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Assessing the Potential Usages of Blockchain to Transform Smart Bangladesh: A PRISMA Based Systematic Review

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Abstract

In recent years, both researchers and internet users have been attracted to the concept of blockchain technology for transforming smart Bangladesh. This study focuses on the possibilities of blockchain technology leading to the transformation of Bangladesh into a smart nation. This article also explains the working procedure and potential usage of the blockchain concept in Bangladesh. The study is mainly focused on qualitative approaches. The researcher used the PRISMA 2020 platform to identify and choose relevant studies and reports from indexed publications. As the idea of block chain technology is very new and not being adopted by all the sectors of Bangladesh's economy, that's why only secondary data were used to conduct the study. The researcher has tried to find the different potential areas of blockchain technology from such developing countries like Bangladesh. The potential areas, such as the supply chain management, voting system, and health care industry, where blockchain can be implemented by introducing different polices and regulations. From the implication point of view, blockchain technology might be implemented to transform smart Bangladesh within 2041 if adequate regulations can be undertaken by concerned authority. This revolutionary technology has great potential and has recently caused upheaval. Based on the descriptive study, some of the relevant recommendations including suggestions for reducing challenges of using blockchain are discussed and future research works can be continued in both academic and business sectors in Bangladesh based on this finding.

Keywords: Block Chain, Digital Transformation, Smart Bangladesh, Supply Chain, Voting Systems.

1. INTRODUCTION

The blockchain is characterized by its immutability, transparency, and decentralized nature. It functions as an electronic ledger, where the addition of records is only possible through a decentralized consensus among peers[1] [1]. The blockchain possesses potential advantages that extend beyond monetary implications, encompassing social, humanitarian, political, and scientific domains

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[2]. However, the total innovative potential of blockchain is currently hindered by some entities aiming to identify real-life challenges.

One potential application of blockchain technology is its use in countering abusive political governments. By leveraging blockchain technology, it becomes possible to establish a decentralized cloud infrastructure that eliminates the need for centralized control by jurisdictionally bound organizations[3]. Despite the potential monetary and political benefits, the utilization of blockchain technology for record keeping, transaction coordination, and inevitability holds significant promise for driving societal progress, comparable in importance to historical artifacts such as the Rosetta Stone or the Magna Carta [4] .

In particular, the blockchain has the potential to serve as a comprehensive public ledger for entire societies, encompassing various aspects such as libraries, collective resources, events, individuals, and assets, including identities. Within this theoretical framework, it is postulated that all assets possess the potential to be transformed into intellectual property. This concept revolves around the notion of assigning a distinct identifier to each asset within the blockchain, thereby enabling the tracking, manipulation, and transaction (i.e., purchase or sale) of said asset on the blockchain [5]. This suggests that both physical resources (such as houses, cars, and vehicles) and digital resources can be registered and processed using blockchain technology[6].

In Bangladesh, the concept of implementing blockchain is in its early stages. Therefore, the industry can'teasily understand where they can implement blockchain in their organization. Besides no article was conducted before about the working procedure of blockchain and its possible areas for Bangladesh. Previous researchers examine an alternative category in Blockchain 3.0 applications that extends beyond the realms of finance, currency, and markets [7]. These applications encompass various domains such as science, genomics, learning, health, development, aid, academic culture, and publishing. The utilisation of the blockchain model in these areas presents advantages in terms of scalability, efficiency, organisation, and coordination. Researchers introduce sophisticated notions such as demurrage currency and analyse their implications within the broader framework of the widespread implementation of blockchain technology. So, the objectives are as follows.

RO 1. Basically, this paper shows the procedures of blockchain technology for creating a blueprint for the digital transformation in Bangladesh.
RO 2. This paper aims to determine the potential areas where blockchain can be implemented from the perspective of Bangladesh as a smart nation.
RO 3. This paper also provides some recommendations on how to reduce the challenges of maintaining identified areas by implementing blockchain.

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2. MATERIALS AND METHOD

According to [8] , cross-border messaging framework exchanges necessitate an advanced messaging facility. The system given by the public to Worldwide Interbank Financial Telecommunication enables banks to send electronic messages safely between themselves. This empowers one bank to teach another bank to credit the record of one of its clients, charging the account apprehended by the sender organization with the credited bank[9]. Utilizing blockchain technology, people can maintain several financial transactions devoid of the association of financial mediators [10]. By way of the blockchain technology, which guarantees the most straightforwardness of transactions, it might make sweeping modifications in the current design of the financial system or the money-related framework [1].

2.1 Block chain

A blockchain is an emerging and dynamic collection of records, referred to as blocks, that are interconnected through the use of cryptographic techniques [1]. Every block within the system comprises a cryptographic hash that represents the previous block, along with a timestamp and exchange-related data [5]. The blockchain is a highly intelligent innovation, credited to the intellectual prowess of an individual or collective entity operating under the pseudonym Satoshi Nakamoto. Originally developed for digital currency, Bitcoin, the technological community has since identified additional potential applications for this innovation[11].

2.2 Application of Blockchain

Many previous studies have been conducted on blockchain technology[12]. Because of its decentralized, verifiable, and immutable character, it has disrupted numerous industries such as finance, SC, operations, real estate, insurance, healthcare, electronic health records, copyright, music, and renewable energy, and it is continuing to extend its footing and effect in these sectors[13]. In the majority of recent review studies, bibliometric analyses of numerous blockchain papers, including conferences, are frequently included [4]. Some of them concentrate on looking at blockchain adoptions to comprehend applications and future SCM research [14]. Data management, improved transparency, quicker response times, smart contract management, operational efficiency, disintermediation, immutability, and intellectual property management are some of the advantages of adopting blockchain in SC, according to [13] .

