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Studying Existing Applications and Challenges in the Field of Blockchain Technology and Governance

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ABSTRACT

A new approach to managing nations is necessary in light of the information age's rise, growing bureaucratic and political obstacles, and concerns over data privacy. Blockchain is only one of these advances. The blockchain alters how people see government and statehood. A field review research is carried out by assessing the impact of this technology on the quality of governance, utilizing a content analysis approach, and employing MAXQDA10 software in order to look at the applications and problems in the area of blockchain technology and governance. The difficulties and, ultimately, the future of governance, government, and its stakeholders are also made clear along the way. The categorization of attitudes is the outcome of reviewing (31) chosen articles. The chosen publications characterized blockchain-based governance as distributed, decentralized, network-based, and occasionally combined with traditional democratic governance. It is impossible to fully and correctly identify and characterize the traits, components, or even the direction toward good governance since this governance is currently in flux and lacks a foundation for its guiding principles. Therefore, it takes more time and in-depth investigation to clearly demonstrate the benefits and drawbacks. There is no definite and well-supported answer to define future governance taking the abolition of the current governance into account, even though many upcoming challenges, dangers, and requirements proposed by researchers, some of which were discovered and introduced, make the path and channels more specific. This is because, as a result of the change in governance structure, the needs and potential risks that have already been identified and established are compliant with the government's and governance's present structures. Certain demands, suggestions, hazards, and difficulties for unforeseen future structures with their unique features cannot be properly addressed.

Keywords: Blockchain technology, good governance, content analysis method, selected articles

INTRODUCTION

Blockchain is a distributed ledger technology that offers a technique to increase system transparency by making all system interactions visible as a series of transactions. Every nation or business today needs efficient and effective governance, which not only addresses immediate issues but also lays out a clear course for future growth and development. Advanced nations are always seeking technology fixes for their everyday issues. Generally speaking, the core of blockchain technology enables citizens to enhance governance processes by tending to follow



the path of good governance, respect for freedom, equality, openness, accountability, and a clear vision for the public good. To put it another way, this technology opens up new possibilities with "the potential to get around current governance failures."

According to Flament et al. (2016), initiatives should be created to improve the elements of good governance. It is simple to argue that the secure uploading of data to the blockchain makes the governance system visible, accountable, and fair when considering the tenets of good governance. We may single out the implementation of electronic voting using blockchain technology as one of these initiatives. This initiative reduces corruption and enhances transparency. Additionally, this technology enhances the current tax system, eliminates tax evasion, and encourages good governance through the use of smart contracts. Conceptually and practically speaking, good governance has changed. In the course of globalization and the expansion of communication flow, the concept of good governance, which in the classical model of government largely depended on the will of governments and codified political and social laws, has a new tool; which, more than any other time, has made it possible to achieve it in the horizon of human political and social life. The government and its instruments of governance are no longer the only ones that can be employed to accomplish good governance as a result of the transition in these tools (Sultaninejad and Gudarzi, 2017).

The heart of blockchain technology is to follow the path of good governance, respect for freedom, equality, openness, accountability, and a clear vision for the public good, according to Wright and DeFilippi (2015), enabling citizens to enhance governmental procedures. To put it another way, this technology opens up fresh possibilities with "the potential to get around current governance failures." Because of the unique characteristics of this technology, it has been determined that governance without rulers is a paradoxical theory that is evident in the emergence of governance issues in the case of systems based on blockchain technology (Ziolowski et al., 2018), and it may not always be advantageous for the economy and society. It is important to take into account the new chances for corruption that this developing technology presents since, like other technologies, blockchain may be utilized for good or ill, for or against growth (Adam and Fazkas, 2018). Based on this, the purpose of this thesis is to look at the uses and difficulties associated with governance and blockchain technology.

Risks and Challenges of blockchain technology governance

Both advocates and detractors of blockchain technology have different perspectives on the benefits and drawbacks of the technology. In this approach, the majority of proponents emphasize the decentralized government aspect, while detractors emphasize the difficulties and drawbacks. Processing power (Swan, 2015), confirmation delay (Swan, 2015), size and bandwidth (Swan, 2015), security and privacy (Swan, 2015), software bugs, the emergence of computers, quantum, the amount of energy required for the process, used for cybercrimes and illegal purposes of money laundering, buying drugs, financing terrorism and gambling (Chavez-Dreyfus, 2018), the possibility of collapse and the severe consequences of governance, following it (Swan, 2015), and topics related to the Internet and its connection (Depon and Maurer, 2015) are some of the technical challenges of blockchain technology. The widespread use of cryptocurrencies makes government monetary policies ineffectual (Wright and DeFilippi, 2015), automation restricts people's freedom, and there are other issues.



According to researchers like Etzuri (2015), the decentralized government is not ideal since it substitutes individual will for the general will. The government is responsible for ensuring fundamental rights. The human element is a fundamental requirement in the fields of governance and politics, and he further asserts that algorithms and rules are not appropriate for politics since politics is an art that derives from the area of human ethics. Blockchain computer code will function as a type of (technology) in the absence of higher authority, shaping the actions and goals of its users in significant but frequently unstated ways (Scott, 2016). Other scholars, like Bettinger (2018), view issues like the absence of standardization in decentralized systems as crucial and identify it as the weak point of this form of governance.

People like Jia (2016) assert that attaining decentralization is highly challenging and that the degree of decentralization is the primary determinant of the complexity of technology governance. The more independent nodes that are running in the system, and the more secure the system is, the higher the degree of decentralization, which carries with it issues like difficult development and scalability. There are suggestions that the mix of centralized and decentralized components is what blockchain programs should aim toward in the future (Bettinger, 2018).

It must be recognized that technical-social mechanisms alone cannot ensure the stability and governance of the autonomous government. Every technology will inevitably face challenges. It is likely to expand and adapt in unanticipated ways because of the social, cultural, and political demands of the environment in which they operate (DeFilippi and Lovelock, 2016).

Method

From a data viewpoint, the study's research technique is qualitative. Up until the end of 2020, all publications published in English and Farsi dealing with good governance and blockchain technology are included in this study. The experiences of other nations in this area, which were chosen from the search results of the second phase, are also evaluated in a separate table and discussion. As a result, these works are also included in the research community. Finally, the chosen articles are subjected to a combined oriented and traditional qualitative content analysis process in MAXQDA10 software. For the present research, the prism diagram is developed and drawn anew with a few small alterations.



