BLOCK CHAIN FOR EFFICIENT INDIAN HEALTHCARE SYSTEM IMPLEMENTATION

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Abstract:

Health care is undergoing a major transformation worldwide due to technological advancements and increase in number of diseases. In the wake of current pandemic Covid ‘19 impact across the Globe, stresses the need to overhaul the Health Management system in a large country like India. A country with two-thirds of population living in rural setting, their access to quality Health System is dubious. In Urban setting also the availability of affordable and accessible health care also left a lot to be of concern. Block Chain Technology integration in all the facets of Health care management can cut costs and dramatically improve accessibility and affordability for all segments of people in India. Suggested Block Chain Modules integration and implementation measures emanating from this study in delivering different medicines and paramedics support aims at rendering efficiency to this strained system. Hence this study acclaims on the key performance metrics on health care system to be integrated with the efficient block chain implementation in India.

Keywords: Health Care System, Block Chain Integration, Block Chain Modules.

1.1 Introduction:

In the wake of current pandemic Covid 19 impact across the Globe, which stresses the need to overhaul the Health Management system in a large country like India. Current situation evidences that we are being caught on wrong foot in on more than one count. Albeit India being tipped as Pharma hub of the world, medical facilities for a common man is still a premium as it clogged with several constraints. High time the health sector needs innovation, support and intervention of professionals at radical levels. It is in this backdrop, Block Chain integration, as a revolutionary mechanism, in the varied interlinked avenues, can serve the purpose of driving efficiency in the management of Health Care system in India through this research study.

Though two-thirds of India’s population live in rural setting, their access to quality Health System is dubious. In Urban setting also the availability of affordable and accessible health care also left a lot to be desired. Indeed, being plagued by exorbitant cost, lack of medical facilities, equipment and quality personnel, needless to say per capita availability of Medical Professionals, according to World Bank: "India Country Overview 2018" is quite dismal.

Block Chain Technology integration in all the facets of Health care management can cut costs and dramatically improve accessibility and affordability for all segments of people in India. Suggested Block Chain Modules integration and implementation measures emanating from this study in delivering different medicines and paramedics support aims at rendering efficiency to this strained system.
1.2 Background of the Study

1.2.1 Health Care Sector in India:

Health care sector across the world is going through a sea change in the wake of recent Pandemic. In many countries, including developed ones, healthcare services at National level are being plagued by an aging population, Insurance payment reforms, skilled worker shortages, and ever-increasing concomitant costs. The emergence of innovative technologies like artificial intelligence (AI), however, has made many healthcare systems optimistic about solutions and ready and eager for change. Another key technology leading this trend is blockchain, which can help healthcare providers automate medical record mining to aid in making more accurate diagnoses or get rid of issues concerning medical treatments by enabling more transparent and accurate and tailored treatment, thereby reducing the financial burden.

After proving its worth in industries like retail and financial services, it is time for making note of its pervasiveness and if scaled up and subsequently make its way into mainstream health sector, especially in a country like India it can help reduce many concerns over security and much needed privacy of health data, it can in many ways help to build a strong and sustainable eco system in the healthcare implementation.

The blockchain technology suggested in this study for stagewise implementation will contribute to improved health outcomes, improved healthcare quality, and lower health care costs—the three seemingly improbable objectives that India has been striving to target and embrace (improving care, improving health, and reducing costs).

1.2.2 Blockchain Integration:

Blockchain is a key platform designed to keep secure any data, needless to say, health data in a distributed, more importantly encrypted, shared ledger and also to offer control access to that data. Blockchain technology in short is based on distributed ledger technology (DLT), which is a major type of secure database, which can be implemented among a group of participants, without a central authority or administration. Members or contributors therefore can readily create, even modify, or to a great extent remove transactions in the database by observing rules that are enforced by the central ledger. For example, the ledger may ensure that as parties you cannot spend money you do not have.

Immutability is an important aspect of blockchain for building trust and protecting the integrity of data stored on the blockchain. Once data are stored on the blockchain, it cannot be changed. Modifications and deletions can be accomplished through appending new records to the blockchain that supersede the originals. However, the older records on the blockchain remain intact. Distributed ledgers are used for building a broad class of applications and services like secure, robust cryptocurrencies (e.g., Bitcoin); for providing verifiable ownership of assets; and for managing access rights to personal data. These services can be provided without the requirement that a single organization be trusted with the data.