Blockchain technology was suggested as part of a plan for national-level selection by [15]. Recently, the blockchain-based electronic voting system has grown in importance as a solution to some issues that might be related to e-voting [5]. Due

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to the immutable property of the blockchain, which has made it a decentralized distributed ballot box, blockchain-enabled voting systems have been proposed as the next generation of contemporary electronic voting systems [16]. Governments are encouraged to adopt intelligent, sustainable voting systems and to incorporate sustainability information into voting systems through blockchain technology. It makes certain that everyone has accurate knowledge of sustainable assets [7]. It's critical to note that while the electronic voting system is increasingly using blockchain to increase security, a number of problems still exist.

Blockchain will aid in addressing some of the interoperability issues in the healthcare industry and can be essential in putting patients at the center of the ecosystem [17] . It improves interoperability, security, and privacy and can put patients at the heart of the ecosystem. In conclusion, blockchain can be used to access and share patient medical records, enable remote monitoring using mobile applications, and create a medical data management system that gives patients ownership of their records [18].

2.3 Methodology

As the research topic of block chain technology is new for developing country like Bangladesh. That's why researchers might conduct this study based on qualitative approaches. The sources of the data are secondary sources, for example, various journals, articles, TV news, and other online portals. The insights required in this research are the criteria for developing a good and effective digital economy in Bangladesh [19]. In addition, as the idea of block chain technology is very new and not being adopted by all the sectors of Bangladesh's economy, adopting strategies from techno-prone countries and summarizing them in an effective way creates a concern for all sectors of the economy [20].

The present study utilized the PRISMA standards based on the number research works, which are specifically designed for conducting systematic reviews and meta-analyses of observational data [21]. A comprehensive search was conducted for original publications published between September 2021 and September 2023, encompassing worldwide databases such as Scopus, PubMed, and Web of Sciences for retrieving database through codified systematic process in Figure 1 [22] . No language constraints were used throughout the search process [21], [23] . The search technique employed in this study involved the utilization of key terms relevant to the major focus of the investigation, including blockchain, digital transformation, prospective areas, supply chain, voting systems, healthcare, and Smart Bangladesh [24]. Identification, screening and included options are clustered relying on some criteria and objects which are represented in figure 1. Records that do not align with the specified keywords or research subject are eliminated. Several factors, such as insufficient data, papers in different languages, diverse outcomes, and unconnected effects and results, might be considered for rejecting

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publications and reports [23], [24]. The selection of the research paper has identified a total of 47 additional papers and four reports within the study.

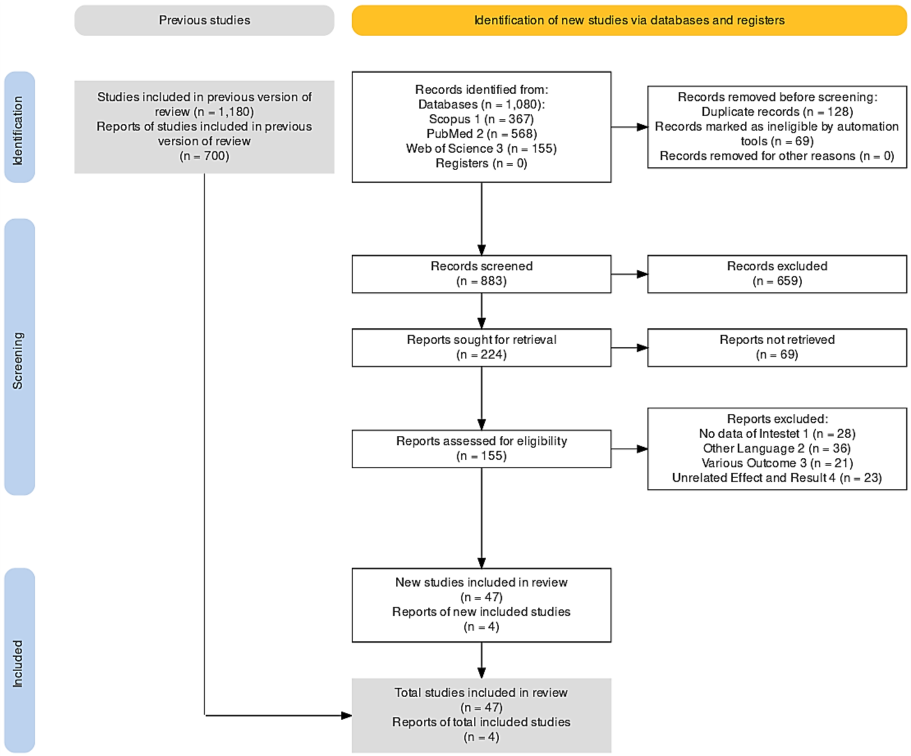

Figure 1. Research Flow Adopted from PRISMA 2020 [25]

3.RESULTS AND DISCUSSION

3.1 Procedure of Blockchain

The utilization of blockchain technology is being observed in various domains, including both financial and non-financial sectors, which have conventionally relied on a third-party online entity to authenticate and protect digital asset transactions conducted over the internet [26]. The application known as "Smart Contracts" was developed by Nick Szabo in 1994. The aforementioned statement highlights the significant role of this particular application within the realm of cryptocurrency [27].

