

Enhancing Security and Privacy in Blockchain Systems for Tax Administration

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ABSTRACT

This **research aims** to analyze the implementation of blockchain technology in tax administration to improve taxpayer compliance and state revenue. The research method used involves a literature study, secondary data analysis, and interviews with experts in taxation and blockchain technology. The **background** of this research is the challenges faced by the government in minimizing tax non-compliance and improving the efficiency of tax administration. The main **object** is to evaluate the potential of blockchain as a solution to create transparency, security, and accountability in the tax system. The **method** used is a quantitative approach through distributing questionnaires to 11 respondents consisting of the directorate general of taxation, taxation employees, the public as service users. Results show that blockchain implementation can reduce the risk of data manipulation, increase taxpayer confidence through transparency, and support more accurate reporting and monitoring. In addition, the use of smart contracts can simplify taxation processes, such as automatic tax calculation and direct payments. The **conclusion** of this study confirms that blockchain has significant potential to improve tax compliance and revenue, but challenges such as implementation costs, regulations, and infrastructure readiness need to be considered. This research provides recommendations for the government to consider a phased implementation strategy with pilot projects to ensure the successful application of blockchain technology in tax administration.

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1. INTRODUCTION

In this increasingly advanced digital era, technology plays a vital role in modernizing various parts of human life, including the way taxes are managed [1]. Blockchain technology is one of the most promising and revolutionary technologies that has been developing rapidly since its inception [2]. This technology has many applications in tax administration and the financial sector, providing unprecedented transparency in the tax administration system [3]. All stakeholders involved can see and check every transaction recorded on the blockchain [4]. This means that without the consent of all parties involved, any data input cannot be changed [5]. As a result, this technology can significantly reduce fraud, corruption, and tax evasion [6].

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Tax administration has undergone a major shift during the digital age. The integration of advanced technologies such as AI and blockchain has reshaped the realm of tax compliance, which brings new challenges and opportunities for taxpayers and tax authorities [7]. One of the significant changes in this process is the incorporation of information and communication technology (ICT) into the tax system [8]. Digital tools that modernize the tax system, including e-tax systems such as e-tax registration, e-tax filing, and e-tax payment, have simplified processes and improved accuracy and efficiency in tax collection and compliance [9]. The system's capabilities have been enhanced by the incorporation of AI and blockchain technology [10]. Blockchain technology has been a major advancement in securing tax data. According to Robert-Aurelian and Adriana Florina, it can increase transparency and efficiency in tax administration [11]. The immutable nature of blockchain reduces the possibility of fraud and strengthens the integrity of the tax system.

Effective tax policies and laws are necessary for robust and effective contemporary tax administration [12]. All aspects of tax administration should fall under the policy framework, which includes the essential processes of collecting, processing, analyzing and responding to data provided by taxpayers and other parties related to tax affairs [13]. By far, the biggest issue facing tax administrations in all countries is the problem posed by the continuous growth of the digital economy [14]. While society is preparing for the transition from the industrial revolution to the third digital revolution, revenue authorities are facing challenges relating to the viability of their tax base and the effective administration and collection of taxes [15].

The decentralized and distributed ledger system known as blockchain technology has gained a lot of attention for its potential to transform many industries, including financial services [16]. It can build financial tools such as payments, smart contracts, and trade records, thereby reducing unwanted transactions and their subsequent impact [17]. This has a significant impact on tax compliance and financial regulation [18]. In addition, financial supervisors are using blockchain technology to change technology trends and help build regulatory frameworks. With this transformation, it is imperative to understand the legal impact of blockchain technology on tax compliance and financial regulation due to its potential to increase the transparency and effectiveness of the tax administration system [19]. To provide better public services and better serve its citizens, every country in the world needs tax revenue. No country can develop and ensure the welfare of its people without taxes [20]. The amount of tax to be paid by compliant citizens increases along with the complexity of the tax system. Effectively implementing blockchain technology in the tax system to provide taxpayers with more revenue is a big challenge. Whether the use of blockchain technology will increase tax compliance of taxpayers is still a matter of debate [21]. At the same time, issues that can help speed up tax collection and prevent tax evasion have been put on the global agenda. Blockchain technology is a transparent and reliable record-based system, so it is very important to discuss because of its possible benefits in taxation [22].