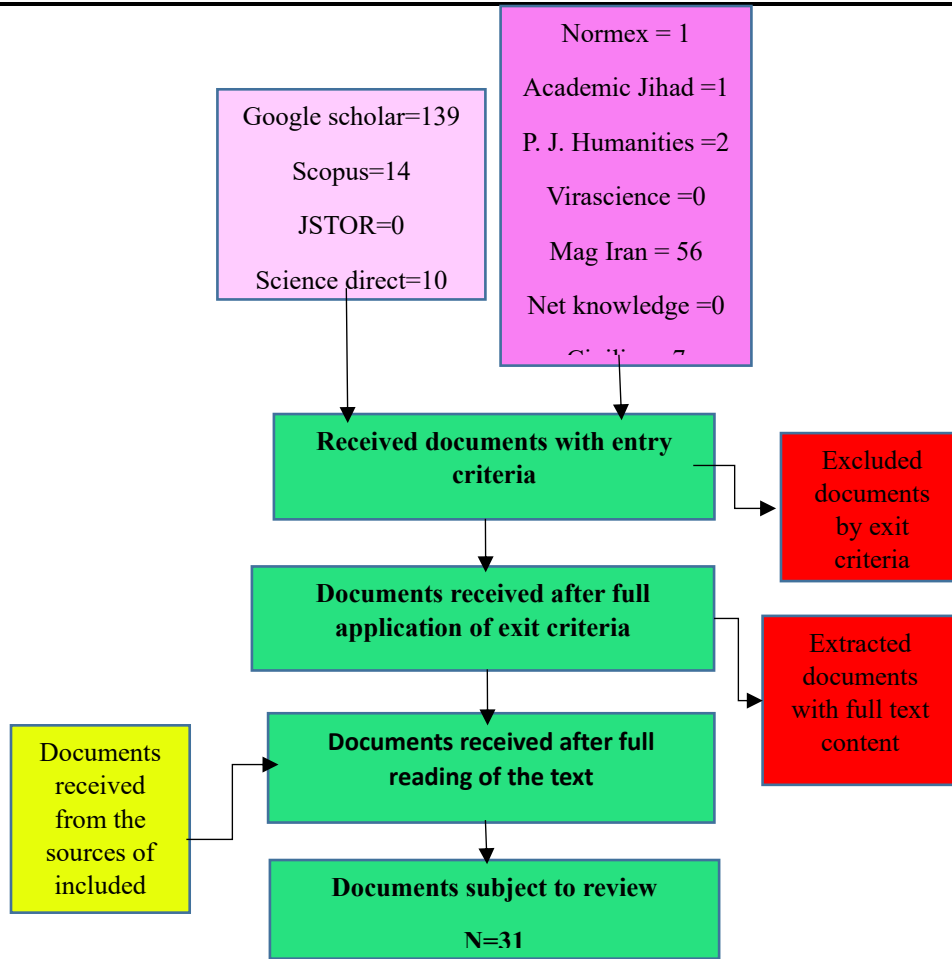


Figure 1. Prism flowchart of the current research

According to Prisma's flowchart, the articles to be evaluated are chosen by applying the entrance and exit criteria of the study of selected articles and adding sources that satisfy the requirements for entry into the research. The "Results Chart" field overview provides information about the data extraction.

It is important to explain the reasoning behind the admission and departure criteria.

- "Entry criteria": Up to the most recent papers published in 2020, this research comprises scientific-research publications in Farsi and English in the fields of good governance and blockchain technology.

- "Exclusion criteria": works published after 2020, in languages other than Farsi and English, as well as theses, conference papers, reports, books, and gray writings are all excluded from the study.

Only Persian and English studies are examined because they are the focus of this research and are at the master's thesis level.

Applications of blockchain technology

Due to decentralization and liberalization, blockchain technology will not only be used in the commercial sector to develop (Myung and Jung, 2019). As a result, the applications that are now being used in blockchain governance and government are diverse in character, as seen in the

table below. To fully analyze each article and extract applications and applications connected to blockchain technology, this table is constructed using the text of the articles that were chosen. To be more specific, each of these applications is given its own category even if they can all overlap with one another and be classified under the same heading.

Table 1. Applications of blockchain

Applications and uses	Articles	Number
Smart contract	{1}, {2}, {4}, {5}, {6}, {7}, {8}, {10}, {12}, {13}, {15}, {16}, {17}, {19}, {21}, {23}, {24}, {26}, {27}, {28}, {29}, {30}, {31}	23
Smart asset and blockchain tokens (tokens)	{1}, {3}, {4}, {5}, {6}, {7}, {8}, {9}, {10}, {12}, {19}, {20}, {26}, {29}, {30}, {31}	16
Decentralized voting system	{1}, {2}, {3}, {4}, {5}, {6}, {7}, {12}, {14}, {15}, {16}, {17}, {18}, {19}, {20}, {21}, {22}, {23}, {24}, {26}, {27}, {31}	22
Decentralized autonomous organizations/communities/companies	{1}, {4}, {7}, {11}, {12}, {13}, {14}, {22}, {26}, {27}, {29}, {30}	12
supply chain	{2}, {8}, {10}, {11}, {13}, {18}, {19}, {20}, {21}, {24}, {28}, {30}, {31}	13
Digital identity	{1}, {2}, {3}, {5}, {6}, {8}, {12}, {16}, {17}, {18}, {19}, {20}, {22}, {23}, {24}, {29}, {30}, {31}	18
Health and medical records	{1}, {2}, {3}, {5}, {7}, {8}, {10}, {14}, {15}, {16}, {17}, {19}, {20}, {23}, {24}, {26}	16
Water management	{2}	1
Registration of businesses and trademarks	{3}, {6}, {7}, {17}, {26}	5
Diamond trade	{3}	1
Title transfer	{3}	1
Registering and securing government documents	{3}, {5}, {8}, {10}, {11}, {12}, {22}, {23}, {24}, {26}, {29}, {31}	12
Receiving pensioners	{3}, {5}, {11}, {23}, {30}	5
Registration and storage of intergovernmental documents	{3}, {8}	2
Registration and transfer of land, real estate, and real estate	{1}, {3}, {4}, {5}, {6}, {7}, {10}, {11}, {12}, {15}, {16}, {17}, {18}, {19}, {20}, {21}, {23}, {29}, {31}	19
Smart City	{5}, {14}, {15}, {18}, {23}	5
stock exchange	{2}, {5}, {7}, {12}, {14}, {18}, {23}, {26}, {28}	9
Record of judicial decisions	{2}, {6}, {20}, {22}, {25}	5



Applications and uses	Articles	Number
Funding projects and tracking money	{6}, {9}, {11}, {19}, {22}, {28}, {29}	7
Controlling the war and its attacks	{3}	1
Customs, passport, and immigration	{6}, {11}, {26}, {28}, {29}	5
Criminal records and the decentralized legal system	{2}, {3}, {4}, {6}, {7}, {18}, {19}, {20}, {22}, {25}, {31}	11
Tax records and their collection	{1}, {3}, {6}, {7}, {8}, {10}, {11}, {12}, {13}, {17}, {22}, {23}, {30}	13
Car ownership and control transfer	{3}, {4}, {6}, {7}, {20}	5
Permission to hold mass events	{6}, {7}, {29}	3
Management without a government manager	{6}, {26}	2
Transnational economic and global payment system	{1}, {2}, {3}, {7}, {8}, {10}, {12}, {18}, {19}, {21}, {22}, {28}, {29}, {30}	14
Internet of Things	{3}, {4}, {7}, {10}, {15}, {18}, {19}, {20}, {24}, {29}, {30}, {31}	12
Patent	{7}, {20}	2
copyright	{7}, {14}, {25}	3
insurance industry	{4}, {7}, {15}, {18}, {26}, {28}, {29}	7
Receiving and paying loans	{7}, {10}, {23}	3
Intellectual Property	{4}, {7}, {17}, {18}, {20}, {28}, {31}	7
compensation for every type of right holder	{3}, {7}, {26}	3
Online payments	{7}, {19}, {23}	3
agriculture	{7}, {18}, {20}, {24}, {29}, {30}, {31}	7
Municipality	{6}, {7}	2
Controlling daily behavior (diet, exercise, etc.)	{7}, {26}, {30}	3
Distribution of wealth and prosperity	{7}, {8}, {10}, {17}, {23}, {26}, {28}, {29}, {31}	9
electronic government	{6}, {8}, {10}, {14}, {18}, {19}, {23}	7
Artificial intelligence	{10}, {30}	2
digital signature	{10}, {17}, {19}, {22}, {24}, {26}, {30}	7
Privacy and civil rights	{3}, {8}, {10}, {12}, {15}	5
Banking	{2}, {4}, {6}, {7}, {10}, {12}, {14}, {18}, {22}, {26}, {28}, {29}, {31}	13