Another important consideration is ownership of assets. This is accomplished by digital keys, addresses, and digital signatures. To provide an evidence, it works in such a way that a pair of digital keys get generated at a time—one public and one private. If juxtaposed to a bank account, the public key should be with the bank account and necessarily the private key is the secret Personal Identification Number (PIN) that would give access to that account. The address is similar to the bank routing number that can be shared with anyone wanting to send money to you. Finally, the digital signature is like a real signature and is used to prove one’s identity, except that blockchain uses cryptography, which is more secure than hand signatures that can be easily forged. India is home to around one seventh of the world’s population. Though it is claimed as the demographic advantage, the difficulty lies in the hands of healthcare industry to offer creditable health care to the people. Government data says that India’s domestic pharma market turnover reached Rs 2.2 lakh crores, in 2020. This is a huge jump from Rs 1.29 lakh crores from 2018 recorded data. To say the least, Healthcare sector in India is much strained and being available
in both private and public hands at premium. Ironically, the panacea lies in the hands of Government, in implementing the BC System in a phased manner to ensure mammoth targets set before the Country.

1.3 Objectives of the Research:
- To analyse the challenges and problems in the current Indian Health Care Management
- To assess the possibilities of integration of Block Chain technology in the Indian Health sector
- To suggest effective Block Chain implementation measures in management of Health Care in India.

1.4 Conceptual Framework
This research study conceptualised on the bedrock that development of an architecture alone would render efficiency in design and delivery of Health care service in India which is of course of enormous size and deep rooted implications at multi levels.

Fig.1 – Block Chain Integration Phases

1.5 Research Analysis:
This study takes an integrative approach; stepwise integration of Patients, Hospitals, Doctors, Pharmacy and Insurance, recording their transaction and thereby rendering transparency and ensuring integrity in every step. Blockchain developed thus, will also act as base reference for future course of action on either or on all sides involved in transaction, as provided in Fig.2
1.5.1 Block Chain Integration of Transaction

The exact flow of transaction among parties involved will be integrated in the following order as exhibited in Fig.3 to speed up the pace and mitigate unnecessary delays at each step.

1.5.2 Technical Process of Implementation

Following figure 4, explains the Framework developed on the process to be implemented in this practical Blockchain research involving different organisations of importance.
1.5.3 Framework of Deployment

This study has an inbuilt limitation in the form that deployment in terms of technical implementation is beyond the scope of the study. This study focused on framework development of technical integration of process, which will subsequently be benefitting the Policy makers in Health Management for consideration and probable implementation.

1.6 Analytical Discussions and Suggestions:

Based on the Block Chain Integration Implementation Process it reveals that the block wise implementation for Healthcare provision will yield fruitful results as being put forth hereunder.
Back in 70s, in India, the market share of Indian Pharma companies was a meagre 5 percent and the rest was shared by Global companies to a whopping extent of 95 percent. By the turn of 2020, the scenario has dramatically changed as the Indian Pharma companies now hold almost 85 percent market share. Even as Government sources currently quote that in the next five years or so, the expenditure on Medicines by Indian people would grow in excess of 10 percent as compared to current levels. Thus, resulting in India being ranked among top 10 countries in terms of spending on medicines at Global level. India is currently by any stretch, remains the largest provider of generic drugs in entire globe. To provide evidence from statistical point of view, Indian pharmaceutical industry leads the pack by supplying over 50% of global demand for various vaccines, even to USA, a considerable portion, say, 40% of generic demand is being met by Indian Pharma sector. Even for UK, 25% of all medicine comes from India, which is a green signal for a new road ahead to integrate Block Chain in all facets of health care management.

Moving forward, much anticipated growth in domestic sales, leave alone Global markets, would be dependent on the ability of Pharma companies to align their key product portfolio with chronic disorder therapies for diseases such as anti-diabetes, anti-depressants and anti-cancers, which are evidently on the northward bound.

Rapid introduction of generic drugs into the domestic market has been in the focus and is indeed to benefit the Indian pharma industry at large. Covid vaccines in India are progressing in their full bloom state. In addition, the thrust on rural health sustenance and lifesaving drugs also to do well for the pharma sector companies. Therefore, Block Chain Integration is a germane for efficient Health Care system in India on the following key performance metrics as displayed in the Table 1.

