

Blockchain and its Impact on Health Services in Developing Countries

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Abstract

Blockchain has the power to bring out a breakthrough in the healthcare ecosystem. Blockchain technology holds the ability to improve patient care quality in developing countries, by rebuilding the electronic relationship between society and the governmental institutions. Blockchain technology fights corruption and fraud in developing countries. However, reaching the people in remote areas in these countries. Blockchain technology help key stakeholders, such as doctors, pharmacists, and other healthcare providers to gain secure and faster access to electronic medical information. Blockchains are immutable and easily accessible from anywhere. On the other hand, prevent counterfeit drug producers, to access the market.

Keywords: Blockchain-Healthcare-Developing Countries.

1. Introduction

Blockchain technology appears to benefit the healthcare industry by storing patient data in all the nodes of a blockchain platform. Allowing hospitals, patients and insurance companies to access to medical records may benefit the industry as a whole, by reducing the time to track down information across systems. Patient records stay insecure. A blockchain platform provides a useful tool for controlling who should and who shouldn't see patient data. Consumers would not be the only ones who benefit, however Hospitals, for example, could check insurance information and see which procedures are covered. Insurance companies automatically pay healthcare providers, so increased efficiency, save time and money.

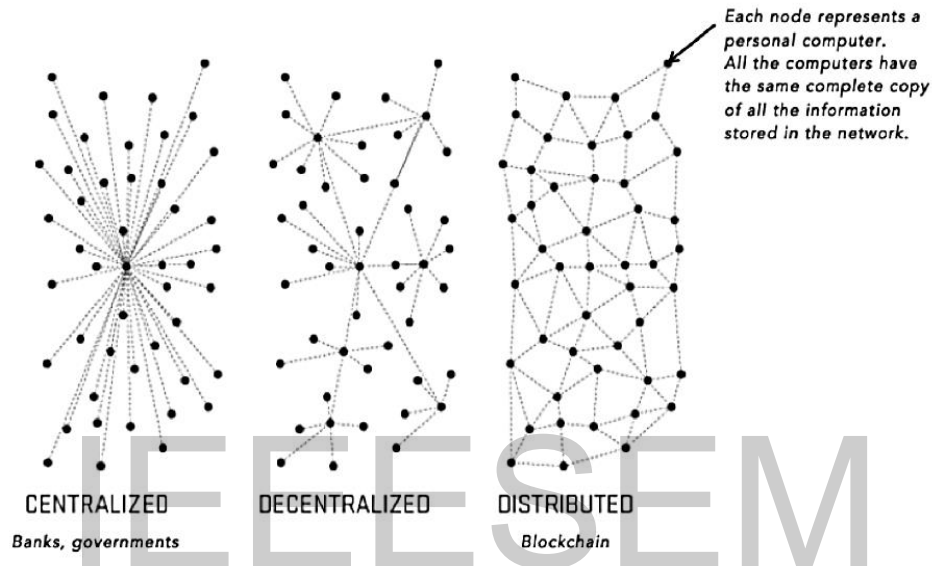
This paper shows the benefits of applying blockchain technology in public health in developing countries such as Egypt, which will reflect on the quality and the speed of public health services. While keeping medicinal records in a single spot would decrease the time and cost to follow it down and it raises protection concerns. Keeping up information security is one of its most dominant highlights blockchain technology offers so far. blockchain technologies could use advanced technologies to collect data, such as drones and sensors. Digital technologies like blockchain facilitate the provision of agricultural extension and introduce services to farmers, services that were previously too expensive or in remote areas in developing countries (1).

2. Blockchain

Blockchain innovation is a new approach to keeping track of, for example, medical records without requiring establishing a central authority and with minimal costs. Blockchain is "a ledger" of transactions maintained by a network of computers. All Transactions are registered in batches called "blocks" and then are added to the existing chain of a block called "Blockchain". Users can then look at the transactions to verify that a particular transaction took place at a specific time (2).

It was introduced in (2009), with the establishment of Bitcoin. Companies and organizations today involved in blockchain. Developing countries are expected to come out in the next years. Especially Asia is very active in this field; many innovations come from China and South Korea. Blockchain is also similar to a database, which stores information. all data are located in a network called “nodes” where there is no central entity such an administration controlling the data. Data are only accessible to those with permission. The next figure [1] illustrates how information is stored in a blockchain system.