The tax system undergoes continuous changes and alterations as a result of evolving business patterns, digitalization, and technological advances. Taxes play a very important role in improving the economy and people's welfare because it is one of the sources of state revenue that makes the largest contribution, which is used to finance state expenditures and development [23]. Since taxes are inevitable and provide the widest range of engagement between the government and its citizens regardless of demographic characteristics, successfully implementing e-taxation is necessary for a digital-friendly government. Taxpayers have high expectations of the services provided due to the extensive use of e-commerce and mobile application tools that they make on a daily basis [24].

Blockchain technology provides security, trust, data integration, and anonymity without having to involve third-party organizations. Blockchain is one of the most important and innovative advances in today's developing world. The name "blockchain" comes from the English words "chain" and "block", and the concept got its name because of its operating logic and functionality [25]. Although blockchain is no different from a regular database, it is simply a database that contains encrypted data.

With the rapid growth of the digital economy, digital transformation has become crucial. This is due to the intangible and elusive nature of digital activities. As greater domestic revenue mobilization and better tax compliance are required to fund public spending, tax authorities of developing countries cannot ignore the importance of digital transformation of tax administration [26]. In most developing and emerging economies, tax revenues constitute a large share of national income. Basically, the term "digital transformation" refers to processes and operations that are changed with the help of technology.

2. LITERATURE REVIEW

Blockchain is one of the most important and innovative advancements in the developing world today. The name “blockchain” comes from the English words “chain” and “block”, and the concept got its name because of its operating logic and functionality [27]. Although blockchain is no different from a regular database, it is simply a database that contains encrypted data. Blockchain applications are a new technological innovation that has many benefits, and it has the potential to grow rapidly in a short period of time and impact business [28]. The relationship between taxpayers and tax authorities is changing due to digitization. Tax authorities are trying to ensure tax systems and tax controls operate properly, pushing them to a new level.

Due to continuous technological developments, changes in business, and the need to improve services, operational efficiency, tax compliance, and revenue collection, most tax administrations around the world have turned to digitization. Digitalization of tax administration is changing the way taxes are managed and taxpayers’ compliance with NRAs. It is important to seize the opportunity of tax administration reform through digitization, although there will be institutional and budgetary challenges that need to be overcome, as enormous and sustainable gains will be made. If tax administrations do not keep up with the digital trend, they will lose their primary objective of remaining an effective and efficient source of government revenue [29].

Over the past ten years, tax administrations have faced challenges due to the emergence of new business models and technologies. New digital technologies, analytical tools and data sources provide tax administrations with new possibilities for centralized monitoring. According to research conducted by the OECD, there are a number of issues that tax administrations face when providing digital services to taxpayers. These include digital disruption, taxpayer expectations of digital services, managing digital demand drivers, adjusting compliance strategies for service delivery, increased connectivity, digital maturity, customer journey, new customer demographics, social media, data privacy and security, customer engagement, and wider choice [30]. Making tax compliance more efficient and less burdensome for taxpayers is a key task of tax administration. This can only be achieved with the effective use of digital technologies. Limited financial resources and lack of information and communication infrastructure prevent some countries in the European Union and beyond from establishing contemporary digital tax administrations.

The public sector has undergone a transformation in the last ten years. It is characterized by constant efforts to improve services while reducing administrative costs. The strategic integration of technology has driven this transformation. It has helped ensure strong accountability and transparency and improved procedures. This digital revolution is changing the way governments relate to their people, especially when it comes to public financial management and taxation.

AI has developed into a major force in the field of financial technology accounting, and has brought with it a wave of transformation in fields such as tax administration. Scholars have sought to understand the extent of AI adoption and its consequences for tax administration as governments around the world are updating their tax systems. The integration of AI into tax management systems is a major component of financial technology accounting, which offers opportunities for modernization and efficiency.

