to Walt & Gilson [1], the health segment is in a crisis requiring emergency attention [1]. It is quite worrisome that despite the magnitude of external funding from donor agencies to these

countries, their health segment continues to deteriorate, with their prospects of achieving SDG 3 looking bleak by the day.

This calls for concern and motivates this intellectual voyage we have engaged in as we intend to analytically examine the causal factors for the failures recorded in this critical segment in the developing world. In a bid to actualize pre-stated objectives, we observed through preliminary empirical analysis that the health sector in these countries lacks a virile health management information system. This fundamental flaw requires urgent intervention. Hence, the emphasis has always been on capacity building, poor financing, infrastructural deficit, etc. We believe that systems audit, which will breed innovativeness, represents the leeway out of this health problem. One noticeable gap we have observed in the health sector of these developing countries is the failure of their respective governments to integrate technology into the system despite its utility in a 21st-century world.

We are considering the growing relevance of blockchain technology applications in the contemporary world vis-a-vis its usage in health systems in the developed world. We are advancing an argument that its full-scale adoption in the developing world will serve as the required panacea for a functional health sector and leapfrog these developing countries to deliver SDG 3 fully. We have interrogated the embedded issues by compartmentalizing the paper into sections, dealing with topics such as a review of impediments to SDG 3 actualization in developing countries. A reiteration of blockchain functionality, assessing the potentials of blockchain technologies in revamping health management information systems while establishing the prognosis of blockchain technologies in fast-racking SDG 3 prospects in developing countries.

II. CONCEPTUAL APPRAISALS

Management information systems have been conceptualized as flow procedures reliant on data from

computers that are integrated with other techniques to guide management in their decision-making process [2]. This implies that it is system based and central to the smooth functioning of any organization. This explains its centrality to the performance of the nation's health system and, by extension, the achievement of SDG 3.

SDG 3, however, represents a global call to achieving health and well-being for all. It is one of the 17 SDGs dedicated to health issues for all, irrespective of ethnic origin, societal status, age, and gender. SDG 3 provides a template for the national health agenda-setting of countries across the globe while guiding their health policy formulations. Several global agencies have been established to drive this goal, while the World Health Organization has continually provided a template for health-related concerns in the international political system. It will not be out of place to posit that achieving SDG 3 is pivotal to attaining other goals.

The rise of bitcoin and cryptocurrencies in 2009 coincided with the beginning of blockchain technology development, which impacted the cycle or operation of accounting and financial reporting. Blockchain offers an innovative approach to documenting, analyzing, and maintaining procedures and financial statements to transform the financial sector and the integrated business environment [3, 4]. As a protection against this, blockchain technology includes fabricating digitized "tokens" linked to physical objects. The ultimate receiver of the product may then authorize the token, which can be used to track the product's history back to its generated location. End users may have more trust in the knowledge they acquire because it cannot be altered unilaterally by a single company or collection of organizations [5, 6].

III. SDG 3 ACTUALIZATION IN DEVELOPING COUNTRIES: AN OVERVIEW

In most parts of the developing world, health systems remain frail due to many impediments. Apart from generating concerns for the citizenry, this frailty poses significant threats to fully realizing sustainable development goals. Take Africa as a case in point; maternal mortality continues to accentuate, infectious diseases are surging while the right to health by the citizenry remains elusive [7-9]. Hence, while the SDGs provide an avenue for qualitative healthcare [10], drawbacks to their full realization must be deleted.

From the scarcity of experienced health personnel to insufficient equipment or poor funding for healthcare centers, the medical sector in most developing countries seems plagued by a legion of encumbrances that portend danger signals for the full actualization of the goals. The due date draws nigh and reinforces calls for strengthening health systems in such climes [10]. To state the obvious, an evaluation of the health sector will reveal gaps requiring urgent attention through remediation to prevent a total collapse. Considering the expectations of SDG 3 vis-a-vis the state of affairs in this clime, it will not be out of place to state that she is far from the goals. While we acknowledge that conditions in the global system are at variance with each other concerning performance on each of the plans, our core concern is to interrogate the state of SDG 3 performance in the developing world to drive optimality of the process [10].

