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9 Blockchain and Government

Anupama Sharma, Ruchi Gupta, Jitendra Kumar Seth, and Seema Garg

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9.1 INTRODUCTION

Digitization and making a ledger of government data through blockchain is a transformative force in various government operations [1]. Blockchain has the potential to assist various government activities and adoption as the technology is continuously evolving. Blockchain-based government [2] documents help to preserve data, make operations fair, and reject double dealing, while increasing its certitude and accountability. Blockchain-based distributed ledgers for government data represent an efficient way to share resources securely using cryptography. A blockchain-based model constitutionally protects the data of a country's citizens held with the government.

Governments get the following advantages through blockchain-based ledger of government data:

- Unshakable retention of government and wary citizen information
- Government efficiently working without intermediary
- Better law enforcement
- Building of trust between government and citizens
- Lowering extravagant expenditure associated with maintaining accountability
- Decreasing corruption
- Increasing transparency in government operations
- Building trust in online civil systems

Figure 9.1 depicts some of the direct benefits of blockchain in many areas, whether government or other areas. Government also may take benefits of blockchain-assisted emerging technologies, such as IoT and artificial intelligence (AI). A number of government and public sector applications, including digital currency/payments, land registration, identity management, supply chain traceability, healthcare, corporate registration, taxes, and voting can be leveraged to support the distributed ledger format. Thus, government activities can be organized better using blockchain and other emerging technologies to serve the nation. Figure 9.2 represents some of the major roles of blockchain usages for government processes.

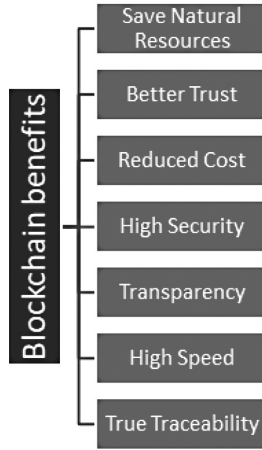


FIGURE 9.1 Benefits of blockchain.

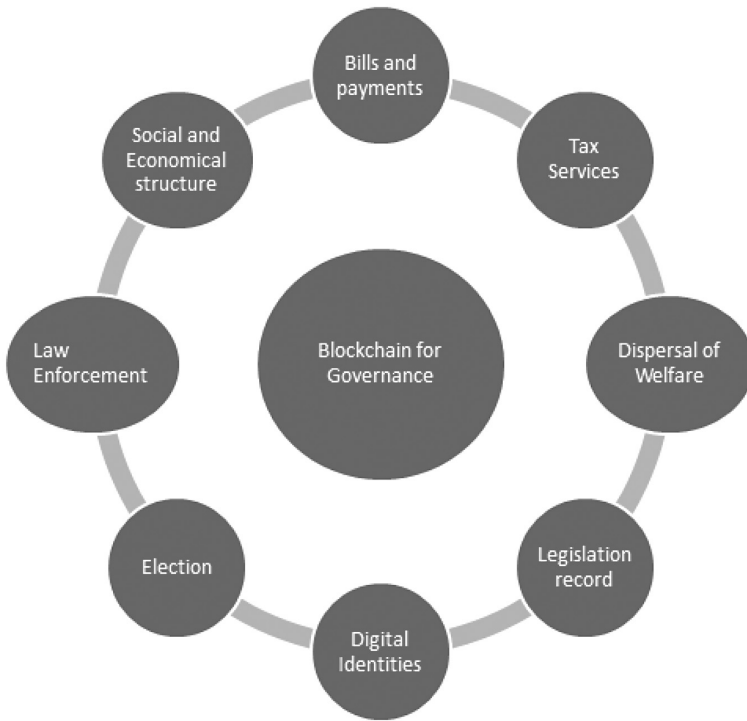


FIGURE 9.2 Blockchain in governance.

9.2 BLOCKCHAIN'S UNIQUE FEATURES

Blockchain technology is made up of some of the technological components which include hash function, cryptographic algorithm, and decentralized network. **Distributed or decentralized** ledger offers evenly distributed power compared to central authorities. These decentralized ledgers are **immutable and auditable**, since immutable means stored data cannot be erased or altered. The hash function is used to avoid alternation in stored data. The cryptographic algorithm which is used in blockchain is a public key cryptography.