Applications and uses	Articles	Number
Business services and e-commerce	{7}, {11}, {18}, {20}, {21}, {28}, {31}	7
Identifying and controlling criminal and illegal activities (cyber and non-cyber)	{2}, {3}, {7}, {11}, {14}, {16}, {18}, {19}, {21}, {22}, {25}, {26}, {28}, {30}, {31}	15
Blockchain-based crowdfunding approach: Initial Coin Offering: ICO	{2}, {11}, {30}	3
Energy production, distribution, and sharing	{6}, {11}, {15}, {16}, {30}, {31}	6
Environmental sustainability	{13}	1
Security and prevention of information hacking	{14}, {20}	2
Preventing information monopoly and censorship	{14}, {31}	2
Government budgeting	{14}, {18}	2
Education and academic affairs	{1}, {6}, {15}, {17}, {18}, {20}, {22}, {24}, {31}	9
Transportation of goods and passengers	{3}, {15}, {20}, {23}, {24}, {26}, {28}, {31}	8
Smart public tender	{16}, {19}, {20}, {22}	4
Private investment fund	{18}	1
Aviation industry	{3}, {18}, {19}, {26}	4
Forensics and electronic evidence	{18}, {25}	2
Shared economy	{9}, {18}, {29}	3
Auditing and Accounting	{4}, {6}, {7}, {11}, {18}, {19}, {23}, {28}	8
Research	{18}	1
Art and music	{6}, {7}, {19}, {26}, {29}	5
Sport	{19}	1
tourism industry	{19}, {23}	2
Electronic governance	{19}, {20}, {23}	3
Reputation management	{20}, {30}	2
Civil registration and marriage registration	{1}, {4}, {6}, {20}	4
Defense affairs of the country	{20}	1
Postal service	{21}	1
Foreign investment	{21}	1
Recruitment services	{22}	1
Certificate	{1}, {6}, {29}	3



Applications and uses	Articles	Number
security forces	{3}, {6}, {26}, {30}	4
Maritime and shipping industry	{28}	1
Hotel management	{7}	1

The decentralized voting system and smart contracts have clearly been the most often mentioned applications and uses of the blockchain in publications, as seen in the aforementioned table.

Challenges, disadvantages, and Risks of implementing blockchain technology

How far are decentralized government services and a government powered by blockchain technology feasible? Is it feasible to "put a nation on the blockchain" without using government records, financial ledgers, or human notaries? As a distributed ledger, the blockchain unquestionably possesses important characteristics including efficacy, affordability, irreversibility, transparency, controllability, and resistance to censorship. But there are a number of unknowns with the plan to decentralize government functions using open, permissionless blockchain technology (Azzuri, 2015, quoted in Swann, 2015). The difficulties, dangers, and drawbacks of using modern technology for governance, even replacing the government, are therefore covered in the table below. The solutions that the chosen articles offer to address these issues are also described in this table so that future issues can be solved by depending on them.

Table 2. Challenges, disadvantages, and Risks of Blockchain

Challenges, disadvantages, and risks	article number
Speculative nature	{1}, {10}, {18}, {30}
Connection	{1}, {18}
Fatal engineering mistakes	{1}
Elliptic encryption curve	{1}
Tendency towards concentration	{1}, {7}, {9}, {10}, {13}, {25}
Raising the technical elite	{1}, {4}, {18}, {26}, {30}
Choosing leaders	{1}, {19}, {26}
Social and economic costs	{1}, {16}, {18}, {20}, {25}, {26}, {28}, {31}
Algorithm forcing	{5}, {7}
Processing speed	{5}, {6}, {10}, {16}, {17}, {18}, {20}, {31}
inflexibility	{6}, {16}, {24}, {26}
Identity control	{6}, {7}
Non-realization of benefits	{6}
Difficult use of blockchain in practice	{6}, {10}, {16}



Challenges, disadvantages, and risks	article number
Difficult control and regulation of decentralized programs and organizations	{7}
Trade in illegal products	{7}
Regulatory challenges	{7}, {10}, {11}, {18}
Criminal and illegal activities	{7}, {8}, {11}, {12}, {16},
Smart property problems	{21}, {24}, {30}
Abuse of government power	{7}
The tension between the government and the blockchain	{7}, {30}
Lack of clarity and uncertainty in blockchain terminology	{8}
A fragmented ecosystem	{8}
Privacy and security	{8}
individualism	{8}, {10}, {12}, {13}, {17},
Existence of irrelevant data	{21}, {30}
Non-compliance with the law	{10}, {17}, {28}
Escape from conventional law	{11}, {28}
Can be hacked and attacked	{4}, {11}, {14}, {18}, {22}, {26}, {31}
Lack of responsibility in the software	{11}, {20}, {21}
High fluctuations in the value of cryptocurrencies	{12}
environmental issues	{13}
High energy consumption	{16}, {18}, {26}, {28}, {31}
Obstacles of bureaucracy	{17}, {21}
Synonymous with blockchain and cryptocurrency	{18}



Challenges, disadvantages, and risks	article number
Low awareness and education	{18}
Network power	{18}, {31}
Size and bandwidth	{18}, {31}
Lack of proof in the entire process of production and joining the chain of evidence	{25}
Creating links between arenas	{28}
Cyber and physical	{28}
Non-participation of all activists	{29}
Wrong display of the blockchain	{31}



- ❖ Speculative nature: Because of its speculative character, private interests and erratic market dynamics, such as fluctuating prices and unclear mining profitability, put public records and basic rights at risk (Azzuri, 2015).
- ❖ Connection: The connection alone determines what information is stored in the blockchain. As a result, these contracts cannot be archived or enforced if the electronic network is down (Azzuri, 2015, quoted in Depont and Maurer, 2015).
- ❖ Gross engineering mistakes: Gross technical errors include too rapid depreciation of profitability for current equipment, enormous expenditures in hashing infrastructure, lack of trustworthy data on transaction volumes, and irrational investor expectations, among others (Azzuri, 2015, cited by Courtois, 2014).
- ❖ Elliptic Curve Cryptography: According to Azzuri (2015), referenced in Bose, Halderman, Moore, Henninger, Nahrig et al. (2014), software problems, poor key generation, weak stochastic signatures, and inadequate entropy are the main weaknesses associated with usage of elliptic curve cryptography (ECC). For example, elliptic curve encryption is not quantum-safe and might be broken at any time by the development of quantum computers (Azzuri, 2015).

A) article "1" proposes a clear and formal procedure of legitimization to avoid the emergence of private powers in public activities.