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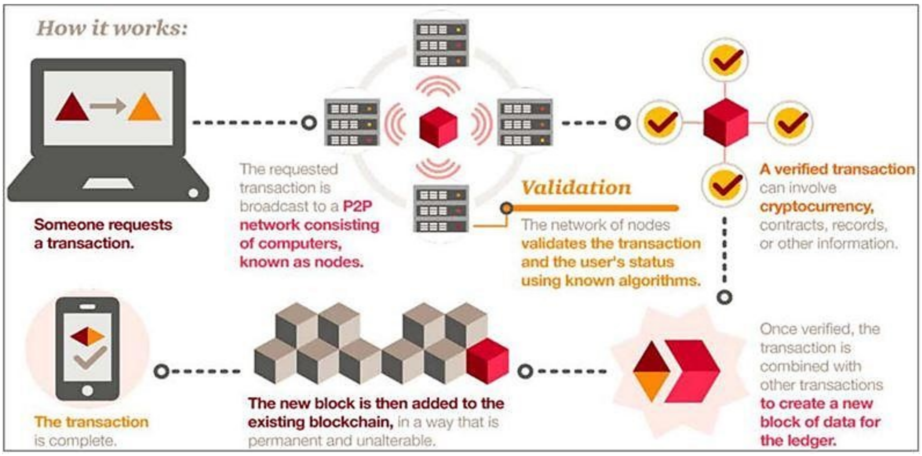

Figure 2. The working algorithm of Blockchain

The blockchain decentralizes and disintermediates all global transactions. The blockchain adds a new layer to the Internet to enable financial transactions, including immediate advanced cash installments (in a widely usable digital currency) and longer-term, increasingly complex budgetary contracts. Blockchains can execute financial contracts, currencies, and soft or hard resources [28]. The blockchain can also track, observe, and execute transactions. Thus, the blockchain may be used for benefit vaults, stocks, and trade in economics, finance, intangible assets (ideas, votes, reputation, health data, intention, etc.), and hard assets (physical property) [29].

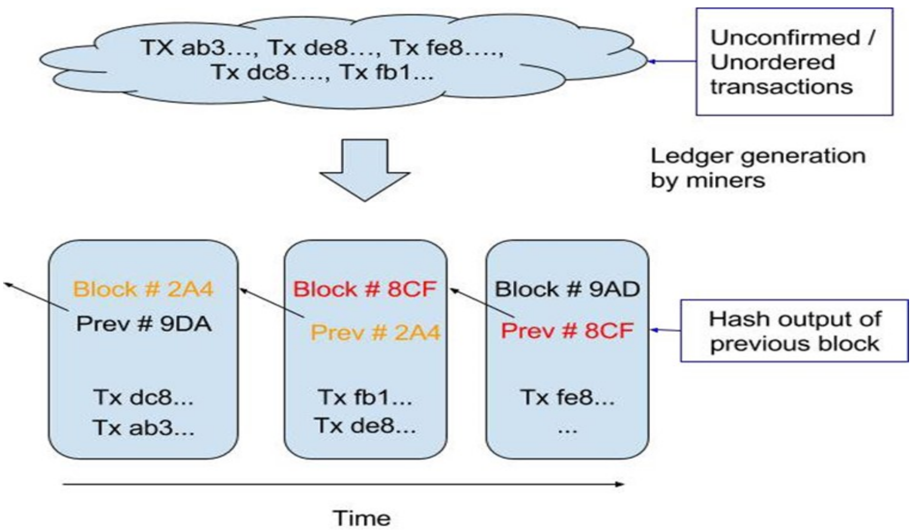

Figure 3. Generation of Blockchain from unordered transactions
2030 Projection of Blockchain Technology Market

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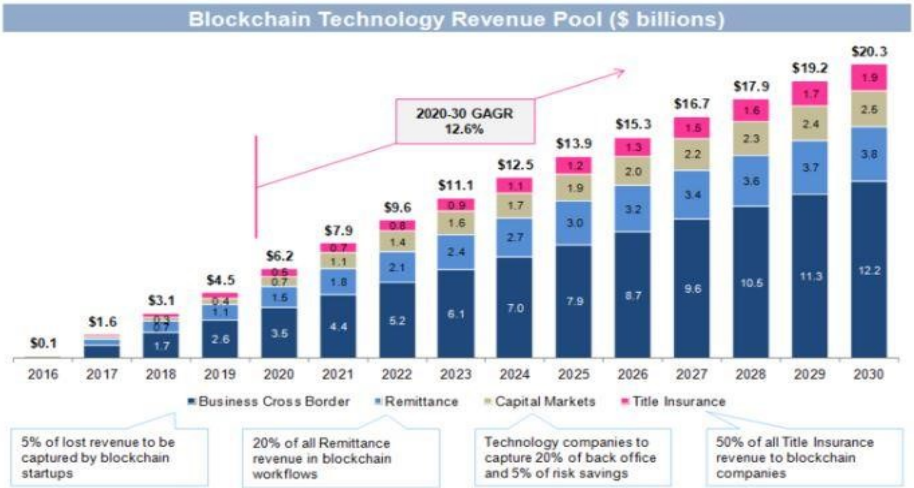

Figure 4. 2030 Projection of Blockchain Technology Market
Source: Autonomous Research LLP

Our estimations suggest blockchain technology businesses might earn $6 billion by 2020 and $20 billion by 2030. Digital ledger technology affects payments in (1) Business Cross Border, (2) Remittance, (3) Capital Markets, and (4) Title Insurance. Cross-border B2B will generate $3.5 billion (56%) of blockchain income in 2020 and $12.2 billion (60%) in 2030. Digital currency usage will also lower remittance payments and move 20% of income to blockchain enterprises. Blockchain sales will be $1.5 billion (24%) in 2020 and $3.8 billion (19%) in 2030. Reducing capital market infrastructure, counterparty risk, Title Insurance fees, and maintenance costs generates remaining revenue. Autonomous Research predicts a 12.6% blockchain technology industry CAGR from 2020 to 2030.

Blockchain can turn the grid into a peer-to-peer network where customers may trade electricity, such as rooftop solar power.25 Despite the goals of many blockchain startups, a decentralized, peer-to-peer trading network that upends the centralized grid in advanced nations in the next decade looks unlikely. These enterprises rely on the grid. Peer-to-peer networks use the distribution grid for virtual transactions, not electricity transfers. The grid's reliability and financial benefits make this acceptable [30].