Artificial intelligence (AI) has quickly become a game-changing technology in many fields, including taxation and financial services. AI technologies such as automation, machine learning, and natural language processing (NLP) are crucial in tax reporting as they improve the accuracy, effectiveness, and compliance of tax procedures. An important part of artificial intelligence, machine learning, is particularly influential in tax reporting. Machine learning uses algorithms that can learn from historical data to find patterns, predict outcomes and make decisions with minimal human intervention. This capability is invaluable in tax reporting as these algorithms can analyze a wealth of financial data to find anomalies and ensure accurate and precise tax reporting. AI can improve the effectiveness, efficiency, and fairness of developing countries’ tax administration by automating certain functions, discovering patterns and irregularities, and forecasting future tax collections. Blockchain can improve tax compliance by making the system more transparent and automated. Every transaction in the blockchain system is recorded in a ledger, which can be monitored by the authorities in realtime. With this more transparent system, it is expected that taxpayers will be more compliant because they know that tax authorities can easily monitor their transactions.

A blockchain-based automated tax system allows authorities to access all wallets and monitor money flows, improving tax compliance. In addition, tax collection can be improved as the tax network will reach more people and expand. To fulfill its tax obligations, the government will have to lower the tax burden of each taxpayer as the tax network expands. In addition to creating the structure of the blockchain, the features of the

blockchain also create its security. Due to decentralization, consensus, and encryption, as well as algorithms and network mechanisms that encourage users to act honestly, the project of using blockchain technology seems feasible for the Tax Administration to establish a VAT information exchange system, which is responsible for the collection and management of taxes in the country will improve the efficiency of the tax system.

Taxpayer trust and compliance will decrease when the government uses external regulations with strict sanctions and supervision. Those who cannot control strict regulations are more likely to rely on extrinsic factors that give rise to controlled motivation. In other words, individuals perform certain actions because they feel compelled and pressured to do so. We recommend the use of private blockchains for taxpayer security and privacy, with permissioned blockchains to ensure that only trusted users are part of the network. Banks, companies, tax authorities, and auditors can be users of the network. With a tax-to-GDP ratio trend of this magnitude, tax authorities are demonstrating their inability to collect taxes. Therefore, it is considered important to modernize the tax administration system through the use of information technology. The theoretical framework of innovation in tax compliance, cost of taxation, success factors of information technology governance (SFITG), and AI readiness can be a solution to this problem. Investment in public goods and human capital is insufficient in many low- and middle-income countries. Many tax authorities have difficulty determining the true tax base and collecting taxes efficiently and fairly due to high levels of informality and limited state capacity. Therefore, they are increasingly adopting new technologies to improve administrative processes, reduce taxpayer compliance costs, and increase overall effectiveness. To finance essential government activities and an important part of the social contract between government and citizens, an efficient taxation system is necessary. However, the model used in most countries is riddled with problems and leads to unfair outcomes and a slowdown in economic growth. Many products have been released to digitize the tax collection process and improve the efficiency of the system.

Blockchain ability to guarantee transparency is one of the main advantages of the taxation process. All participants in the network can see every transaction recorded on the blockchain, which results in a transparent and traceable record of tax filings. This transparency can help companies and tax authorities verify transactions, ensuring that all income and expenses are accurately reported. This level of transparency reduces the likelihood of disputes. Because all parties can be assured of the accuracy and authenticity of the reported data, it increases trust between businesses and tax agencies. One important feature of blockchain technology is data integrity. A transaction recorded on the blockchain cannot be altered or deleted.

3. RESEARCH METHODE

This study used a quantitative approach with a survey design. The following are the steps taken in this research:

3.1. Questionnaire Development

The questionnaire was designed to measure taxpayers' perceptions of the use of blockchain in tax administration. Questions cover aspects such as transparency, security, ease of use, and impact on tax compliance. Example question: "How much do you believe that the use of blockchain can reduce errors in tax reporting?"

3.2. Population and Sample

The research population is taxpayers registered with the Directorate General of Taxes (DGT) of Indonesia. The sample was taken using purposive sampling technique, with a target of 11 respondents who have experience using the tax system. Data Collection: The questionnaire was distributed online through a survey platform to facilitate data collection. Respondents were asked to provide responses to each question on a Likert scale (1-5), where 1 indicates disagreement and 5 indicates full agreement.