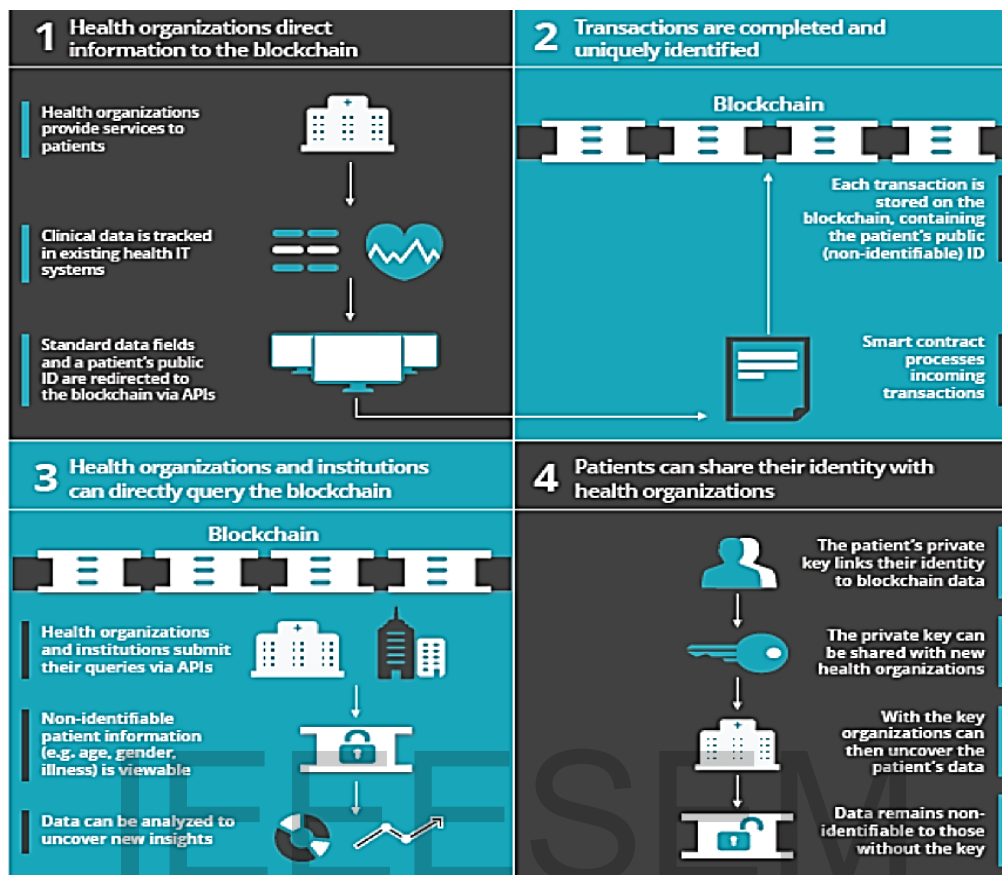
Figure 1: Types of Networks



3. Blockchain Transform the Healthcare Sector:

It provides a structure for data sharing and security. Healthcare stakeholders collect information from the patient (Name, date of birth, prescriptions and so on. After that, data stored in the organization database or on a cloud system. Healthcare stakeholders can query the blockchain that provides requested data with security. The patient can decide to whom he gives access to his medical record.

Figure 2: Example of a Healthcare Blockchain ecosystem



As shown in the previous figure [2], it is an example of a Healthcare Blockchain ecosystem, consists of four phases: Health organizations direct information to the blockchain, Transactions are completed and uniquely identified, Health organizations can directly inquiry the blockchain and Patients share their information with health organizations.