3.2 Prospective Areas of Blockchain Technology in Bangladeshi Government

3.2.1 Blockchain Technology in Supply Chain

The following diagram presents a fusion of blockchain technology and supply chain functionalities, which will now be detailed and analyzed. Figure 5 provides a

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conceptual representation of the collaborative and interactive dynamics among various entities within a supply chain operating under a blockchain network [31]. Each member of the blockchain network submits transactions in a manner that is contingent upon the precise activity that has been done. During the early stage of raw material procurement, the suppliers responsible for pre-processing natural resources engage in posting transactions on the ledger pertaining to said initial process [19]. The aforementioned transactions encompass several tags, such as the name of the raw material, the quantity involved, the quality of the material, the geographical location of its origin, and additional relevant information [7]. Upon the initiation of the transportation process for the raw materials, the corresponding transactions are expeditiously recorded and reported. With this approach, all participating entities within the network are able to authenticate critical information pertaining to the precise raw material they have acquired or that has been utilized in the production of their respective products. Likewise, throughout the manufacturing phase, the manufacturer engages in a comparable relationship with the blockchain and subsequent participants in the chain [20].

Figure 5. Fundamental Factors of Supply Chain with Blockchain Technology

The manufacturer may ensure the accuracy of important information on the natural resources they have acquired by carefully reviewing and confirming the details provided in the transaction tags [7]. This enables them to proceed with the manufacturing process in a suitable and appropriate manner. Following the conclusion of a particular step, novel transactions incorporating additional information tags, such as the manufacturer's name and field experience, are sent. Subsequently, the items are transferred to the distributors. The distributors successfully facilitate the selling of items to both wholesalers and retailers [20].Blockchain transactions that display significant data tags, such as the addresses of the buyer and seller, the amount exchanged, the caliber of the product's raw materials, and other pertinent information, serve as examples of the process

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[20].The primary responsibility of distributors is to engage in the sale of items to intermediaries rather than directly to end users. At present, similar to each stage within the supply chain, the distributor (typically a party involved at each stage) has the ability to access significant tag information pertaining to the progression of the product until that particular stage [19].

This information encompasses details such as the geographical location of the raw material source, the reputation of the manufacturing company, the identity of the distributor, and other relevant data. For example, a merchant has the ability to promptly assess the quality of a product's natural resources and obtain relevant feedback prior to its sale to the consumer. Following this, when a distributor transports the goods to a wholesaler by initiating a related transaction, the latter engages in a comparable manner. The transaction tags are examined for further data, after which the selling process is carried out to the subsequent wholesaler or retailing organization, followed by the submission of a new transaction. The aforementioned principle is also applicable to retail organizations [19]. Finally, the end user is provided with the completed product along with a submitted transaction that includes relevant tags. This allows the end user to thoroughly examine and validate every part of the product's trip along the whole supply chain process up until that point. Table 1 provides a comprehensive summary of the existing constraints encountered by supply chain components and the beneficial effects resulting from the implementation of blockchain technology.

Table 1. Outline of Supply chain constraints and Blockchain's benefits.

Supply chain Factors	**Current limitations**	**Blockchain impact**
Producer/ Raw Materials	The capacity to demonstrate, in a comprehensive and transparent manner, the provenance and quality indicators of items [19].	Benefits from improved trust in tracking manufacturing raw materials and value chains from raw materials to consumers.
Manufacturer	Product tracking is limited until delivery. The ability to examine raw material quality is restricted.	Value increases with a shared information system involving raw material suppliers and delivery networks.
Distributor	Poor cooperation in custom tracking systems. Certification limitations and trust concerns.	The integration of proof-of-location and conditions certificates into the ledger system [31].
Wholesaler	At the wholesale level, there is a lack of trust and proof about where things go.	Capability to verify both the origin of the items and the conditions under which they

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		were transformed or transported.
Retailer	A lack of faith in the items' origins and verification of their journey [19].	Keep track of all goods and products from the end customer to the seller with ability to handle returns of goods.
Consumer	A lack of faith in the product's ability to comply with the standards set forth for its origin, quality, and conformity with the standards set forth for its original stage.	Comprehensive and clear information about where the product came from and how it got from the raw material to the finished, bought product.

3.2.2 Blockchain Voting System

Blockchain technology might make voting safer and easier. Even if a hacker gained access to the terminal, they couldn't affect the blockchain's other nodes. Because it would be difficult to fake an ID and each vote would be connected to a unique ID, the government could count ballots more correctly and promptly [32]. Blockchain technology made voting more open and available, stopped illegal voting, kept data safe, and made sure the results were correct. It's important to use computer votes in blockchain. But if a computer voting system is hacked, all votes that have been cast can be changed and used. Even though computer voting has benefits, it has not been used on a national scale[33]. Concerns about voting online can be solved by blockchain technology. Figure 6 shows the main ways in which the two methods are different. In traditional voting methods, there is one person in charge of votes. No one knows how to verify the information, so anyone can make changes to it quickly. Since there is no central authority, records are stored at many nodes. It is not possible to hack all nodes and change the data. So, individuals can't just take away votes and quickly confirm them by adding them up with votes from other nodes [34].

If it's used right, the blockchain is a digital, decentralized, encrypted, visible record that can't be changed or hacked [34]. The distributed blockchain framework of a Bitcoin electronic voting system eliminates risks and makes it tamper-proof. Blockchain-based electronic voting requires a fully distributed voting infrastructure [33]. Blockchain-based electronic voting only works when no one, not even the government, controls the online voting system. To conclude, voting systems might be transparent while people believe in the legitimacy of authority [35]. The literature review and other trials on this subject may help make vote administration and participation more efficient. However, blockchain presented a new electronic voting methodology [32].