3.3. Data Analysis

The analysis was conducted to find the relationship between the use of blockchain and the level of compliance and tax revenue. The statistical tests used included regression analysis to determine the significant effect of the independent variable (blockchain usage) on the dependent variable (tax compliance and revenue).

3.4. Implementation Example

For example, Indonesia's Directorate General of Taxes (DGT) has started implementing blockchain technology in its tax reporting system. Every tax transaction is recorded in a decentralized blockchain network, ensuring that data cannot be manipulated and can be verified by all relevant parties.

3.5. Taxable Entrepreneur (PKP)

PKP is a taxpayer in charge of making tax invoices. In this process, PKP has a cryptographic key in the form of a public key and a private key.

3.6. Cryptographic Keys

1. Public Key: Used to verify data. This key can be shared with other parties to read or validate the information.
2. Private Key: Used to generate digital signatures. This key is secret and only owned by the invoicer (PKP).

The public and private key pair plays a crucial role in ensuring the authenticity and integrity of digital transactions. When an invoicer (PKP) generates a digital signature using their private key, the recipient can validate the authenticity of the document using the corresponding public key. This cryptographic mechanism ensures that the invoice has not been altered and originates from a legitimate source, reducing the risk of fraud and unauthorized modifications.

The use of public and private keys enhances data security in electronic invoicing and other digital interactions. Since the private key remains confidential and is solely in the possession of the invoicer, it prevents malicious actors from forging signatures. The public key, being openly available, allows any recipient to verify the document's legitimacy, creating a transparent and secure system for digital transactions.

3.7. Tax Invoice Generation

Tax invoices generated by PKP are made electronically and equipped with a digital signature. This signature is created using a private key to guarantee the authenticity of the tax invoice.

3.8. Digital Signature Process

A digital signature links the identity of the invoicer with the tax invoice document. This process ensures data integrity and protects the document from unauthorized changes.

3.9. Storage on Blockchain

Once the tax invoice is generated, the invoice data is stored on the blockchain. Blockchain is a distributed ledger technology that is secure, transparent, and immutable. Each invoice is recorded as a block of data, which is then linked to the previous block. This ensures data security and validity. Blockchain Benefits:

1. Security: Data cannot be altered or manipulated once recorded.
2. Transparency: All relevant parties can verify the invoice directly.
3. Efficiency: Speed up the invoice validation and audit process.

With this technology integration, the tax system becomes more reliable, efficient, and modern. From this research, it is expected that the findings will demonstrate that taxpayers using blockchain-based systems exhibit higher compliance rates compared to conventional systems, leading to increased tax revenue by reducing tax evasion and fraud.

4. RESULT AND DISCUSSION

Blockchain technology can significantly enhance tax transparency by fostering increased public trust. With blockchain ability to automatically and transparently record every tax transaction, authorized parties can easily track financial activities, ensuring greater accountability. The encrypted and immutable nature of blockchain data further strengthens legal security, providing taxpayers with higher confidence in the system and reducing concerns about potential data alterations or unauthorized access.

Additionally, blockchain minimizes corruption and data manipulation within the tax system. Traditional tax systems often face risks where certain individuals can alter financial records for personal gain. However, blockchain requires all changes or new entries to be validated by multiple independent parties, making unauthorized modifications nearly impossible. This decentralized verification process ensures data integrity, ultimately improving the reliability of tax records and reducing fraudulent activities.

Furthermore, blockchain enhances the speed and efficiency of data processing in tax administration. By leveraging a blockchain-based tax system, the verification of taxpayer data becomes significantly faster and more transparent. Governments can reduce the time required to track and validate tax reports, eliminating data backlogs in tax offices and streamlining audit procedures. This improved efficiency not only benefits tax authorities but also facilitates a smoother experience for taxpayers, ensuring a more effective and reliable tax system.