9.3 PURPOSE OF BLOCKCHAIN-BASED GOVERNANCE

Adopting block chain technology for government operations will help to begin a cycle of confidence in the judicial and fiscal system that has been lacking in recent years. A few of the domains being affected by blockchain technology are listed below:

- Property Registration
- Identity Administration
- Voting System and Election Process
- Protection of Sensitive Data
- Tracing Supply Chain Management.

The main purpose of blockchain-based governance is to serve the nation better. It may be possible only with building trust of civilians in government activities. True traceability, transparency, identity management, unaltered data on distributed ledger, welfare distribution, handling of tax issues, etc. play an important role managed by blockchain.

9.4 BLOCKCHAIN TECHNOLOGY – THE WAY TO ASSIST THE GOVERNMENT

Blockchain assists government operations to properly manage its key functions. Although blockchain, a decentralized public leader, differs from the governance fundamentals, which are mostly based on centralized public sector units, the incorporation of this technology has the potential to revolutionize the way the government conducts its affairs and make it quick, efficient, and transparent.

The Indian government has announced a spate of projects in recent years that use this revolutionary technology for its e-governance projects. Interest in blockchain has even been shown by state governments. In June 2017, the Andhra Pradesh and Telangana state governments indicated that they were planning to adopt blockchain solutions for land registry, data protection, and KYC (Know Your Customer) records.

Interest in the adoption of blockchain solutions has also been expressed by states like Maharashtra, Gujarat, and Uttar Pradesh. The three key areas listed below are where the inclusion of blockchain in governance can make a fundamental difference to the way the government implements its social agenda.

9.4.1 MAKING THE PROVISION OF WELFARE MORE EFFICIENT

For governments around the world, taking care of the vulnerable and the socially deprived is one of their essential obligations. Welfare schemes, such as old age pensions, scholarships for the disabled, subsidized LPG (liquefied petroleum gas), as well as electricity are the only means of livelihood for the poor and the vulnerable in a country like India, where millions are below the poverty line. Under the Direct Benefit Transfer program, most of these payments can be covered. However, there remains some difficulties in the process, such as fraud, human error, the presence of some applicants who do not have bank accounts, and difficulty prioritizing those who are most in need of government assistance.

9.4.2 TRANSACTION COSTS

These can be reduced significantly with the implementation of blockchain technologies by the government. The chances of fraud, leakages, and human error will be considerably lower as the need for third parties to make transactions and maintain records will be minimized.

9.4.3 LAND REGISTRATION

Vague land titles in India today are a major cause of concern, leading to prolonged litigation. It is possible to make them permanent and tamper-proof by integrating land deeds/records into the blockchain.

9.4.4 FOOD VALUE CHAIN

The government will ensure traceability and accountability in the agricultural supply chain through blockchain technology. It is possible to deal successfully with problems related to unequal pricing, overdue payments, and middlemen.

9.4.5 ENSURING BASIC GOVERNMENT FOUNDATION

In current occasions when the danger of an assault is prominent, it is very feasible for individuals with an odious plan to seize control of basic switches. Accordingly, basic information of government associations and organizations is at risk of being seized. Besides, as innovations are additionally used by rail lines, flood boundaries, energy establishments, and many others, the danger of accidents and assaults to harm property and humans increases. With a dispersed record, it is conceivable to screen the trustworthiness of the product for any unlawful changes. It additionally guarantees that information communicated from frameworks with an IoT isn't altered.

9.4.6 CROP INSURANCE

Blockchain is an ideal stage for regulating crop protection. In its present structure the Pradhan Mantri Fasal Bima Yojana (PMFBY) is managed in bunches. Utilizing the

blockchain arrangement, the public authority can add value addition to its services – for example, transferring warnings and rules concerning harvests and limit yields in each instance. Similarly, the insurance agency can also transfer the rates for all harvests in that bunch, utilizing the expert agreement for the group.

9.4.7 BLOCKCHAIN ECONOMY [3]

Blockchain is capable of implementing transactions in an autonomous model. Decentralized autonomous organizations are governed by smart contracts through blockchain, thus making the whole system quite efficient and economical.

9.5 EXPEDIENCY OF BLOCKCHAIN IN GOVERNANCE

Numerous legislatures around the globe are not designed for accepting digital currency; but they do comprehend the significance of blockchain. The public authorities can use blockchain for multiple tasks to enhance day-to-day performance. The advantages of blockchain in government incorporate the accompanying aspects.