- ❖ Centrifugal: Centrifugal forces and the potential for networks to be dependent on private oligarchies, such as mining firms, that may easily complete stock market mergers and acquire substantial amounts of power on a worldwide scale (Azzuri, 2015). While the Internet has helped democratize markets and liberate information, it is also assisting in the transformation of many of the centralized institutions that predated the advent of the digital age. Governments and huge enterprises have

- expanded in this fashion because they make use of the Internet's untapped capacity for dissemination.
- ❖ Raising the technical elite: Startup founders, leading scientists, managers, and other well-known individuals have a significant influence on society and associated issues. Because of their technological expertise, this select group develops into actual leaders who influence how the sector should develop. The network policy is likewise directed by this group (Azzuri, 2015).
 - ❖ Selection of leaders: There is empirical evidence that no technology can change "a vertical relationship of governance into a horizontal one" (Azzuri, 2015, quoted in Van Dyck & Winters van Beek, 2009), in spite of any utopian perspective of the distribution of authority in society based on blockchain technology.
 - ❖ In any civilization, there will be a mix of centralization, decentralization, and power struggle. Electing leaders through legal channels and setting open, accountable methods to limit their power are problems that persist regardless of technology. A problem that blockchain governance fails to address while promising a more advanced and universal social level (Azzuri, 2015).
- O) A legitimate self-governing identity must be established in order to advance the democratic process.

- ❖ Social and economic costs: There will always be significant social and economic consequences associated with transferring authority from the public to the private sector (Azzuri, 2015). For instance, maintaining it will be quite expensive (Zbinden and Kandova, 2019). It is crucial to remember that cost-effectiveness has not yet been established since it is uncertain what the blockchain's investment-to-return ratio is (Jimoh et al., 2019).

The public chain has a relatively high operational cost, which lowers its economic efficiency (Wu and Zheng, 2020).

N) Weu and Zheng (2020) propose the usage of a consortium chain to address the issue of inefficiency brought on by high expenses in the public blockchain.

- ❖ Algorithm coercion: One may argue that technology is a constraining force that restricts people's actions. An executive constraint that explicitly restricts how people behave and interact with these technologies makes up the program that implements the algorithm rather than simply being a collection of strings written in the software language (Myung Sun, 2018). According to Wright and DeFilippi (2015), as automation rises, personal liberties will also decline.
- ❖ Processing speed: Ethereum can only execute transactions at a maximum rate of nine times per second, but Bitcoin can process transactions four times per second. Extending the usage of blockchain technology without enhancing processing performance is challenging.

(B) Fortunately, a number of algorithms have been created to dramatically enhance the blockchain's performance. As a result, the time problem may be resolved. In the research by Olens et al. (2017), it is suggested that other potential developments such as side chains and drive chains can aid in resolving this problem.



- ❖ Inflexibility: The fact that distributed solutions, like blockchain, are substantially less effective than conventional centralized database systems should be emphasized. They cannot readily be modified and are challenging to grow to larger capacities. It, therefore, results in less flexibility. This prevents wrongly entered data from being removed or modified (Razzaq et al., 2019).
- ❖ Identity control: Identity management is a key component of many government operations.

B) Olens et al. (2017) propose connecting the blockchain with identity management systems to address this issue.

- ❖ Failure to achieve benefits: There are several benefits associated with the blockchain. Many of them might not even be blockchain-related or even blockchain-specific, and occasionally even the advantages are legendary.

D) According to Olens et al.'s (2017) study, whether the advantages are achieved or not relies on blockchain applications, their governance, and the social and institutional contexts of their use. To answer this problem, these three factors must be taken into account.

- ❖ The difficult use of the blockchain in practice: Olens et al. (2017) note that while blockchain proponents portray this technology as a panacea for almost any information-related issue, the actual application is more challenging. Of course, from Azzurri's (2018) point of view, blockchain technology is portrayed as being more developed than it actually is.

E) In order to address the aforementioned issue, the writers of this paper claim that the technology-based character can be attributed to a lack of technical sophistication and a lack of understanding of its potential. A shift from a technology-based approach to a needs-based one should occur as the process matures. This strategy should take social issues and public values into account, and blockchain architecture and e-government apps should be created in accordance with new governance models. It can be simply one part of the blockchain in this area.

- ❖ Difficult to control and regulate decentralized applications and organizations: Controlling and regulating decentralized organizations and blockchain-based decentralized apps is increasingly challenging for governments. For instance, Wright and DeFilippi (2015) cite digital currencies and the associated challenging implementation of monetary policy.
- ❖ Trade in illegal products: According to Wright and DeFilippi (2015), the government has attempted to stop the flow of illegal narcotics and other items by going after the middlemen who handle the products. A decentralized autonomous organization can be developed and unleashed to assist the transaction of illegal or forbidden items by replacing human skills.
- ❖ Regulatory challenges: Blockchain technology's quasi-anonymity presents substantial regulatory issues, and its broad adoption may make it more difficult for law enforcement to identify and stop illicit activity (Wright and DeFilippi, 2015).
- ❖ Criminal and illegal activities: Blockchain-based technology lowers barriers to crime and improves the efficiency of online gambling companies and other similar businesses (Wright and DeFilippi, 2015). Additionally, this technology aids terrorist groups in



obtaining money and evading precise surveillance (Rueda et al., 2020). Cryptocurrencies like Bitcoin facilitate the anonymous generation, transfer, and laundering of criminal funds (Razzaq et al., 2019).

I) According to Aristide and Marco (2019), the lawful blockchain's effectiveness can prevent or reduce the occurrence of illicit operations.

In response to this issue, Razak et al. (2019), citing Bartoletti and Livio (2017), suggest two solutions:

1) Training of the Anti-Money Laundering Working Group

2) Prohibition of cryptocurrencies

- ❖ The problems of smart property: The development and widespread use of smart properties also bring forth fresh difficulties that are difficult to resolve within the existing legal framework. For instance, a person who is the technological owner of intellectual property (as opposed to the legal owner) has complete control over this resource, which cannot be used by anybody unless expressly authorized by the Code (Wright and DeFilippi, 2015).
- ❖ Abuse of government power: Wright and DeFilippi (2015) raise the concern that governments and other government actors could enact harsh regulations to manage the developing internet environment and the blockchain ecosystem. This will lead to a flagrant misuse of government authority, and many of these strategies will stop the economic benefits that technology can provide.
- ❖ The tension between the government and blockchain: The centralized character of governments and the decentralized nature of the blockchain, according to Aristide and Marco (2019), are in stark contrast. For this reason, blockchain's decentralization is what gives it its greatest allure. The article's main concern is the inherent risk that the blockchain will be used in a way that does not enhance transactions and processes, does not foster efficiency and transparency, and will instead result from governments moving away from public blockchains and toward private permissioned blockchains.
- ❖ Lack of clarity and uncertainty in blockchain terms: Aristido and Marco (2019) state that a significant obstacle hindering the application of the blockchain is the lack of precision and confusion in the fundamental concepts.

F) According to Aristido and Marco (2019), the creation of standards will help to address this lack of clarity.

- ❖ Fragmented ecosystem: According to Aristido and Marco (2019), "a big danger will develop due to a non-standard blockchain environment, leading to a fragmented ecosystem, with the formation of multiple private blockchain systems that follow their own laws and protocols. Blockchain systems won't be able to connect with one another in this scenario.