The onset of the Covid-19 pandemic, apart from adversely impacting the health sector, has come with a catalogue of negatives on the actualization of SDG 3. This informs Arora and Sarker's position, who opined that developing countries

must mobilize resources internally and externally to sustain the populace's health and guarantee the achievement of the SDGs [11]. Aside from the various impediments acting as a clog in the wheel of developing countries concerning achieving the SDGs, a weak MIS system has further compounded the challenges they face as reliable data production has remained a mirage in health institutions [12]. Hence, the position of world health organization noted the centrality of robust health information systems as pivotal to the health security of the developing world [13]. This observation by the global health regulator represents a clarion call to the developing world on the expediency and exigencies of improving her health information systems as a core requirement for shoring her health segment with improved chances of achieving the global health goals.

It is not in doubt that sound health remains a pre-condition for societal development [14]. This brings to the fore the centrality and necessity of SDG 3 in all human societies or settlements. Equally important to note is that developing countries largely domiciled in Asia, Africa and Latin America share semblances concerning their SD goals actualization. This informed our decision to launch this inquiry which seeks to make a case for adopting blockchain technologies in improving health medical information systems in such societies.

IV. REITERATING THE UTILITARIAN FUNCTIONALITY OF BLOCKCHAIN APPLICATIONS

One of the cutting-edge technologies in recent years is blockchain. However, despite its growing significance, little is known about the potential of blockchain for enterprises, specifically human operations, vis-a-vis its attendant ethical implications [15, 16]. To state the obvious, blockchain is a recent approach in the IT infrastructural platform that efficiently and permanently records transactions between parties [17].

It is instructive to state that government institutions, healthcare companies, and insurance are among the industries utilizing blockchain technology in the developed part of the globe. Blockchain usage includes encoding rules for damages reimbursement, identity management through automated identity checks, and identity management in governmental institutions [18]. A clear illustration is creating autonomous peer-to-peer organizations replicating services like Airbnb and Uber [19]. There is little wonder why BCG selected blockchain as one of the cutting-edge digital technologies that will most likely change how people live and work [16].

Although business partners do not necessarily have to trust one another, blockchain is sometimes called a "trustless" network. To provide complete transparency, every network user with permissions sees the same data simultaneously. Blockchain technology, which uses distributed ledgers on a peer-to-peer network and is decentralized and unchangeable, provides important ways to get beyond CIT's current problems. It allows ecosystem participants to instantly access reliable data impervious to modification and manipulation [20]. It will, therefore, not be out of place to state that a decentralized method of reliable digital record-keeping is blockchain because it has a lot of potential for business processes involving individuals.

The features of blockchains make them excellent for accountability purposes. Anytime products and related documentation (such as bills of lading or ship notifications)

travel from one player in the production chain to the next, they are susceptible to falsification or embezzlement [5]. Thus, although blockchain technology has been implemented in various corporate domains, such as manufacturing, government services, and logistical activities, the banking and insurance sector has witnessed the most rapid growth [21].

V. CAN BLOCKCHAIN TECHNOLOGY AID THE REVAMP OF HEALTH MIS SYSTEMS?

Blockchain is an international information network that regulates an ever-growing collection of data entries and is validated by all participating nodes. The data, which is maintained in a blockchain network, contains every operation that has ever been performed [22]. Blockchain technology can be transformative and revolutionary in commercial and personal computer applications. As a technique for arranging operations in a decentralized system, blockchains give a record of consensus with a cryptographic audit trail that can be stored and checked by several nodes. Several internal and exterior certification procedures are reduced or eliminated by continuously enabling contractual stakeholders to monitor resources and contracts through a formal policy [23].

Uses of blockchain technology can change how we currently utilize health-related data and the software and physical infrastructure that supports it. Its central premise is the fundamental Information Technology infrastructure of the blockchain and its immutable chain of data entries, which enables transparent and secure transactions [24]. Medicaid and Medicare systems might profit from adopting blockchain applications if they replace costly hardware and software IT systems with a blockchain architecture. The MMIS is a cohesive collection of practices and computer processing operations subsystems created at the common design level to achieve main goals [25]. This is in sync with Massaro's belief that technological developments and innovations, focusing on blockchain technology, will pave the way for disruptive innovation in healthcare [26]. This is more so as a new era of innovation is being ushered in by blockchain, and this epoch will create the groundwork for a new paradigm in healthcare.