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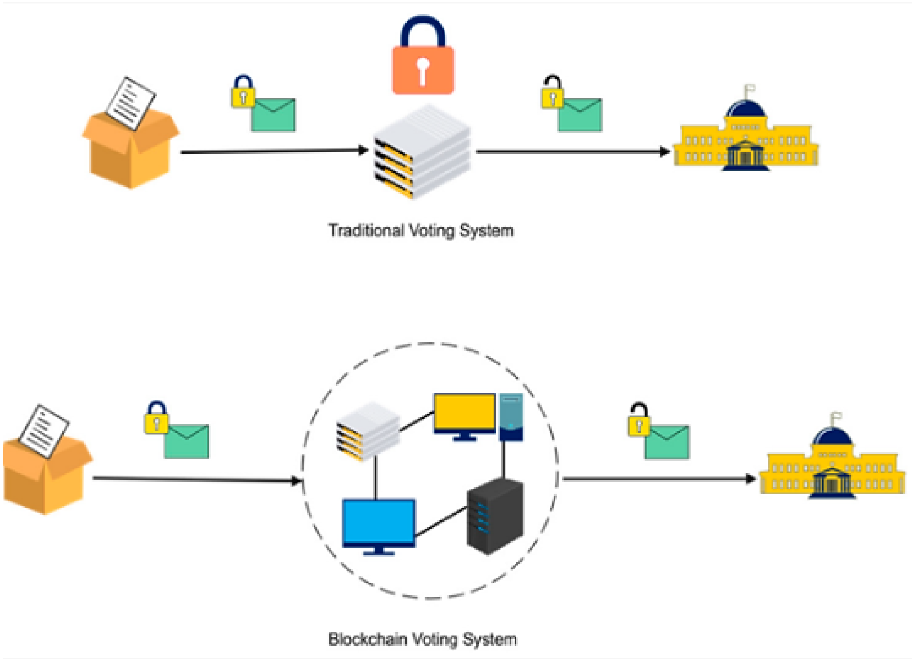

Figure 6. Proposed Blockchain Voting System

The use of blockchain technology has the promise of fundamentally transforming the management systems employed in voting procedures, hence augmenting the levels of transparency, security, and trust that are inherent in the election process ledger [35]. There are several potential domains in which blockchain technology might be effectively employed for the purpose of managing voting systems:

Table 2. Possible Domain Improvements in Proposed Blockchain Voting Systems

Domains	Positive Impacts on Blockchain Technology
Secure and Transparent Voting	Blockchain makes vote recording and verification secure and transparent. Votes can be recorded as blockchain transactions for immutability and tamper resistance. This improves vote integrity since all transactions are publicly maintained on a stakeholder-accessible decentralized ledger [35].
Voter Identity Verification	Blockchain-based identity management solutions improve voter verification. By securely keeping voter data on the blockchain, identity verification is easier. This can reduce voting fraud and guarantee qualified citizens votes [33]

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Domains	Positive Impacts on Blockchain Technology
Immutable and Auditable Voting Records	Blockchain technology can record voting transactions immutably and auditably. Each blockchain vote is time-stamped and irrevocable, giving a clear audit trail. If needed, independent audits, recounts, and inquiries are possible.
Decentralized and Resilient Infrastructure	A decentralized network of computers makes the blockchain resistant to attack and manipulation. Blockchain can defend against single points of failure and preserve vote integrity even in the face of cyberattacks by spreading voting data across several nodes [35]
Increased Voter Participation	Blockchain-based voting systems may boost voter turnout, especially among abroad voters. Blockchain allows secure and simple digital voting, removing geographical boundaries and increasing voter access. This may boost voter participation and engagement [34].
Real-Time Vote Counting	Blockchain enables real-time counting of votes and result tabulation. Each vote on the blockchain may be immediately computed and confirmed, decreasing human vote-counting time. This can speed up election results, improving electoral efficiency [32].
Enhanced Transparency and Trust	Blockchain records the voting process publicly and auditably, promoting openness and confidence. Voters can independently verify the voting mechanism to ensure correct recording and counting. This can boost electoral trust and confidence.

3.2.3 Blockchain in Healthcare Sector

Most healthcare sectors are centralized and prone to single-point services and data leaks because of cybersecurity assaults. Patients' sensitive data leaks can have catastrophic implications[36] . Current medical systems lack transparency, trustworthiness, immutability, audit, privacy, and security for healthcare data management [36], [37]. Blockchain technology may tackle these healthcare system issues. The use of blockchain technology holds significant potential in the realm of healthcare data management, as it offers the ability to enhance operational efficiency and provide a robust foundation of trust [38]. The technology has many useful built-in features, such as decentralized storage, authentication, openness, immutability, flexible data access, connection, and security [2]. Consequently, these qualities facilitate the extensive blockchain technology usages in the realm of healthcare data administration. Figure 7 depicts the healthcare systems that have been enhanced by the implementation of blockchain technology. The use of smart contracts inside the blockchain framework facilitates the establishment of mutually agreed upon terms and conditions among healthcare partners, eliminating the need

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for intermediaries [2], [39] . It effectively mitigates superfluous administrative expenditures. Blockchain primarily relies on three fundamental conceptions: peer-to-peer networks, consensus processes, and public key cryptography [38]. Blockchain is categorized into three distinct types based on the management of permission. These categories include public, private, and consortium blockchain [2].