G) According to Aristido and Marco (2019), the fragmentation issue can be resolved through the establishment of standards with the primary objective of ensuring system compatibility.

- ❖ Privacy and security: Aristido and Marco (2019) assert that human factors have a role in security difficulties with the blockchain and Azzurri (2018) asserts that searches of the workplace can reveal transactions in the public blockchain.



H) A certain level of standardization is required to ensure the safety and security of the keys used for cryptographic operations as well as the protection and non-tampering of data due to privacy and integrity (Aristido and Marco, 2019). Additionally, separate addresses can be used for receiving and transmitting in order to guarantee privacy (Azuri, 2018, quoted by Nakamoto, 2008).

- ❖ Individualism: The adoption of blockchain-based networks is incompatible with the collaborative economy, and these platforms limit people's ability to establish meaningful social bonds and interpersonal interactions (DeFilippi, 2019).
- ❖ Existence of irrelevant data: Due to their versatility, open blockchains process a large quantity of data (Azzuri, 2018, quoted in Greenspan, 2015). A key issue is that the blockchain cannot stop the introduction of unnecessary data and incorrect information, which is another limitation (Rohani et al., 2019). O) To address this issue, Rouhani et al. (2019) propose the existence of an observer to confirm the accuracy of the data.
- ❖ Non-compliance with the law: It is highly challenging for open networks to police the law since they are regulated by their own codes independent of geographical boundaries (Azzuri, 2018, quoted by the Office of State Science, 2016).
- ❖ Escaping from conventional law: The willful avoidance of legal and regulatory requirements, which endangers the public interest and the rule of law, is another problem (Yung, 2019).

J) To safeguard the public interest and the rule of law, J. Jung (2019) advises a re-evaluation and ongoing re-evaluation of measures to address such blockchain concerns.

- ❖ Hackability: One of the unsettling elements that might potentially compromise blockchain technology is quantum computing (Myung and Jung, 2019).
- ❖ Lack of responsibility in the software: Operational hazards are a result of the blockchain's decentralization. In that, nobody is in charge of running and maintaining the blockchain software (Yung, 2019). Therefore, it is crucial to answer the question of where and how to keep blockchain-based records (Navadkar et al., 2018).
- ❖ High fluctuations in the value of cryptocurrencies: According to Rueda et al. (2020), the decentralized nature of cryptocurrencies causes significant price swings. After these changes, inflation and stagnation manifest.
- ❖ Environmental issues: According to Beck et al. (2018), the consensus method generates yearly the same amount of carbon dioxide as one million trans-regional flights, which raises environmental issues.
- ❖ High energy consumption: To reach an agreement in the blockchain, a significant amount of computational power and energy must be used (Zbinden and Kandova, 2019).

K) Naturally, Zbinden and Kondova's study (2019), which Antonopoulos (2017) cited, claims that "the consumption of energy required for Bitcoin mining is geographically independent. Therefore, Bitcoin really promotes the growth of renewable and alternative energy sources and decentralizes the energy sector. This article also indicates that there are many consensus process iterations that can take the place of the current procedure.



- ❖ **Obstacles of bureaucracy:** In his essay, Kaso (2019) claims that bureaucrats have strong opposition to the use of blockchain technology. Additionally, bigger challenges arise from things like a shortage of competent staff to exploit blockchain technology. The government restricting adoption and innovations by enacting rules and regulations to block the introduction of new technologies is one of the significant difficulties that these technologies will face in the future (Kibum and Taun, 2019).
- ❖ **Synonymous with blockchain and cryptocurrency:** According to Jimoh et al. (2019), there are misconceptions regarding the uses of blockchain technology and cryptocurrencies. They wrongly conflate these two ideas and attribute cryptocurrency-related mistakes (such as online fraud) to the blockchain.
- ❖ **Low awareness and training:** The lack of knowledge and education about the advancement of blockchain technology is one of the major obstacles to implementing it (Jimoh et al., 2019).

M) To address this issue, Jimoh et al. (2019) recommend that strategic training be provided for decision-makers, lawmakers, regulatory bodies, etc., in addition to holding educational workshops, seminars, summits, and conferences in accordance with the demands of the business sector.

- ❖ **Network power:** The network's low power is one of the main problems and difficulties on the technical front.

L) The power of the network is a barrier that should be raised appropriately in order to enhance the frequency of transactions in the blockchain (Jimoh et al., 2019).

- ❖ **Size and bandwidth:** The size and bandwidth are a challenge that has to be fixed in order to regulate the blockchain in transactions (Jimoh et al., 2019).
- ❖ **Lack of proof in the entire protection chain:** The impact of the blockchain will be minimal if it is not utilized to create electronic evidence. As a result, the blockchain can only confirm the veracity of the evidence once it has been joined to the chain; it cannot confirm the veracity of the evidence prior to joining the chain (Wu and Zheng, 2020).
- ❖ **Creating a link between the cyber and physical arena:** A problem for blockchain technology is the development of a connection between the cyber and physical worlds, according to Rouhani et al. (2019), who cite Johanson and Nielson (2018). Because this approach cannot ensure that a person is present in both a physical and digital setting, this problem is crucial to recognizing and validating a person's identification.
- ❖ **Non-participation of all actors:** All network participants must participate for the blockchain to be successful, which presents a number of difficulties and restrictions (Rohani et al., 2019, cited by Vanderpole, 2018).
- ❖ **Use of inconsistent programming interface:** The technological difficulties with the blockchain, including the usage of the Application Programming Interface (API), are mentioned by Ahishakieh et al. (2018), citing Yili Homo et al. (2016). The utilization of this connection is challenging, and blockchain apps cannot leverage it.



The economic and social costs of processing speed, followed by criminal and illegal activities after the implementation of blockchain technology, are the most significant challenges ahead for the effectiveness of blockchain technology on the quality of governance and new governance based on blockchain, according to the above table and texts, which are based on the study and review of selected articles.

Theories of selected articles in the field of change and stability of the role of the government in the face of blockchain technology

This section uses a tabular layout to explain how the government functions in the chosen articles. Some articles point to the existence of the state and the continuation of its current role, others point to the necessity of the state's existence and the complete elimination of the state, while others do not present discussions for this point. Lastly, some articles suggest new theories and the emergence of a new role for the government in their research.

Table 3. The role of the government in facing blockchain technology

Article number	The role of the government in dealing with blockchain technology			
	The existence of the current government	Absence of the current government	Not to mention the need for the existence or non-existence of the current government	A new theory in relation to the government
{1}	★			
{2}		★		
{3}				Government without power
{4}			★	
{5}				Distributed Autonomous Government: DAG
{6}	★			
{7}				The government with indirect intervention
{8}	★			
{9}		★		
{10}			★	
{11}				The existence of a neutral state
{12}		★		
{13}			★	
{14}				The birth of a new government
{15}	★			

The role of the government in dealing with blockchain technology				
Article number	The existence of the current government	Absence of the current government	Not to mention the need for the existence or non-existence of the current government	A new theory in relation to the government
{16}			★	
{17}			★	
{18}	★			
{19}	★			
{20}	★			
{21}	★			
{22}				Global government
{23}	★			
{24}	★			
{25}				Combined government
{26}				The possibility of blockchain competition with the government
{27}			★	
{28}	★			
{29}				Governance competition resulting from the blockchain with the government itself
{30}				Techno-totalitarian government
{31}	★			



- ❖ The author of article {1} cautions that a very libertarian society based on technology in which the function of the state has vanished will jeopardize citizen rights and lay the foundation for the formation of technical oligarchies. As a result, it underlines how important having a government is.
- ❖ The third kind of decentralized governance is presented in article {2} as negating the requirement for conventional players who participate in hierarchical government. Therefore, the state is not viewed as essential for future governance in this article.
- ❖ The article {3} claims that when blockchain technology is linked to government assets and resources, every person would have actual authority over their government. As a

result, this government is helpless, and the people themselves hold the majority of the authority.