4.1. Impact of Blockchain on Tax Compliance

Blockchain technology has the potential to enhance tax compliance by ensuring transparency, security, and efficiency in tax reporting. One of the primary concerns in taxation is fraudulent reporting, where taxpayers may manipulate their financial statements to evade taxes. With blockchain's immutable ledger, every transaction is permanently recorded, making it nearly impossible to alter data retroactively. This feature ensures that taxpayers adhere to regulations, knowing that authorities can verify every transaction.

Moreover, blockchain fosters trust between taxpayers and tax authorities. Transparency in the tax reporting system ensures that taxpayers are aware of their obligations, reducing the likelihood of disputes. When individuals and businesses perceive the system as fair and incorruptible, they are more willing to comply voluntarily. The ability to trace each transaction further eliminates the loopholes that could be exploited for tax avoidance.

A key innovation that supports compliance is the use of smart contracts for tax calculation and payment automation. These contracts allow real-time processing of tax obligations based on predefined rules, minimizing errors and delays. For example, businesses can automatically remit value-added tax (VAT) at the point of sale without manual calculations, reducing instances of underreporting or late payments.

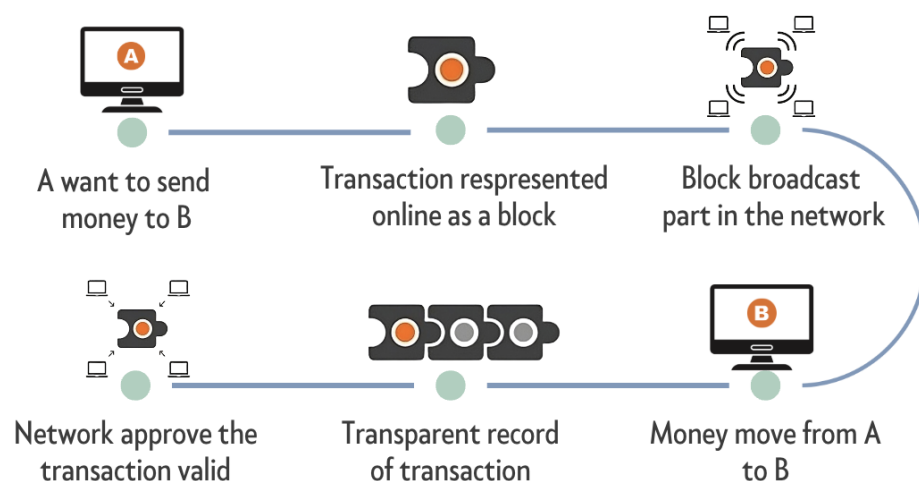


Figure 1. Blockchain Based Tax Administration Framework

Figure 1 illustrates the fundamental framework of blockchain-based tax administration, showcasing the seamless integration of taxpayers, financial institutions, and regulatory bodies into a unified network. This integration ensures that every transaction, from initiation to completion, is recorded as an immutable block. By broadcasting transactions to all parties in the network, blockchain provides real-time transparency and validation, significantly reducing the risk of errors, fraud, or data manipulation. This transparent approach allows authorities to efficiently monitor and approve transactions, promoting accountability across the tax system.

The process begins when a taxpayer initiates a transaction, which is represented digitally as a "block." The block is then broadcast to the entire network for validation by multiple nodes. Once approved, the block is permanently added to the blockchain, creating an indelible and transparent record. This streamlined process minimizes administrative burdens while improving the accuracy of tax collection. Moreover, by decentralizing the transaction approval process, blockchain eliminates the need for intermediaries, thereby enhancing system efficiency and reducing operational costs.

4.2. Transparency and Reduction of Tax Fraud

One of the most significant benefits of blockchain in tax administration is its ability to reduce fraud through transparency. Since transactions are recorded in a decentralized and tamper-proof ledger, the risk of financial misreporting or manipulation is significantly reduced. Every tax transaction, from invoicing to payment, can be tracked in real time, allowing authorities to detect suspicious activities promptly.

A study conducted on blockchain-based tax filing systems indicates that fraudulent activities, such as underreporting of income and falsified deductions, decline when taxpayers know that their transactions are permanently recorded. The transparency of blockchain encourages taxpayers to provide accurate information, as attempts to manipulate records become futile.