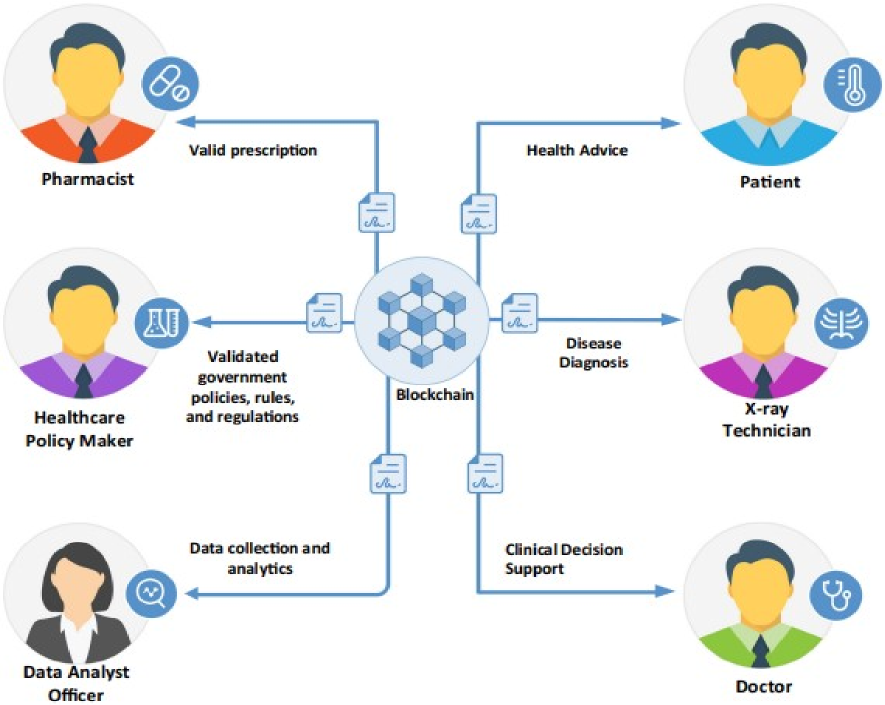

Figure 7. Proposed Blockchain Technology in Healthcare Sector

In the context of public blockchains, the consensus method allows for the participation of anyone who is connected to the Internet. Public block chains incorporate incentive structures and employ cryptographic techniques for digital verification, utilizing proof-of-work procedures [2].The public blockchain system operates with transparency, allowing for the pseudonymous identification of each participant. In the context of a private blockchain, the network is under the exclusive control of a singular organization [39] . Hence, the consensus mechanism of this blockchain necessitates the involvement of a reliable entity. The advantages of both public and private blockchain networks are combined in the consortium blockchain. This solution is exclusively applicable to certain organizations seeking to enhance intercommunication efficiency [2].. Healthcare organizations have the flexibility to choose from many types of blockchain networks based on unique requirements, since each network offers distinct advantages and disadvantages [37], [38].

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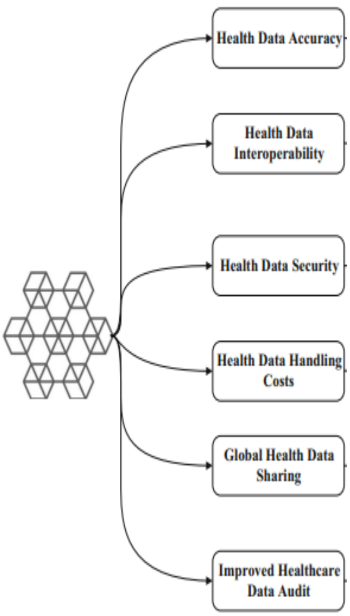
Benefits Of Leveraging Blockchain Technology for Hdms

In Table 3, the advantages of using Blockchain in healthcare systems are expressed.

Table 3: Benefits of Leveraging Blockchain technology for HDMS
Source: Author Work



The integration of patients' data from several facilities can be achieved using automated means. The utilization of this technology allows healthcare practitioners to have a comprehensive overview of patients' entire medical records [39].

The electronic health records (EHR) and electronic medical records (EMR) contained within the blockchain system adhere to a universally accepted data code standard.

Health Data Security mitigates the potential for unauthorized access, theft, or mistreatment of data. The utilization of blockchain technology ensures the security of health data, safeguarding it from any harm caused by natural catastrophes [38].

Medical firms have the ability to conveniently retrieve comprehensive patient data without the need to visit several places

The worldwide Health Data Sharing programme offers medical institutions the benefits of worldwide accessibility and traceability [38].

Allows auditors to check transactions simply. Complies with essential laws and regulations for healthcare establishments [36] . Reduces data duplication.

3.3. Discussion

3.3.1 Overcoming Challenges of Blockchain Technology in Supply Chains

Supply chains sometimes provide a range of challenges that are closely linked to factors such as freight failure, human error, and intentional fraud [40]. Consequently, ensuring security emerges as a fundamental feature that needs attention and resolution. In the context of a supply chain, the data that is exchanged takes on various formats and must fulfill diverse requirements. This results in a more intricate and challenging process of managing and ensuring the integrity and transparency of transactions and their associated data[41]. However,

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it is important to note that such guarantees are often lacking [20]. An example of a potential threat inside the supply chain involves a malevolent entity that engages in fraudulent activities by manipulating invoice data and illegitimately modifying the amounts paid or due. Therefore, it is imperative to provide a system that improves the state of being unchangeable and guarantees the secrecy of transactions in scenarios involving supply chains[42].Blockchain technology can solve supply chain security issues by maintaining integrity, control, and transparency over items, commodities, and their contents. The other subsets provide an analysis of several components of blockchain technology that have explicit or implicit impacts on the supply chain [40].

1) Scalability

Modern global supply chains involve many parties and a lot of fresh, time-sensitive information. Modern supply chain management solutions badly handle this data since there is no unified database[19] Blockchain allows all supply chain participants to join a decentralized database, scaling up. As a result, all network members maintain all supply chain data on a shared ledger, which eliminates single points of failure. For instance, the blockchain ledger makes worldwide communication and information sharing easy for supply chain partners [40].