- ❖ Article {4} does not discuss the presence or absence of government; it simply discusses the subject of new governance brought about by blockchain technology.
- ❖ The article {5} offers five guidelines for creating a government based on blockchain technology. The creation of a distributed autonomous government is the fifth principle, which shows that it is possible to create a system of governance as an operational-social infrastructure and an automatic information processing device of the society, whose rules are decided with the consent of the entire society.
- ❖ The article {6} claims that the current electronic government is enhanced by employing blockchain applications. In this article, it is presumed that there is an electronic government of some sort and that blockchain aids it.
- ❖ According to article {7}, the development of blockchain technology would reduce the need for middlemen like the government. By establishing rules, establishing social standards, etc., these mediators are compelled to indirectly govern individuals and affect their decisions in this situation.
- ❖ According to Article {8}, the government's participation in its functions is crucial, and using blockchain technology to enhance government performance and services is beneficial. Governments may profit from the use of blockchain both internally and in dealings with citizens or businesses.
- ❖ According to Article {9}, the lack of government and corporate control will cause society to go on a free path. It is unknown how much technical decentralization can constrain corporations and governments. In general, a distributed decentralized governance is required at the top layer for decentralized infrastructure.
- ❖ The article {10} makes the point that blockchain technology can challenge the government, but it skips over the question of whether or not a government is even necessary.
- ❖ The government will not meddle with blockchain networks, according to article {11}. Blockchain programs preclude it because it lacks important legal interests or because they exist if it does. But this administration lacks the essential tools to take action to lessen and avoid dangers.
- ❖ The proposed nature of the system and its technological capability to provide equal rules for each of the parties in a smart contract would replace the requirement for government intermediaries now required, according to article {12}. The removal of all middlemen, whether governmental or not, is what it ultimately refers to. According to this article, there is no requirement for a government as a consequence.
- ❖ He neglects to discuss in article {13} the government's involvement in future governance and its impacts, both good and bad, on it.
- ❖ A government without intelligent emotion will function better than an intelligent electronic government, according to the article {14}, and will be a trustworthy government in the position of a catalyst for the change to a new society.
- ❖ The article {15} makes the crucial point that using blockchain technology to deliver government services in a decentralized and effective manner does not imply abolishing



the government but rather encouraging a good government where power is not concentrated in the hands of a select few people.

- ❖ The article {16} analyzes a nation with the same political climate as the one in place now, but corruption is reduced via blockchain technology. As a result, it is assumed that the government is in place, and neither its need for elimination nor the possibility of its continued existence is mentioned.
- ❖ Without addressing the need for a government or the possibility of one not existing, the article {17} also looks at the impact of blockchain technology on government management.
- ❖ In the article {18}, it is determined that the government's presence in governance based on the blockchain is conceivably essential after taking into account the issue that motivates the government to take the lead in embracing the blockchain and implementing and creating its programs. He did not, however, suggest a structure for its administration.
- ❖ The article {19}, which discusses the use of the blockchain to boost government and governance effectiveness under the headings of "electronic government" and "electronic governance," has rejected the necessity or non-necessity of the government and even the government in its current or new form, but the article's main premise—that the government exists and technology aids it—is taken into consideration.
- ❖ The article {20} also investigates this impact while making the premise that there is a government and takes into account how well the blockchain might offer fresh approaches to managing the government.
- ❖ In article {21}, the author makes the assumption that a government exists and that it is necessary to work with other institutions to improve good governance by relying on technologies like blockchains because there must be coordination between the government of the university and business.
- ❖ According to the article {22}, a worldwide government with a decentralized system to improve the globe synced with blockchain technology, will take the place of the existing government.
- ❖ In article {23}, which examines how the blockchain affects government and electronic governance, it is presupposed that there is a government and that the blockchain serves to advance it.
- ❖ Based on the fundamental premise that there is a government and that the blockchain is an additional constant component, article {24} also considers the beneficial impact of the blockchain on current governance and government services.
- ❖ In the article's final conclusion {25}, it is noted that the integration of social governance with existing science and technology does not result in the demise of the government and its institutions. Instead, governance and the existing government are combined with technocracy, so there is still a government, albeit one that is integrated with cutting-edge technologies.
- ❖ According to article {26}, blockchain technology can eventually compete with the government itself and put its survival in peril by offering competitive governance.



- ❖ The need for the state's existence or its absence is not discussed in article {27}. Only the democratic impact of blockchain-based voting is examined in this article.
- ❖ According to article {28}, there are obstacles and a lack of infrastructure that prevent the use of blockchain technology to replace established government institutions. However, this technology can only make these institutions stronger and more effective. According to these views, technology will support the government in the examination of this document.
- ❖ The conflict between institutional governance based on blockchain and governmental institutions is discussed in Article 29. According to this text, it will thus be feasible to overthrow the government in the future.
- ❖ The establishment of the techno-totalitarian regime is discussed in article {30}. By utilizing blockchain technology, government institutions are attempting to control their own political and economic operations.
- ❖ Article {31} makes the assumption that the government is there and that the blockchain will aid it when applied to underdeveloped nations where there has been no change in the institutional settings.

The majority of the articles forecast the stability of the government's existing position, as shown by the above table and contents.

The Future of Governance and future governance

In this section of the study, the chosen articles are used to draw conclusions about the future of governance and the future of governance in relation to the adoption of blockchain technology in society.

Additionally, based on the ideas of the chosen articles, the primary beneficiaries of this governance are extracted and written in another column of the prepared table.

Table 4. Future governance and stakeholders

Key Stakeholders in future governance	The Future of Governance and future governance	article number
Technical specialists and elites	Blockchain-based governance combined with organizational theory	{1}
Change of beneficiaries in liquid form	Decentralized network governance	{2}
Citizens	Transforming the government into decentralized organizations	{3}
Technical specialists and elites	Lack of governance modeling in blockchain	{4}
the whole society	Direct democratic governance and blockchain government	{5}
Extractors and designers	Governance by blockchain and blockchain governance	{6}
State actors	New governance based on transparency and voting without corruption	{7}

Key Stakeholders in future governance	The Future of Governance and future governance	article number
Citizens	Lack of governance modeling in blockchain	{8}
Several dominant actors: the government and the company	Sustainable decentralized governance	{9}
Algorithm determinants	The best blockchain governance model	{10}
Conflict over interests	Blockchain governance alongside national governance	{11}
Abuse of illegal activities	Decentralized governance	{12}
Failure to mention the beneficiaries	Blockchain economy governance	{13}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{14}
Citizens	Lack of governance modeling in blockchain	{15}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{16}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{17}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{18}
community members	Democratic governance based on blockchain	{19}
Citizens	Lack of governance modeling in blockchain	{20}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{21}
Citizens	Distributed decentralized governance	{22}
Citizens	Electronic governance based on blockchain	{23}
Failure to mention the beneficiaries	Governance by Blockchain	{24}
Failure to mention the beneficiaries	Integration of technocracy and democratic governance	{25}
Failure to mention the beneficiaries	Blockchain distributed governance	{26}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{27}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{28}