Furthermore, blockchain technology provides an immutable record of transactions, ensuring that any attempts to tamper with or alter financial data are virtually impossible. This characteristic not only deters fraudulent behavior but also serves as a reliable source of evidence for tax authorities during audits and investigations. Taxpayers are aware that the system is designed to safeguard data integrity, which further discourages attempts at financial misrepresentation. This feature is especially critical in addressing systemic issues such as tax evasion and corruption, which have long plagued traditional tax administration systems.

In addition to fraud prevention, blockchain enhances the efficiency of tax reporting and compliance processes. By automating routine tasks such as invoice generation, tax calculation, and payment tracking, blockchain reduces the likelihood of human errors and delays. These automation features also allow tax authorities to allocate their resources more effectively, focusing on more complex compliance issues rather than routine tasks. Businesses benefit as well, as they experience streamlined reporting processes, minimizing the administrative burden associated with tax compliance.

The decentralized nature of blockchain also fosters greater collaboration and trust among stakeholders, including taxpayers, tax authorities, and financial institutions. With a shared ledger accessible to authorized participants, all parties can monitor transactions transparently, ensuring that the tax system operates fairly and equitably. This transparency builds public trust in the system, leading to higher voluntary compliance rates. As a result, blockchain not only reduces fraud but also contributes to a more efficient and trustworthy tax administration framework.

Tax authorities can use real-time analytics and AI-powered blockchain monitoring tools to identify anomalies. For example, if a business suddenly reports a significant drop in taxable income despite stable revenue streams, authorities can flag the transaction for further review. This automated detection mechanism helps in early fraud prevention, reducing revenue losses.

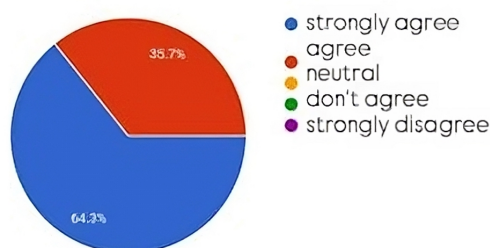


Figure 2. Survey Blockchain Role in Reducing Fraud

Figure 2 presents survey results showing public perception regarding blockchain ability to minimize fraud. A majority of respondents agree that blockchain will enhance accountability and prevent corrupt practices in tax administration. Based on the survey results depicted in the pie chart, the majority of respondents (64.3%) strongly agree that blockchain technology plays a significant role in reducing fraud. This highlights a high level of confidence in blockchain ability to provide a secure and transparent system for recording transactions, which minimizes opportunities for manipulation and fraudulent activities. Additionally, a notable percentage (35.7%) agree with this perspective, further emphasizing the widespread belief in blockchain potential to enhance accountability and integrity within financial and administrative systems. The absence of neutral or opposing views underscores a strong consensus on blockchain's impact in combating fraud.

5. MANAGERIAL IMPLICATION

These managerial implications highlight the importance of careful planning, resource allocation, collaboration, and privacy considerations in ensuring the successful integration of blockchain technology into tax systems.

5.1. Phased Implementation Strategy

To ensure the successful adoption of blockchain technology in tax administration, a gradual and strategic implementation is necessary. Starting with pilot projects will allow policymakers to assess blockchain's effect on specific tax processes, such as VAT collection or e-invoicing. These pilots provide an opportunity to uncover potential challenges related to technology, regulation, and operations. With these insights, authorities can make necessary adjustments before scaling the system across the entire tax administration structure. This phased approach mitigates risks associated with large-scale deployment, ensuring that blockchain adoption is effective and sustainable.

5.2. Investment in Infrastructure and Training

For blockchain implementation to be successful, robust infrastructure and skilled personnel are essential. Governments must invest in state-of-the-art computing systems, secure networks, and data centers capable of supporting blockchain operations. Alongside these technological investments, it is crucial to develop comprehensive training programs for tax officials and other relevant stakeholders. Such programs will equip them with the skills needed to efficiently manage and utilize blockchain systems. Ensuring the technological and human resource readiness will maximize operational efficiency and maintain the long-term sustainability of blockchain-based tax systems.