2) Performance

In the supply chain, products and goods undergo many processes. They often experience human mistakes, fraud, or hardware malfunctions, which lower system performance. Blockchain can represent most activities as electronic transactions [40]. System performance improves with quicker, error-free execution. No matter the location, a smart contract can pay customs parties in minutes. Data correctness, integrity, and secrecy take time in typical supply chain systems, but blockchain may provide these properties automatically. Automatically checking and verifying a receiving party's digital signature throughout a freight's path reduces a system's effort but improves performance.

3) Consensus

Consensus enables data immutability on blockchain networks. The consensus maintains a broad agreement amongst network nodes on all posted transactions [42]. Time stamps, sender and recipient addresses, amount transacted, tags or electronic seals on goods, and others are examples of transaction information [7]. Blockchain technology is special because of consensus processes. Blockchain technologies enable several general agreement techniques depending on ledger access [20]. Many public and private ledgers use proof-of-work, proof-of-stake, realistic Byzantine fault tolerance, evidence of elapsed time, and authority matching [42]. Modern supply chains lack a means to organize and safeguard each product phase, making mistakes, fraud, and ware failure conceivable. Blockchain trust and node general agreement revolve around consensus algorithms and "mining" [19].

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4) Location
Blockchain technology functions and properties are independent of user location. The supplied decentralized network may be shared over the Internet, thus any lawful supply chain stakeholder can participate in a freight's lifetime [19]. Consequently, a blockchain-enabled supply chain network may be even more global compared to a traditional one because businesses and constituents from different areas are selling complex services and products [40]. The supply chain's biggest benefit from blockchain technology's geographical flexibility is time efficiency. Banking across distant nations can impede payment mobility by months, depending on rules and interrelationships [20]. Using cryptocurrencies on a global blockchain network expedites business and payment confirmation to mere minutes [7].

5) Privacy
Blockchains provide privacy in contrast to existing supply chains, where any data may be tampered with. In addition to unchangeable data, blockchain ledgers protect users' privacy. Public blockchains enable users to interpret the distributed ledger using a new address without revealing their true identities. In addition, permissioned and private blockchains can provide complete network anonymity[7], [42] .In a consortium or private blockchain, participants can join anonymously while being authenticated through a supply chain off-chain mechanism. Thus, the supply chain functions while their true identity is shielded from network participants, and they are legal players [20]

6) Cost
As with location, blockchain technology in supply chains reduces costs. Blockchain is an economic supply chain solution since banks are slower at vast-distance transactions than cryptocurrencies [7]. Most operations may be represented as transactions, making supply chain workflow quicker than before. As the extraction will be recorded as a transaction on the distributed ledger, the entire blockchain network can learn within minutes that the extraction of the raw material is complete [42]. Consequently, the subsequent phase is in its inception, as the extraction will be reported as such. The antecedent discussion focuses on aspects of blockchain that influence SC logistics and their respective responsibilities[7], [20].

3.3.2 Voting Systems Challenges by Using Blockchain Technology

Blockchain technology has the potential to address the challenges associated with electronic voting, rendering it a more economically viable, user-friendly, and secure alternative compared to conventional network systems [32]. Over the course of time, scholarly investigations have brought attention to distinct issues, including the necessity for more exploration in the realm of blockchain-based electronic voting as well as the notable technological obstacles associated with such voting systems[33].

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1) Processing Overheads and Scalability
Blockchain works for a few users. In the context of large-scale elections, the utilization of the network leads to a proportional increase in the user base, resulting in escalated transaction costs and time requirements [35] . As blockchain nodes increase, scalability issues worsen. System scalability is already a concern in the election. Integration of electronic voting will affect blockchain-based system scalability [34]. Shading can improve blockchain scaling by parallelizing it. In a traditional blockchain network, all nodes verify transactions and blocks [32].

2) Identifier of the User
In the context of user identification, blockchain technology employs pseudonyms. This particular approach fails to offer comprehensive privacy and confidentiality. The potential for the user's identity to be revealed arises from the public nature of the transactions, which allows for their examination and analysis. The functionality of the blockchain is not optimally aligned with the requirements of national elections.

3) Privacy in Financial Transactions
Blockchain makes transactional anonymity and privacy challenging. Transactional secrecy and anonymity are needed in an election system due to transactions. This requires a non-centralized third-party authority to monitor privacy [32].

4) Efficiency of Energy
The use of energy-intensive procedures, including protocols, peer-to-peer communication, consensus mechanisms, and asymmetrical encryption, is inherent in the functioning of blockchain technology. The implementation of energy-efficient consensus mechanisms is important for the effective functioning of electronic voting systems (EVS) through a blockchain-based approach. The authors of the study proposed alterations to existing peer-to-peer protocols with the aim of enhancing their energy efficiency [35].

5) Immaturity
Blockchain technology represents a paradigm shift towards a decentralized network, signifying a groundbreaking advancement [34]. This innovation possesses the capacity to fundamentally transform enterprises across several dimensions, including strategy, structure, procedures, and culture. The existing instantiation of blockchain has some imperfections. Currently, the technology lacks practical utility and suffers from a dearth of public and professional comprehension, hence impeding the assessment of its prospective value. The current challenges encountered in the implementation of blockchain technology predominantly stem from its relative immaturity [34].

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6) Acceptability
Although blockchain is highly effective in ensuring accuracy and security, it is important to note that people's confidence and trust play crucial roles in the success of blockchain electronic voting. The complexity of blockchain technology may pose challenges in gaining public acceptance for blockchain-based electronic voting [43]. This complexity could potentially hinder the widespread adoption of blockchain-based EVS. We need a comprehensive marketing campaign to raise awareness among people about the advantages of the proposed voting systems. This will help them understand and embrace this innovative technology more easily.