4. Blockchain Opportunities for Developing Countries

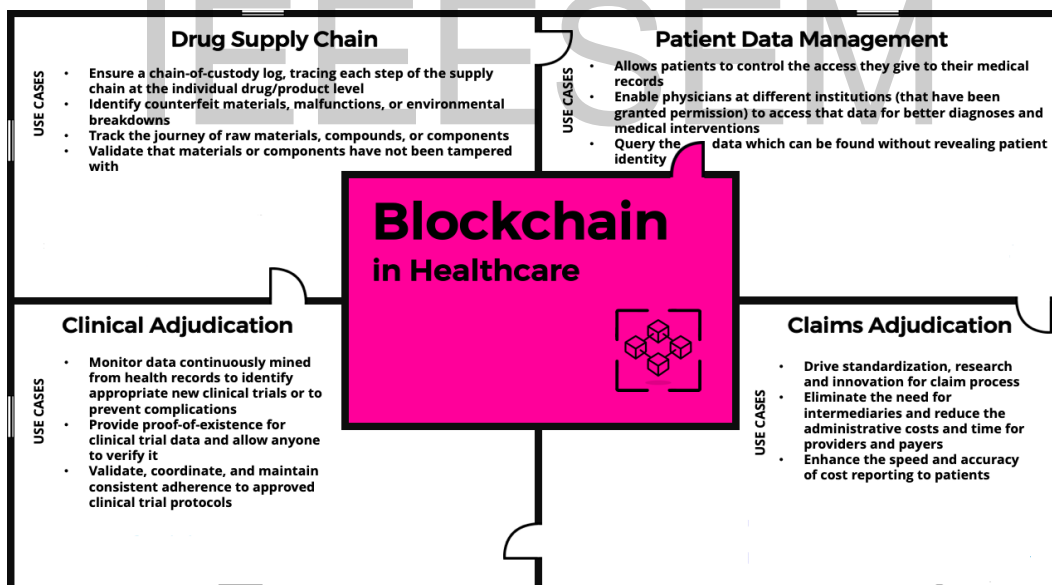
East Africa countries are discovering applications for blockchain. In Nairobi (Kenya), (IBM) has worked business- to -business (B2B) logistics platform for food industries, across Africa to extend micro-finance loans to vendors. (IBM) analyzed purchase records from mobile devices and then applied programs and algorithms to predict creditworthiness. Also using a blockchain to manage the entire lending process.

In Nigeria the cleanup of the “River Niger” where blockchain and internet of things (IOT) technologies, to monitor toxin levels. On the other hand, many applications for blockchain technologies in healthcare can be used for developing countries. Such as, Medications forging is a major problem, in the pharmaceutical industry. (10%) to (30%) of the Medications sold in developing countries are counterfeit (3). Most of these counterfeit drugs are manufactured in India or China. World Health Organization (WHO) estimates that (16%) of counterfeit drugs contain wrong ingredients (4).

A blockchain technology, insure the authenticity of the drugs. For instance, when a drug is produced, a record is generated, contains all the relevant information about the drug. Each time the drug moves from point to another, the information is stored on the blockchain, making it easy to track the product. Most Developing country's organizations are inefficient and recordkeeping is paper-based, get official documents require standing in a queue for hours. Also, are often typed by hand. Applications that run on the blockchain, solve these problems and save time. The lack of technology in developing countries let people in many poor regions of the world out of banking infrastructure and out of the capital to start new businesses and services like building new hospitals and medical services. The introduction of digital currencies will help many developing countries to access monetary facilities. Venezuela is an example; it is going through an economic crisis nowadays, with hyperinflation in prices. Trying to face those bad conditions, people turned to cryptocurrencies (5).

One of combining the blockchain advantages with existing solutions. Orange Telecom Company for birth registration in Uganda, governments can reorganize registration processes. Clinics are equipped with cell phones and are responsible for sending data on babies to the central registration, villages and hospitals could document newborns in the blockchain technology. The data include names of the parents, height and the weight. Besides, they could register adults. Next figure (3), explains blockchain applications in healthcare services:

Figure 3: Blockchain in Healthcare



There are several part show the importance of this figure such as,

- a) **Management of patient data:** Blockchain deal with Patient Data, by gathering and storing in an organization's internal database. its allows patients to control the access they give to their medical records. Its enable physicians to access patient data, by granted permission, a patient can also share their health data by advanced technology such as "smartwatch", without revealing patient identity.