Blockchain technology applications can revolutionize how we use medical information technology and the supporting hardware and software infrastructure. We contend that the underlying technology and associated crypto currency's decentralized architecture suggest various applications in contrast to the conventional legacy applications currently used in the public healthcare sector. Its associated private market participants can result in cost savings and efficiencies. A distributed ledger that is auditable and open to all users is made possible by a blockchain's open and decentralized database. This houses data open-source characteristics of blockchain technology, making it a logical fit for the demands associated with the complexity of transaction-laden systems related to medical information technology in the private and public sectors [25].

Therefore, we reiterate that establishing a Medicaid Information Technology Architecture (MITA), a national framework to promote improved system development and healthcare management for the Medicaid enterprise, is essential to the implementation.

VI. BLOCKCHAIN TECHNOLOGIES & SDG 3 PROSPECTS IN DEVELOPING COUNTRIES

The blockchain is the foundational technology underlying cryptocurrencies, allowing for open (peer-to-peer), safe, and quick transactions. With the development of the Internet of Things (IoT), supply chains, health systems, and numerous financial activities (such as online payment and exchange platforms), the blockchain's applicability has become more diverse.

Blockchain technologies can potentially revolutionize how quickly Sustainable Development Goals are achieved [27]. What might this technology's unforeseen, negative societal and economic effects be, and how can governments maximize their possibilities while reducing their uncertainties? Many applications of blockchain technology could support sustainable development. Blockchain innovation has, however, thus far concentrated on financial applications disconnected from the real economy [28]. Instead of creating true value through new goods and services, most advances in this industry aim to make money by collecting rents through financial intermediation and speculative gains in crypto-financial assets. Such behaviour is a recipe for financial bubbles and crashes, especially when coupled with a lack of oversight and rapid technological advancement [28].

If blockchain technology is used properly, there are many chances to reframe current approaches to sustainable development and speed up progress. Although, blockchain technology is a new development year behind the SDGs, which took off years before. Hence, nobody could have anticipated blockchain's trajectory and its ability to help advance these lofty goals. Yet, we now see possibilities for blockchain technology to recast traditional methods to sustainable development – and, if used responsibly, accelerate progress.

On the one hand, digitalization's technological transformation may present an unimaginable potential for improving human welfare while hastening the realization of the Sustainable Development Goals and the Paris Climate Agreement. DLT (distributed ledger technology) and blockchain for creative digital financing of the SDGs, especially Goal 13 (Climate Action). In recent years, blockchain and distributed ledger technology (DLT) have drawn much interest as the foundational technological infrastructures for cryptocurrencies like Bitcoin and Ethereum [29].

VII. SUMMARY

In this study, SDG projects engage various locally-based and globally dispersed partners, including governments, humanitarian organizations, residents, local governments, and NGOs. We must develop new coordination and group decision-making systems to solve these issues in a decentralized and global manner. Blockchain technologies provide the possibility to create such a governance model. A blockchain is a decentralized platform that allows for a shared understanding of information based on a predetermined set of values and can enable self-executing operations based on those values and new technological paradigm that integrates the real and virtual worlds and increases automation could make use of blockchain as a major technology. Its effects extend beyond the economy and can change social interactions, public institutions, our relationship with the

environment, and nations' options for achieving sustainable development.

VIII. CONCLUSION

Blockchain was designed to create bitcoin but can now store software code and cryptographic protocols. Although the technology allows for innovation in almost any field, the most popular applications are for cryptocurrencies and contributions to the group (DeFi) systems, which use blockchain-based decentralized applications to build investment products.

This study has also shown that a new technological paradigm of increasing automation and fusing the real and virtual worlds has blockchain as a potentially important technology. Its effects go beyond the economy; they also impact how we interact with one another and with our environment, how public institutions operate, and how nations may pursue sustainable growth.

In another dimension, the cryptocurrency industry is highly digitalized, making it ideally equipped to operate as a more reactive space in the early shift to renewable energy sources. As a model for other industries to follow, several are already urging the full decarbonization of the blockchain. Consequently, blockchain and other cutting-edge technologies may become our window to a more sustainable future with increased worldwide cooperation, internationally coordinated regulations and incentives, and smart standards

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