Table 1: Health Care - Key Performance Metrics

|   | Average Hospital Stay | Set a target length of stay for the patients based on the type of illness |
|---|----------------------|--------------------------------------------------------------------------|
| 1 | Bed Occupancy Rate   | Keep the occupancy rate under checks, not yielding to pressure from Facility centers for full occupancy all the time. |
|   | Medical Equipment Utilization | Effective allocation and optimal usage of equipment and get rid of exorbitant maintenance costs incurred for additional equipment purchase and inventory. |
|---|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------|
| 4 | Patient Drug Cost per stay    | Effectively allocate monetary resources to access to patients’ drugs.                                                            |
| 5 | Treatment costs               | Analyze deviation if any in terms of abnormal or exaggerated bills and to standardize costs according to treatment/Care provisions. |
| 6 | Patient room turnover rate    | Maintain high standards of service quality in order to manage the turnover with speed as well as hygiene quality.                  |
| 7 | Patient follow up rate        | Guide patients with empathy and responsiveness and hand hold through their recovery process and subsequent patient follow-ups.   |
| 8 | Hospital Readmission Rates    | The number of patients that return to the hospital premises within a short period of time after being discharged                   |
| 9 | Patient Wait Time             | Paramount attribute to determine the Patient admission or return rate by virtue of their contentment. To identify trends and rush time and balance demand and supply in patient management. |
| 10| Patient Satisfaction          | Number one priority for any healthcare organization, in order to improve the service offering.                                   |
| 11| Staff-to-Patient Ratio        | Evaluate the staff-to-patient ratio on a regular basis and to check the system effectiveness, to increase patient satisfaction, and to reduce errors accrual. |
| 12| Canceled/missed appointments  | Track the causes and costs owing to canceled or missed appointments and take corrective steps by recording such encounters.     |
| 13| Safety of patients            | Get insights from patients or caretakers on critical procedures such as post-operation infections, respiratory issues, or treatment-related diseases |
| 14| Waiting Time of Emergency Rooms | Calculate and adjust time taken by patients to acquire emergency rooms as it is critical for instant care and responsive actions. |
| 15| Costs by Payer                | Evaluate the distribution of the costs amongst the different units. And assess which costs big for payer and suggest measures to optimize the pay. |

1.6.1 Implications for Strategic Growth and Efficiency

Today’s patients demand a more personalized seamless, and coordinated approach to their health care, where providers amalgamate health data from multiple different data sources (e.g., medical records, payer systems, genomics, clinical trials, and government sites) to come up with a diagnosis. Unfortunately, two major issues limit this approach: significant security and privacy concerns that impede sharing of health records, and the fact that patients interact with a large number of healthcare providers, leaving a scattered trail of information.

Much of the apprehension concerning paramount data security and quintessential privacy of patients is fuelled by recent high-profile security breaches happening in healthcare records of patients. A recent
study revealed that healthcare data breaches are rapidly growing in scale and impact to healthcare institution and patients. The primary concern of patients is that they have little or no control over their information after it has been provided to a payer, provider, or healthcare exchange. Patients want greater insight into how their data are used, who has access to it, and when it is being modified. To further complicate matters, patients have medical histories from a variety of caregivers, such as a paediatrician, a university physician, a dentist, an employer, a health plan provider, or a medical specialist. Over the years, they leave data scattered across many healthcare systems that lock them away in silos. The result is a trail of health records that are hard to collect, are difficult to piece together, and are under primary ownership of the healthcare provider.

Thus, this study summarizes the other pain points in healthcare today and how blockchain technology can be applied to overcome these obstacles and create a lucid framework for effective implementation.

Conclusion

The healthcare industry values many of the basic underlying tenets of blockchain technology, such as trusted execution, non-repudiation of data, auditable trails and records for transactions, full replications of data in a secure environment, consensus on data changes, and decentralization of authority/data. Blockchain technology holds high promise of being a widely adopted mechanism in the healthcare system for resolving issues that have long concerned the industry. At the same time, there are many areas of blockchain that are relatively untested in a healthcare environment, such as the need for a service level agreement, viability of privacy, scalability of a system to handle large numbers of participants, control and restrictions around access to patient data, and issues of patient record ownership.

Despite its tremendous potential, healthcare systems should tread very cautiously and also observe protocols in implementation. Futurists can be optimistic regarding blockchain technology and maintain a healthy skepticism toward the hype surrounding it today. As healthcare systems embark on securing and digitizing their infrastructure, they should focus on introducing novel clinical decision support systems using analytics and AI.

Blockchain shows great potential in providing a foundation to support and advance AI. As use cases for blockchain are identified that have compelling value to healthcare—from reducing cost to improving patient outcomes, engagement, and experiences—they can be prototyped with attention to privacy, security, and compliance from the start, and piloted with de-identified test data across consortiums of participating healthcare organizations to test, improve, and evolve the solutions for optimal effectiveness.

This study results, of course, if pursued for implementation in Health Care system will for sure open vistas for efficient, affordable and accessible systems in the Indian Health Care Sector.

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