- b) **Clinical endpoint adjudication:** Clinical endpoint adjudication, is a standardized process for safety and efficacy of pharmacologic or device therapies in healthcare trials. (CEA) is a part of any new medical product. At present, the long procedure takes several years to finish and generates massive amounts of data. Verification of the blockchain technology, to ensure that any data stored on a shared ledger is accessible by all stakeholders.
- c) **Claims adjudication:** It is the determination of financial payment after patient benefits are applied to a medical claim. It is processed to eliminate the need for intermediaries and reduces the administrative costs and time for providers and payers. Enhance the speed and accuracy of cost reporting to patients.
- d) **Drug supply chain:** A manufacturer marks a produced drug, after that generating a (hash) and uploading the data on the blockchain. Before selling the product, a pharmacy and the patient, can Identify a counterfeit drug.

5. Blockchain Challenges in Developing Countries

Development programs in developing countries face weak institutions and Corruption, for instance, is more likely to occur in some countries where a lack of law enforcement is observed (6). Blockchain is not always the best tool for the job. For example, in tracing product origins and distributed verification systems may be unnecessary, where most parties are known to each other. Centralized databases suitable and suffice for such purposes (7). As any new technology introduced, experimentation related to blockchain technology it remains unsettled. One of blockchain application on financial field is (Bitcoin), first need to fulfill some functions that money provides.

Bitcoin still not accepted currency widely enough. Numerous National governments still not permit to be paid with bitcoin, which diminishes the motivating forces for people and organizations to utilize it to pay for administrations like healthcare services (8). The legal handling of smart contracts and the need for legislation and laws regulating interactions between stakeholders in developing countries (9). With the excessive amount of data, medical organizations produce a large amount of data, so it is important that blockchains have the ability to store larger amounts of data with efficacy. Developing countries lack a good infrastructure in communications and Information technology (ICT), with illiteracy in using modern technology and computers.

6. Conclusion

Blockchain technology is already addressing many of the healthcare industry's issues, such as, patient healthcare records and drug manufacturers, which results in giving doctors more time to focus on providing medical care. Blockchain allowing patients to access to their medical records, with cheaper technology. It also raises privacy concerns. As any new technology introduced, experimentation related to blockchain technology still need more Study and examination.

There are several recommendations when apply this technology such as, Blockchain technology in the healthcare market is immense. There are some recommendations for applying blockchain in healthcare sector in developing countries like: with more (ICT) infrastructures developing countries, that will improve healthcare services and reduce treatment costs. Artificial Intelligence

(AI), will improve blockchain technology in healthcare. All stakeholders should collaborate, such as the government and patients to assist blockchain technology in developing countries and Conducting awareness programs in developing countries, to shows the importance of blockchain and its role in improving the healthcare of individuals.

References

1. Planes-Satorra, Caroline Paunov and Sandra. How are digital technologies changing innovation? Technology And Industry. Paris : OECD, July 2019. p. 35, Policy Papers.
2. energypedia. Blockchain Opportunities for Social Impact in Developing Countries. [Online] July 22, 2019.
https://energypedia.info/wiki/Blockchain_Opportunities_for_Social_Impact_in_Developing_Countries.
3. Quora. IBM. [Online] December 17, 2018.
<https://www.ibm.com/blogs/blockchain/2018/12/what-are-the-use-cases-for-blockchain-tech-in-healthcare/>.
4. Pennsylvania, University of. Wharton School . [Online] Nov 28, 2018.
<https://knowledge.wharton.upenn.edu/article/blockchain-brings-social-benefits-emerging-economies/>.
5. Blockchain as a Tool for Developing Countries. Mihail, Caradaic a. [ed.] Andrei Taranu. Romania : National University of Political Studies and Public Administration, 2019. 6th ACADEMOS Conference. p. 61.
6. Kai Schmidt, Philipp Sandner. Solving Challenges in Developing Countries with Blockchain Technology. Frankfurt : Frankfurt School Blockchain Center,FSBC Working Paper , OCTOBER 2017 . p. 2.
7. Delivering blockchain's potential for environmental sustainability. Miriam Denis Le Sève, Nathaniel Mason and Darius Nassiry. London : ODI,203 Blackfriars Road, October 2018.
8. Juden, Michael Pisa and Matt. Blockchain and Economic Development: Hype vs. Reality. Washington DC : s.n., July 2017.
9. Potential of Blockchain Technology for Trade Integration of Developing Countries. Jakob Schwab, Jan Ohnesorge. Bonn,Germany : German Development Institute,Federal Ministry for Economic Cooperation and Development (BMZ) , April 2019. ISSN 2512-9384.