9.5.1 DIGITAL IDENTITY MANAGEMENT [4]

The management of digital identity management is a key plan of blockchain technology to process organizations' personal data and to connect various customers' databases. All these processes are not required to store data by involved individual organizations. Moreover, databases are not to be centralized to connect and be accessed from everywhere.

9.5.2 ELECTIONS ON DISTRIBUTED LEDGERS

Blockchain technology provides secure, distributed, and auditable record keeping. This concept may be used during the process of voting in an election to avoid fraud. Moreover, the counting of votes becomes automatic and provides a straightforward decision without distortion.

9.5.3 BLOCKCHAIN FOR CAPITALIZATION

Financial transactions can be protected through blockchain technology to make them secure. Blockchain-based public ledger may be accessible by members having no rights to modify, thus protecting the transaction data and preventing fraud. The whole of the database will be secured once stored with proper encryption. Financial plans of the government can be maintained without loss of data and this reduces the costs of paperwork. It enhances productivity and provides straightforward outcomes.

9.5.4 TRUST BUILDING [5]

Blockchain-governed applications are currently growing in many sectors like banking and healthcare, due to the resulting improved speed and efficient implementation.

The Pew Research Center indicated that the trust of citizens in the American government is almost at a record-breaking low of 18%. Public trust can be enhanced through the use of blockchain technology.

The arrangements governed by blockchain are straightforward and decentralized. For instance, the administrations of Sweden, Estonia, and Georgia are implementing aspects with blockchain-based land vaults, empowering numerous gatherings to safely hold duplicates of the library. This model could help in rapid resolution of debates over property or forestall them in a transparent manner. At the point when citizens and the government share admittance to records, potential for doubt diminishes. These activities improve the trust of citizens in the government processes.

9.5.5 STRAIGHTFORWARD GOVERNANCE

Government organizations can achieve smoother functioning through using blockchain technology, involving lower repetition, dwindling review problems, and enhanced security. Government authorities may have better coordination over this technology. The GSA FAST_Lane measure framework is used to oversee recommendations from sellers; it currently takes 40 days to deal with an approaching proposition, while by adopting the blockchain the time can be reduced to 10 days. Also, GSA officials feel that expenses have been reduced by approximately 80% by adopting the technology.

9.5.6 TRUE TRACING

Blockchain provides true tracing of merchandise which is not possible with conventional tracing systems. The network of production empowered with blockchain turns out to be very efficient. It deals with various networking issues efficiently and makes further follow-ups quite convenient and realistic.

9.6 CURRENT STATUS OF BLOCKCHAIN USAGE BY GOVERNMENTS

Business landscapes have experienced lots of amendment through blockchain in various countries. The steps toward digitization of the international economy will support the development of economic growth. Several countries are actively working on this concept as briefly described below.

9.6.1 CHINA

M/s Alibaba Incorporated is a huge e-commerce company from China which has built an international reputation and plays an important role in China's economy. If we talk about China's economy, Alibaba uses blockchain for cross-border traceability in its operations. It also provides blockchain as a service (BaaS), where users learn to work with blockchain. BaaS provides a platform for organizations where

they focus on innovation, not on infrastructure. BaaS by Alibaba offers active support for Hyperledger Fabric, Ant Blockchain, and Quorum. Moreover, Alibaba uses blockchain technology for charities also, which is also known as ‘Charities on the Chain’ and comes up with transparency to donors as well as beneficiaries. Immutable records of donations are stored in digital ledgers. Another conglomerate, M/s Tencent Incorporated, is evolving as a logistics platform driven by blockchain by partnering with the China Federation of Logistics and Purchasing. China is becoming a blockchain innovation hub as one of the world’s biggest economies.

9.6.2 DUBAI

With the help of emerging technologies like blockchain and IoT, Dubai is becoming a smart city by working on three areas for strategic efficiency; these are government, industry, and globalized leadership.

They made estimations that blockchain-based operations can save approximately 5.5 billion Dirhams in documentation resources only. Further, those saved resources increase the growth of the economy.

9.6.3 USA

US FDA signed an agreement with the IBM Watson Health branch to use the distributed ledger technology of blockchain to keep track of patients’ data. This partnership has been built to address the transparency as well as security of the data flow process in health organizations.