3.3.3 Possible Solutions of Blockchain Technology in Healthcare Centre

1) Global Sharing of Scientific Data
The exchange of healthcare and medical data is a crucial and fundamental measure aimed at enhancing the proficiency of healthcare practitioners and advancing the intelligence of the healthcare system [44] . The exchange of health records has the potential to occur among individuals. As an illustration, consider a scenario where a patient expresses a desire to disclose their medical history to a physician during their initial encounter. Furthermore, the act of sharing can occur between a person and a stakeholder, as exemplified by a patient disclosing their medical information to an insurance company or a research institution. The sharing of data has the potential to extend across international boundaries. Nevertheless, the current operating mechanism of health-related systems has certain limits. One notable constraint is the limited accessibility of patients to their own health records [45] . Consequently, individuals possess limited awareness regarding the dissemination of their personal health information to unfamiliar entities. Blockchain technology has the potential to significantly enhance contact and collaboration between stakeholders in the healthcare business[46]. By facilitating a secure and efficient sharing mechanism for electronic health data, blockchain may effectively contribute to the improvement of this sector. The contribution to blockchain-based healthcare is often regarded as highly significant.

2) Data Management
Many enterprises, especially healthcare institutions, are data-driven, and the volume of data created in this or another age like the IoT is expanding, yet data security and privacy are constantly abused, either purposefully or by unauthorized users. Due to this, numerous institutions have lost significant reputations and wealth. Health data users should have privileges based on their jobs. Blockchain technology enables frictionless access[47]. We list various blockchain technologies designed for this purpose below. The lack of control over uploaded ledgers was addressed by Zhu et al.'s cloud-based blockchain data management system in another study. Their approach includes a trust authority node that lets people stop bad actions even under a majority attack.

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3) Electronic Health Record

Traditional healthcare records are paper-intensive activities, making it difficult to track patient health over time. They also provide inaccurate data, which can lead to patient mistreatment. By implementing EHRs, IT might reduce such work. Physician practices improved treatment quality using electronic health records. EHR also improves disease management and preventative treatment. The digital record approach improves decision-making support and career cooperation. Thus, healthcare professionals are more aware of its importance. Many studies were done to construct blockchain technology to protect, distribute, and store EHR data across other organizations. According to [44], they created a blockchain architecture for medical data exchange using secure cloud storage systems for patients' crucial medical records. This framework manages medical data using a digital archive with owner access control. Cloud encryption under the chain stores this. They used identity-based encryption and signatures to encrypt medical data using digital signs. In addition to blockchain, additional methods maintain medical facility integrity and traceability.

4) Cloud Application Data Storage

Every healthcare blockchain transaction is saved in blocks on decentralized storage. EHRs are the building blocks of a large distributed medical storage system for patient medical data [44] . The latter can be kept on premises or in the cloud for security. Cloud storage is a vast amount of storage made up of several storage devices networked together to support IT infrastructure [48]. Blockchain-based healthcare is an IT infrastructure example. Cloud storage offers rapid transmission, good sharing, storage capacity, low cost, simple access, and dynamic association. Cloud implementation keeps data disseminated and protected under one roof, without third parties. The research examined collaboration and policy enforcement issues between medical professionals, public health agencies, healthcare providers, and governments [45].

5) Management of Enrollment Information

Administrative data from health care plan enrollment, delivery, criteria, and credentialing Most of this data comes from national governments, but we may also use data from small, medium, and large healthcare organizations [48]. Managing such a diversified data set manually involves significant reference, credential, and eligibility checks. Therefore, the procedure is somewhat extended. Administrative support is burdensome, slowing the enrollment process and hindering healthcare efficiency [48]. This information might be recorded on a blockchain to quickly check for reputable references and relevant documents. This might help an administrative assistant streamline enrollment by simplifying procedures, eligibility questions, network administration, and coordination [49].

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6) Security
Due to its relevance to EHR security, blockchain technology has boomed in the health sector. EHRs can enhance healthcare. It is produced when a patient is admitted to a hospital, a doctor diagnoses them, or the EHR stores diagnostic results like MRI scans [48]. Thus, digital data security is paramount, and blockchain is used to protect healthcare data. Blockchain technology helps healthcare data management retain value and reduce storage costs. Blockchain technology is the simplest way to secure digital data, and it will continue to shape organizational data management [49].

4. CONCLUSION

This study demonstrates blockchain technology's prospective usages and implementation solutions for widespread applicability in multiple scenarios. They could also enable larger-scale human progress [49]. Bangladesh can use blockchain in different areas such as supply chain management system, voting system, and health care industry by introducing different polices and regulations One weakness of this study is that it uses only secondary data. Future studies can be done by using primary data so that actual practical scenarios can be understood. The integration of blockchain technology into a future global framework with centralised and decentralised models is intriguing for such a developing country like Bangladesh. Similar to other new technologies, blockchain can first disrupt but also accelerate the establishment of a more complete ecosystem that includes both old and novel methods. In Bangladesh, cash facilitates community factions rather than just gaining and conserving value [50], [51].

The emergence of the blockchain economy has introduced novel perspectives on conducting activities on a broader scale. The concept of centralized models was regarded as a commendable notion during its inception, representing a groundbreaking advancement in human coordination several centuries ago[52]. However, with the advent of the Internet and the emergence of distributed public blockchain ledgers, a novel cultural technology has surfaced. These advancements possess the potential to enable inclusive participation of the entire global population, comprising seven billion individuals, while also facilitating more extensive and intricate coordination [53]. Consequently, these developments hold the promise of expediting our journey towards achieving a genuinely advanced society. If the blockchain industry were not in existence, it is likely that another industry would have emerged to fulfill a similar function. Furthermore, it is highly probable that there will be additional industries that will complement the blockchain industry in the future. The blockchain industry represents one of the initial prominent instances of implementing decentralization models on a significant scale, conceived and executed at a heightened and intricate level of human engagement in Bangladesh [35].

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