5.3. Collaboration Among Stakeholders

Blockchain success in tax administration depends on seamless collaboration between various stakeholders, including taxpayers, financial institutions, and regulatory bodies. Establishing clear guidelines and communication channels can help foster trust and cooperation among these parties. Integrating blockchain with existing digital tools and financial platforms will create a unified ecosystem that simplifies compliance for taxpayers while enhancing monitoring capabilities for regulators. This collaborative approach will ensure that blockchain's full potential is realized, resulting in greater transparency, efficiency, and data integrity across the system.

5.4. Privacy and Security Considerations

While blockchain offers exceptional transparency, it also raises privacy concerns, especially when it comes to handling sensitive taxpayer data. Therefore, tax authorities should implement privacy-preserving mechanisms, such as permissioned blockchains, ensuring that only authorized parties can access confidential information. Regular cybersecurity audits and system updates are essential to safeguard the blockchain network from emerging threats. By prioritizing data security and privacy, tax authorities can enhance taxpayer confidence in the system, encouraging broader acceptance of blockchain technology within tax administration.

Collaboration between tax authorities, technology experts, and policymakers is crucial to establishing standardized regulatory frameworks for blockchain-based tax administration. Clear guidelines and compliance measures will help prevent illicit activities, such as tax evasion and money laundering, while promoting fair taxation. By leveraging blockchain's capabilities in a structured and secure manner, governments can foster a more efficient, trustworthy, and transparent tax ecosystem that benefits both administrators and taxpayers.

6. CONCLUSION

The implementation of blockchain in tax administration offers enormous potential to improve tax compliance and revenue. The technology brings greater transparency, security, and efficiency to tax management, which in turn can strengthen state revenues and reduce revenue leakage.

Improving Taxpayer Compliance: With immutable characteristics that ensure that data cannot be altered once recorded, blockchain creates a transparent and secure tax system. This fosters taxpayer confidence in the fairness and accuracy of the system, thereby encouraging voluntary compliance. **Reduces Tax Avoidance and Evasion Practices:** Blockchain provides full transparency of recorded transactions, making it easier for the government to detect tax avoidance and evasion attempts. With a system that is more transparent and difficult

to manipulate, opportunities to hide income or perform tax manipulation are reduced, resulting in a broader tax base. Strengthening Tax Revenue Through Automation and Efficiency: Blockchain can automate various aspects of the taxation process, such as automated tax collection using smart contracts. This not only reduces administrative costs and processing time, but also ensures that taxes are paid in a timely manner, increasing the country's tax revenue. Preventing Corruption within the Tax Administration: blockchain decentralized and transparent nature can reduce the risk of corruption in tax administration. With immutable records, every tax transaction becomes more accountable, reducing the possibility of corruption by certain elements in the tax system.

Overall, blockchain implementation has the potential to support a more efficient, fair, and reliable taxation system, which in turn increases tax revenue and supports the country's financial stability. However, to optimize these benefits, there needs to be support from regulations, technological infrastructure development, and education to the public so that the adoption of blockchain in taxation can be effective. According to this study, companies that want to implement blockchain technology should make thorough preparations, which include improving technological infrastructure and providing training to employees. In addition, policymakers and government bodies should develop technical standards and a clear regulatory framework to support blockchain adoption. To address the current issues and maximize the benefits of blockchain technology in financial reporting, the public and private sectors must work together.

7. DECLARATIONS

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7.2. Author Contributions

Conceptualization: MM, AS, and DJ; Methodology: IY; Software: LP; Validation: MM and AS; Formal Analysis: DJ and IY; Investigation: AS; Resources: MM; Data Curation: DJ; Writing Original Draft Preparation: IY and DJ; Writing Review and Editing: IY; Visualization: MM; All authors, MM, AS, DJ, IY and LP, have read and agreed to the published version of the manuscript.

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The data presented in this study are available on request from the corresponding author.

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7.5. Declaration of Conflicting Interest

The authors declare that they have no conflicts of interest, known competing financial interests, or personal relationships that could have influenced the work reported in this paper.

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