The previous US government also allowed the Department of Homeland Security in 2018 to adopt an IoT and blockchain technology to protect sensitive border data.

9.6.4 UK

The UK’s FSA has also taken steps toward the adoption of blockchains. Their blockchain-based developments are in the areas of food traceability application through integrated blockchain and land registry market, using this technology to make an efficient buying and selling process and reduced land registration frauds.

The Department of Pensions is also assessing this technology to provide comfort and satisfaction to claimants through the transparent management of their money.

9.6.5 INDIA

The number of blockchain-based projects is growing rapidly in India. Most of the state governments such as Kerala, Andhra Pradesh, and Maharashtra are starting to promote schemes for startups and projects to use blockchain technology. A recent report of the World Intellectual Property Organization envisages India gaining sixth from top place in patents related to blockchain technologies. Blockchain-based applications are ubiquitous; hence fresh explorations are appearing in almost every field, particularly in all the processes of the government.

9.7 BLOCKCHAIN APPLICATION IN GOVERNMENT PROCESSES

Blockchain may be used in various aspects of a political process which helps it acquire a more transparent outlook in the eyes of the citizens. It will also improve the efficient workflow of political decisions. A fair politically based government may have an impact on culture, a country's economy, ethics, social values, happiness index, growth index, and many other aspects. Blockchain creates a platform for policy and decision makers to showcase directly their ideology to citizens and it can foster a strong bond among them, thus maintaining greater confidence of citizens for other stakeholders including politicians (democracies). There follow various activities where government may make use of blockchain technology:

9.7.1 BLOCKCHAIN IN THE ELECTION PROCESS

Blockchain technology provides a platform where citizens may get the opportunity to vote on the distributed ledger. This technology removes the changes of forgery during the voting process and subsequent steps, thus resulting in a transparent selection of their leaders. Moreover, voters' identity will be better protected using this technology by hiding their actual identity. A blockchain-oriented election process can be an efficient and effective process which may enhance the future perspective of good governance.

9.7.2 TRANSPARENT PUBLIC PROCUREMENT

Corruption is one of the main problems of public procurement [6]. The selection of vendors is one of the steps of public procurement which is not transparent to an acceptable level. This process highlights many issues such as financial waste, decreased healthy competition, etc. Moreover, it leaves an impression of being complex and opaque, thus generating disagreements among various groups. With the support of blockchain, governance has a chance to set up a system which resolves the associated risk factors by establishing some tamper-proof transactions and maintaining records through smart contracts [7]. Accountability and transparency will not be hindered with suggested smart contracts.

9.7.3 CORPORATE OWNERSHIP REGISTRY

In many countries, the government has started using blockchain technology to create and use central registries which eliminate forgeries and manipulations. It is expected that possibilities of corruption in various stakeholders, including companies, will be eliminated after using this emerging technology. It will directly impact the vested interests such as money laundering, receiving and sending bribes, and using government resources for unethical usage.

9.7.4 GRANT DISBURSEMENTS

The efficiency of a political party is usually judged through its working culture in various fields, such as the education sector, social work, construction, different levels

of assistance, etc. Blockchain-based implementation of services may increase trust related to the whole of the involved process [8]. This technology has the capability of reducing the intermediaries' involvement in the activities to grant permission and release funds to the real beneficiaries for the relevant activities.

9.8 GOVERNANCE THROUGH BLOCKCHAIN – MAJOR ISSUES AND CHALLENGES

Blockchain technology is widely accepted in every field of work and governments are preparing to take advantage of it [9]. A technology may possess another side to the coin; also the blockchain may have some uncontested issues and challenges. These issues though nascent may hinder the prevailing benefits of blockchain for government activities. Some of such issues and challenges are described briefly as follows:

9.8.1 INITIAL IMPLEMENTATION COST

Initial cost for implementation of blockchain for a particular system requires proper set up for the technology. There may be initial high cost of development of the technology as well as the maintenance cost which have to be borne by the user departments.

9.8.2 NASCENT STATE OF TECHNOLOGY

As blockchain is an emerging technology, there is a lack of awareness about the technology. Even the implementing departments may face human resource constraints while working on this technology. At present the numbers of blockchain developers are meager in the world. The requisite experts of blockchain technology are in short supply, at least in India.