Key Stakeholders in future governance	The Future of Governance and future governance	article number
Failure to mention the beneficiaries	New governance based on blockchain	{29}
Internal developers	Blockchain-based global governance	{30}
Failure to mention the beneficiaries	Lack of governance modeling in blockchain	{31}

Positive examples of blockchain implementation in different countries

The rate of global government-led blockchain project expansion is astounding (Myung Sun). Many nations are moving toward political systems that use blockchain (Yang, 2018). Despite these elements, this part expresses executed and created programs for the future of the relevant country, as well as the programs' beneficial consequences on the standard of governance. It should be mentioned that the articles used as the basis for these materials were all chosen for review; they were all discovered through searches, which served as the primary method of article selection; and they only covered the results of blockchain initiatives in various nations.

Another crucial point is that the program and project statements in this table are all that is discussed; in terms of the implementation's outcomes, more time and thorough research are required given how rapidly blockchain technology is developing and innovating.

Table 5. Programs and projects related to the blockchain in different countries

The Effect on the Quality of Governance	Future program and project	Implemented program and project	Public ation year	Article name	Country name
Improving the effectiveness of government		Receiving pensioners' money with blockchain program on mobile phone	2018	{3}	
Improving the effectiveness of the government/improving effectiveness of the government/improving the effectiveness of the government/improving the		digital money Blockchain for government administration/ Interbank payment/electronic voting system stock exchange	2018	{5}	England



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Public ation and year	Article name	Country name
right to comment and answer and the effectiveness of the government					
Improving the rule of law		The use of "regulatory technology" in the literature of politics	2019	{11}	
Improving the rule of law/improving government effectiveness		Use of justice to save electronic evidence/welfare distribution	2019	{14}	
Improving the right to comment and respond		Online voting	2020	{15}	
Improving the effectiveness of government		Welfare payment system based on blockchain	2020	{23}	
Improving the rule of law		Judicial Use of Blockchain in judicial procedures	2020	{25}	
Improving the effectiveness of the government/improving accountability and the right to comment	Using Blockchain to combat vote fraud	Exchange of intergovernmental documents	2018	{3}	
Improving the effectiveness of the government/improving the effectiveness of the government	Blockchain for the Ministry of Health	Document management system based on blockchain	2018	{5}	Russia



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
Improving the right to comment and respond	Using blockchain to securely store government data	E-voting	2019	{14}	Ukraine
Improving the effectiveness of the government and improving the rule of law		Blockchain technology for land registration	2020	{15}	
Improving the effectiveness of government		Exchange of patient's medical history, based on blockchain	2020	{23}	
Improving the right to comment and answer/improving the effectiveness of the government		E-voting	2018	{3}	
Improving the right to comment and answer/improving the effectiveness of the government	Providing digital identity for young children	Electronic voting platform/auction system based on blockchain	2018, 2018	{5}, {31}	South Africa
Improving corruption control and improving government effectiveness			2018	{3}	
Improving the effectiveness of the government and improving the rule of law	E-voting	Blockchain technology for land registration	2020	{15}, {23}	Australia
Improving the effectiveness of		Clearing and settlement of	2018	{5}	



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
the government/improving the effectiveness of the government and the right to comment and respond. Improving the right to comment and respond Improving the right to comment and answer/improving the effectiveness of the government and improving the rule of law	E-voting/digital identity	transactions in the stock exchange / electronic voting of the postal system	2020	{15}	
Improving the effectiveness of government		A stock exchange based on blockchain	2020	{23}	
Improving corruption control, improving the rule of law, and improving government effectiveness		Blockchain technology for land registration to prevent ownership by corrupt officials	2019	{11}	
Improving the effectiveness of the government/improving the rule of law/improving the effectiveness of the	Registering and sharing medical information using blockchain technology	Issuance of shares with blockchain/ Smart contracts legal bill/ Trade and record keeping with blockchain/ Digital ID / electronic voting	2018	{5}	USA



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
government/improving the effectiveness of the government and improving the rule of law/improving the right to comment and respond.					
Improving the effectiveness of government					
Improving the effectiveness of the government and improving the right to comment and respond	Patent, digital signs, and copyright office		2015	{7}	
Improving the effectiveness of the government/improving the effectiveness of the government		Health information/transfer of information	2019, 2020	{14}, {23}	
Improving the effectiveness of government.		Social security fund management system/loan evaluation in	2018	{5}	
Improving all components of governance	Building a Blockchain City	blockchain/asset maintenance system			China
Improving the effectiveness of the government and improving political stability		Blockchain development with military purposes	2019	{8}	



The Effect on the Quality of Governance and non-violence	Future program and project	Implemented program and project	Public and year	Article name	Country name
Improving the effectiveness of government	Blockchain-based Electronic invoicing and tax administration		2020	{15}	
Improving the effectiveness of the government and improving other components indirectly/improving the effectiveness of the government/improving the effectiveness of the government/improving all components		Blockchain-based electronic government/Social security funds/Blockchain-based loan evaluation/Blockchain-based smart city	2020	{23}	
Improving the rule of law		Judicial system based on blockchain, in court	2020	{25}	
Improving the effectiveness of government	Smart water-saving system based on blockchain technology		2020	Construction of Chinese Smart Water Conservancy Platform Based on the Blockchain: Technology Integration and	



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
Improving the effectiveness of the government/improving the effectiveness of the government/improving the effectiveness of the government.	Management of government documents until 2020	Digital passport based on blockchain/Transport information system to Dubai/Electronic voting system of Abu Dhabi Stock Exchange	2018	Innovation Application {5}	UAE
Improving the effectiveness of government	Blockchain medical records	Blockchain store system	2019	{14}	
Improving the effectiveness of government		Blockchain	2020	{15}	
Improving the effectiveness of government		Tourism identification program	2017	{19}	
Improvement of all components		Smart Dubai based on blockchain/Governance framework based on blockchain in Dubai	2020, 2019	{23}, {24}	
Improving the effectiveness of the government and improving the rule of law		Housing implementation project based on blockchain technology	2020	Novel blockchain reference model for government services: Dubai government case study	



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
Improving the effectiveness of government		The implementation of fresh regulations that permit banks and fintech firms to establish blockchain systems for trading unlisted securities.	2018, 2020	{5}, {23}	France
Improving the right to comment and respond		Online voting	2020	{15}	
Improving the effectiveness of government		Cross-border interbank payments	2018, 2020	{5}, {23}	Singapore
Improving the effectiveness of the government and improving the rule of law		Digital identity based on blockchain	2018	{5}	
Improving the rule of law and improving the effectiveness of the government	Real estate registry based on blockchain		2020	{15}	
Improving the rule of law and improving the effectiveness of the government		Land sale project based on blockchain	2019	{17}	Sweden
Improving the effectiveness of the government and improving the rule of law		Land registration smart contracts	2020	{23}	
Improving the right to comment and respond		E-voting	2018, 2020, 2019	{5}, {15}, {24}	Denmark