9.8.3 RISK TO PRIVACY AND DATA BREACH

Though blockchain data is secured through the hash function and public key cryptography, there still remain chances of cyber-attack on the public keys.

There are many other issues and challenges in adopting blockchain technology, such as social repercussions of decentralization of the processes, immaturity or poor decision making during blockchain-based governance [10]. However, a closer look highlights the obvious drawbacks of any technological usages, even of blockchain technology. Also, these problems are not specific to the implementation of blockchain for the government. Further, the blockchain technologists are striving to find solutions to associated problems.

9.9 BLOCKCHAIN USE CASE STUDY IN INDIA

In India, the apex policymaker body of central government is called NITI Aayog [11] which has analyzed the impact of implementing blockchain on various government

processes and developed a case study. It has highlighted the presence of many obstacles in the implementation of such systems. Some of the issues are discussed below.

9.9.1 LAND RECORDS

The conventional method of acquiring and maintaining land records and transfer of land ownership is not found to be efficient because many of the departments may be involved in the said process. This involves issues such as land data not being properly recorded in files, poor coordination among various departments resulting in delay in implementation, natural calamities cause lossing of documents, or disputes of ownership on land records. To keep track of land records is a difficult task, making it an inefficient process. Blockchain has been found to be a new way to keep the records on distributed ledgers and transfer of ownership will be easy with this technology. Distributed ledger is immutable and readily auditable, hence, may be efficiently used to record land registries.

The NITI Aayog has found many complexities in adopting this technology for land registry which is a complex process. Major concerns needing to be resolved before transferring the records on distributed ledger are discussed below:

9.9.1.1 High Cost of Litigation

A very large number of disputes have been registered in courts regarding land issues, such as ownership conflicts, title of the properties, cost of the properties. There are many judicial and administrative forums where such unresolved cases are pending. Those needing resolution before getting transferred to blockchain may take more than 10 years to resolve.

9.9.1.2 Establishing Land Ownership

There are many ways to get land ownership; it may be gifted, transferred based on inheritance, purchased, etc. To verify the details of ownership several documents (property tax slips, electricity bills, etc.) are required to be verified. Moreover, all the judicial cases of land ownership need to be completed before transferring to the new system.

9.9.1.3 Asynchronicity of Information

Various agencies are involved in land registries such as Estate and sub registrar offices; hence, many cumbersome pre-processes need to be completed to make a synchronous system.

The NITI Aayog has completed a survey on the use of blockchain-based governance in the Union Territory of Chandigarh, and highlighted the need for the 'digitization' of processes to enhance the usage of existing IT systems. Blockchain features are analyzed, being critical to execute 'smart contracts' and to simplify the involved government processes.

In general, blockchain-enabled systems are able to create immutable records of land ownership. These records are digitally stored for the future with the ability to audit from anywhere and at any time. This technology is highly recommended and is being adopted in governance in many countries.

9.9.2 SUPPLY CHAIN MANAGEMENT FOR PHARMACEUTICAL DRUGS

One of the worldwide issues is related to spurious drugs. The Ministry of Health and Family Welfare in India performed a national drug survey in 2016. WHO has made an estimation on the basis of the national drug survey that 1 out of 10 medicines are fake and this needs immediate attention. Fake drug production is a malpractice which leads to significant risk for patient health.

Numerous benefits have been observed in using blockchain for pharmaceutical supply chain management, as it enhances transparency and reliability of transactions in the pharmaceutical industry. Blockchain allows manufacturers to access real-time data. Moreover, consumers will be able to verify the drug provenance on its purchase.

Thus, major benefits of blockchain are as follows:

- End-to-end optimized tracing of pharmaceutical drugs: Drugs in transition may be tracked at any point of shipment through blockchain. True tracing is required to fulfill business commitments.
- Enhanced accountability through transparency: This facilitates the efficient management of inventory and allows batch reminders which are required for patient health safety.

Blockchain technology will be able to remove the dependency of intermediate agents in the drug supply chain. Efficient supply chain management with quality control will enhance the reputation of this industry.

The case study [11] of using blockchain by the NITI Aayog includes many other issues and suggested some solutions such as digital identity management through blockchain to remove fraud in educational certifications, blockchain for legal platforms, blockchain for insurance, blockchain for organic farming, blockchain for energy trading.

9.10 BLOCKCHAIN AND GOVERNMENT – FUTURE GOVERNANCE

Blockchain technology has much potential to establish a fruitful political system which may remove the loopholes of the current system [12]. The efficient use of national resources will be implemented and tracked transparently through blockchain-based distributed ledger technology. Smart contract will streamline the vendor selection process without any fraud and involvement of vested interests.

Blockchain-based governance is expected to be totally transparent and accessible to civilians too. The major change will be toward a transparent process, since distribution and utilization of government funds can be analyzed by the stakeholders in the system.

9.11 CONCLUSION

Blockchain and governance is a big milestone to achieve, particularly in developing countries. Governments of developed countries, namely the USA, have already taken

steps toward implementing emerging technology to take its flavor in various activities and processes of governance.

Major outcomes of blockchain technology-assisted governance are transparent processes to gain better trust of citizens, fast and efficient execution of government processes, law enforcement, and procurement, to name a few. Government assets can be traced properly through blockchain-based distributed ledgers. The systematic organization of various government departments is possible under blockchain-based governance. The government is responsible for maintaining a social, ethical, secure, and progressive environment for civilians. Blockchain-based governance will be better able to maintain such a secure environment and evenly prioritized processes for the betterment of country people. Blockchain-based governance is the future governance to bring about a revolution in politics. Politics without any fraud and unethical steps will be possible through this technological change. All third-party involvement for their interests in various political matters will be removed. Political leaders who want to serve the nation will get a platform to work fear-free. Their decisions and fair execution will be visible to everybody on public ledger. Smart contracts play an important role in removing forgery from various procurement processes. Blockchain-based government is the only way to serve the nation in an efficient manner where natural resources are saved while enhancing different activities. It will become a game changer for future generations to bring efficient governance and that is the requirement of current self-disciplined societies.

REFERENCES

- [1] Arruñada, B., & Garicano, L. (2018). Blockchain: The birth of decentralized governance. *Pompeu Fabra University, Economics and Business Working Paper Series, 1608*.
- [2] De Filippi, P., & McMullen, G. (2018). *Governance of blockchain systems: Governance of and by Distributed Infrastructure* (Doctoral dissertation, Blockchain Research Institute and COALA).
- [3] Beck, R., Müller-Bloch, C., & King, J. L. (2018). Governance in the blockchain economy: A framework and research agenda. *Journal of the Association for Information Systems, 19*(10), 1.
- [4] Lesavre, L., Varin, P., Mell, P., Davidson, M., & Shook, J. (2019). A taxonomic approach to understanding emerging blockchain identity management systems. *arXiv preprint arXiv:1908.00929*.
- [5] De Filippi, P., Mannan, M., & Reijers, W. (2020). Blockchain as a confidence machine: The problem of trust & challenges of governance. *Technology in Society, 62*, 101284.
- [6] AlShamsi, M., Salloum, S. A., Alshurideh, M., & Abdallah, S. (2021). Artificial intelligence and blockchain for transparency in governance. In *Artificial Intelligence for Sustainable Development: Theory, Practice and Future Applications* (pp. 219–230). Springer, Cham.
- [7] Murray, A., Kuban, S., Josefy, M., & Anderson, J. (2019). Contracting in the smart era: The implications of blockchain and decentralized autonomous organizations for contracting and corporate governance. *Academy of Management Perspectives*, (ja).
- [8] Paech, P. (2017). The governance of blockchain financial networks. *The Modern Law Review, 80*(6), 1073–1110.
- [9] Rikken, O., Janssen, M., & Kwee, Z. (2019). Governance challenges of blockchain and decentralized autonomous organizations. *Information Polity, 24*(4), 397–417.

- [10] Ziolkowski, R., Miscione, G., & Schwabe, G. (2020). Decision problems in blockchain governance: Old wine in new bottles or walking in someone else's shoes?. *Journal of Management Information Systems*, 37(2), 316–348.
- [11] https://niti.gov.in/sites/default/files/2020-01/Blockchain_The_India_Strategy_Part_I.pdf
- [12] Katina, P. F., Keating, C. B., Sisti, J. A., & Gheorghe, A. V. (2019). Blockchain governance. *International Journal of Critical Infrastructures*, 15(2), 121–135.