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
Improving the effectiveness of government	Maritime transport based on blockchain		2019	A Ten-Step Decision Path to Determine When to Use Blockchain Technologies	
Improving the right to comment and respond		E-voting	2018	{5}	Spain
Improving the right to comment and accountability/improving the effectiveness of the government.	Welfare management system	Direct democracy system/ use of virtual currency to prevent capital outflow	2019	{14}	South Korea
Improving the effectiveness of government					
Improving the right to comment and respond		Online voting	2020	{15}	
Improving the effectiveness of government		eID+	2019, 2020	{16}, {23}	
Improving the rule of law and improving the effectiveness of the government	Blockchain technology for land, real estate, and real estate registration		2020	Dutch blockchain, real estate, and land registration	Swiss
Improving the effectiveness of the government and improving the rule of law	Digital identity based on blockchain		2020	{15}	Italy



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
Improving the effectiveness of government Improve corruption control Improving the effectiveness of the government, improving the rule of law, and improving accountability and the right to express opinions Improving the effectiveness of government Improving the effectiveness of government Improvement of all components		Blockchain-based public procurement	2020	{15}	Japan
		Blockchain HACKMX	2019	{16}	Mexico
		The system of providing for the needs of refugees	2019, 2018	{17}, {31}	Jordan
		Budget support management based on blockchain	2019	{17}	Germany
		Tourism industry based on blockchain	2017	{19}	Greece
		Electronic governance based on blockchain	2020	{23}	
		2020	RBI Distributed Ledger Technology and Blockchain - A Future of Decentralized India		India
Improving the effectiveness of government	Blockchain-based financial market				
Improving the rule of law and improving the effectiveness of the government	Blockchain technology for land registration		2019	Blockchain Technology: Disrupting The Current Business and Governance Model	
Improving the effectiveness of government		Payment system based on cryptocurrency	2020	{23}	Kazakhstan



The Effect on the Quality of Governance	Future program and project	Implemented program and project	Publication year	Article name	Country name
Improving the effectiveness of the government, improving the rule of law, and improving accountability and the right to express opinions		The system of providing for the needs of refugees	2018	{31}	Pakistan
Improvement of all components	Blockchain-based government	Blockchain-based government	2018	{31}	Uganda

Conclusion

The selected articles have made more references to certain uses and implementations of blockchain technology. These include popular and trusted programs like smart contracts, decentralized voting systems, digital identity tools, smart assets, and systems for registering and transferring ownership of land and real estate. These applications have received more attention in research, and their significant features have been thoroughly examined. By implementing these measures, it is guaranteed that there will be positive benefits and improvements in good governance. The selected articles have made fewer references to programs such as postal services, defense affairs, air and marine industries, welfare distribution systems, etc. This suggests that there is room for further research in these areas and points researchers toward filling the research gap related to blockchain applications in these fields.

The wide range of these applications demonstrates the many capabilities of blockchain technology in developing application systems that can enhance governance and state affairs. This demands ongoing efforts from experts and politicians to ensure that these applications are implemented correctly and without encountering any obstacles. There are significant and well-established obstacles that society faces in adopting and utilizing blockchain technology for their government and governance affairs. These include high social and economic costs, slow processing speed, a rise in criminal and illegal activities, and concerns surrounding privacy infringement. Before integrating blockchain technology into their affairs, it is crucial for all societies to acknowledge the aforementioned risks and provide sufficient resources - both material and intangible - for research in related fields.

Certain technological sources view blockchain technology as a revolutionary force that could potentially eliminate current forms of governance and government, resulting in the emergence of a new type of governance. This new system may either completely do away with the role of government in society or lead to its transformation into a new form with different functions and meanings.



An examination of the concepts presented in the selected articles reveals that "viewpoint number two" is prevalent, which suggests that current forms of government and governance are inadequate for a society based on blockchain technology. However, some of these selected articles have not explored any models related to this potential shift in roles. As a result, based on the analysis of these articles, it is uncertain and vague whether or not the future of governance hinges on blockchain technology. Since governance in this context is not defined in the same way as current forms of governance, it cannot be evaluated using the same criteria used to assess good governance and its components. It should be noted that despite their positive outlook for the future, this group of articles and their unspecified viewpoint lack concrete evidence to support this optimistic perspective. Other articles with a more defined approach toward governance in the context of blockchain technology have developed models that are better suited to the unique conditions and features of this form of technology. The analysis of these articles reveals that blockchain-based governance is often described as being distributed, decentralized, and network-based. At times, it may also incorporate elements of current democratic governance. However, due to the uncertain nature of this form of governance and a lack of solid evidence for its principles, it is difficult to accurately define and describe its characteristics, components, and alignment with good governance. Therefore, further detailed research is necessary to fully grasp the benefits and drawbacks of this approach. While many researchers have proposed solutions to potential challenges and dangers, there is no definite or rational answer for how to define the future of governance in light of the possible elimination of current forms of governance. This is because the proposed requirements and potential risks that have been identified thus far are based on the current structures of governance and government. Due to the shift in governance structure brought about by blockchain technology, it is difficult to fully address all the risks and challenges associated with unknown future structures that possess unique characteristics.

The findings reveal that community government based on blockchain technology is often impartial and lacking in authority. Some articles suggest that this type of government is a blend of technocracy and current governance structures. Others predict that the future government will be global and borderless. Based on these articles, it appears that the concept of government, as currently defined, will not exist in the future of this revolution. Instead, a new form of government will need to be planned and designed with specific features and requirements in order to optimize efficiency and effectiveness.

The selected articles suggest that the stakeholders of future governance - who are defined by various theories and concepts - encompass different social classes and groups. However, it is important to note that some articles did not identify these stakeholder groups. In contrast, other articles introduced the key stakeholders of a blockchain-based future, which can be further categorized as follows:

The stakeholders of a blockchain-based future, as outlined in the selected articles, include:

- Citizens
- Technical experts, skilled professionals, developers, and individuals responsible for designing and specifying algorithms
- The broader society, including civil society and the public sector
- Several powerful actors, such as government entities or companies



- Changes to beneficiaries in a fluid form, taking into account the rotation of different governance roles

- Activists involved in illegal activities

- Miners

- Conflicts over interests aimed at preventing non-national forms of governance.

The findings indicate that if blockchain-based governance becomes dominant and stable in the future, it is anticipated that different stakeholders - including citizens, technology experts, society as a whole, politicians, and companies - will benefit from it in distinct ways. Even though all of these definitions and introductions are simply predictions without any guarantee of certainty, planning based on these predictions and fulfilling the associated requirements can help mitigate potential risks and challenges in the future. This perspective predicts a distinct future for all areas of governance. However, due to the uncertain channels and direction of future governance, even implementing the requirements suggested by researchers and mitigating the potential risks that have been identified thus far cannot guarantee a definite scenario for the quality of governance. Based on the author's research and a general conclusion drawn from the articles studied, it can be inferred that viewpoint number one will eventually evolve into viewpoint number two as blockchain technology becomes more widely used in governance and government affairs. This means that the implementation of blockchain will gradually transform current governance and government structures, necessitating the definition of new components, the identification of specific requirements, and the discovery of unforeseen risks. As a result, the end of viewpoint number one is linked to the beginning of viewpoint number two in the conceptual diagram (1-5) with a dashed line.

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