



## Blockchain Technology as a Security Media for E-Commerce Transaction Process

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**Abstract.** The purpose of this study is to design the application of blockchain technology in an e-commerce service. The method used in this research was qualitative descriptive analysis and supported by literature studies. The results show that applying this technology can reduce the potential loss of tax fraud in VAT reporting. Blockchain technology implementation is done to solve fraud, limit contact between purchases and sellers, and misuse personal data by increasing security and transparency by applying cryptocurrency in payments. This technology is also reliable to solve the problems of taxation and improve the efficiency of tax digitization. So it can be concluded that in the future, blockchain technology is one of the security systems for making e-commerce transactions and payment systems that are easier, more efficient, and well-documented so that can reduce fraud in VAT reporting by e-commerce.

**Keywords:** Blockchain, Security, E-commerce.

### 1. Introduction

The spread of information and communication technology is increasing, especially on the Internet; the global business community has moved towards e-commerce [1]. In recent years, smart technology and fast communication can significantly improve the product and service sector [2]. Along with the increase in online transactions and e-commerce, there must be trust in the online environment [3]. Although e-commerce is growing rapidly, the biggest threat to e-commerce platforms' future is the security of the network architecture [4]. The taxation sector is one of the largest sources of national income. It must be able to adapt to all possible changes. In the industrial revolution, 4.0, Goods and Services Tax or Value Added Tax (VAT) is one type of tax that needs attention [5]. Blockchain is the basic technology for the operation of bitcoin and other cryptocurrencies. Research on the impact of cryptocurrency, the decentralized public ledger, has shown that a blockchain is a tool that can minimize costs and bring about major changes to the financial sector in the end. Blockchain is considered a digitalized and de-neutralized public ledger intended to keep records of every data transaction that occurs to provide confidence in every process carried out between sellers and

buyers without a third party to monitor centrally, to verify the accuracy of data and information [1, 6]. A ledger is a node that stores important data and information locally on a copy of the blockchain. It ensures that all the data stored is protected by the crowd rather than by a single central authority. Therefore, each node can be easily recognized and rejected. In some designs, there are rules or information important to the system in a distributed ledger. However, all nodes must be public to perform transparency [7].

Several previous literature studies have shown that blockchain technology has been implemented in various sectors, including the government and commercial sectors. The application of this blockchain technology has greatly benefited the accounting and auditing fields. In addition, blockchain can also be implemented for effective and efficient tax management. Blockchain technology can provide a reliable ledger, which means that no one party can manipulate it because every transaction in the system is directly stored and transparently recorded through smart contracts [8]. In the tax sector, choosing VAT as the research object is because the focus in e-commerce transactions lies in delivering goods and services. Besides, blockchain has the advantage of tracking goods so that VAT is selected to determine the amount of value-added tax paid on each product and find out tracking product prices and tax imposition [9]. However, despite the benefits, few countries use digital technology to calculate and manage VAT payments. Previous research has combined Decentralized Storage Network (DSN) and Smart Contract by proposing a new model based on blockchain technology to verify transactions, calculate VAT, and approve VAT payments. The system runs on the host computer to encrypt and decrypt data. The smart contract is implemented in the Remix Integrated Development Environment (IDE) based on the Ethereum platform [10, 11].

This study aims to identify the application of blockchain technology in an e-commerce transaction service that will increase the transparency, accuracy, and data security of the value-added tax system. Thus, it can reduce the potential for tax-loss on fraud in the VAT reporting and payment system because the end consumer receives the product from the production process. The focus is on digital transactions. The method used in this research was qualitative descriptive analysis and supported by literature studies to describe the use of blockchain technology as a security system in e-commerce transaction processes.

## **2. Method**

This study used a qualitative descriptive analysis method. It was supported by literature studies to determine the variables related to blockchain technology and e-commerce transactions in supervising the taxation sector that focuses on VAT reporting and payments.

## **3. Results and Discussion**

The pattern of public consumption from conventional to digital has changed rapidly. It is supported by easy public access to the internet. People prefer to buy goods from online stores, social media, or other online shopping platforms because they are considered more practical, easy, and do not require much energy. Indonesia is in the top position with the value of e-commerce transactions in the Southeast Asia region with a value of 12.2 Billion in 2018, and there had been an increase of six times the value of e-commerce transactions in Indonesia from 2015 to 2018 (See Table 1).

**Table 1. Value of Southeast Asia E-Commerce Transactions**

Country	2015 (US\$)	2018 (US\$)	2025*(US\$)
Indonesia	1.8 Billion	12.2 Billion	53 Billion
Vietnam	400 Million	2.8 Billion	15 Billion
Thailand	900 Million	3 Billion	13 Billion
Malaysia	1 Billion	2 Billion	7 Billion
Philippines	1 Billion	2 Billion	7 Billion
Singapore	1 Billion	1.8 Billion	5 Billion

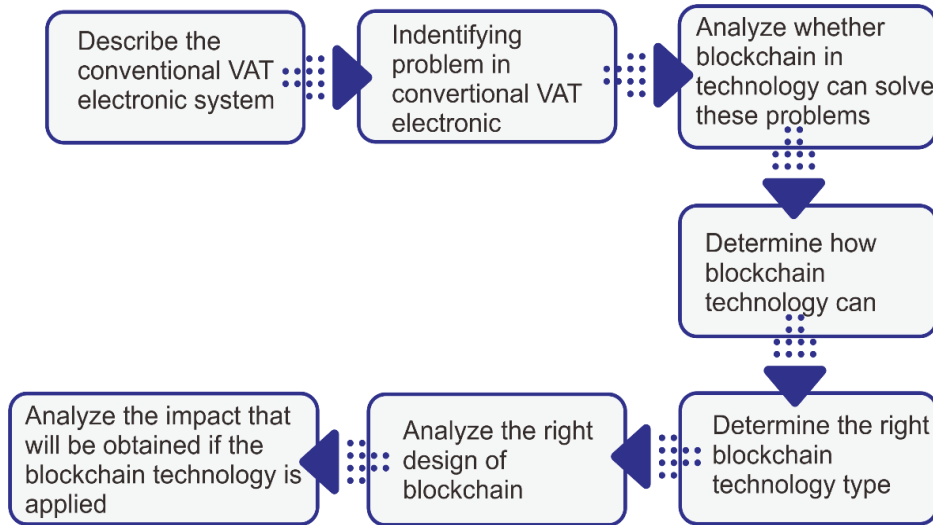
In Table 2, an average increase of 9.6% indicates an increase from year to year in VAT revenues from sales of goods and services transactions from 2014 to 2019. In 2019, VAT revenues amounted to 65.4 Trillion, with this figure experiencing growth in VAT revenues compared to the previous year. However, VAT receipts from transactions have not been maximized as well as possible. It is because many e-commerce transactions have not been taxed. Also, there are still many VAT frauds in sales and purchases of tax invoices in practice VAT, so that VAT receipts do not match that should be.

**Table 2. Realization of VAT Receipts (in Trillion IDR)**

Year	Value-added Tax
2014	409,2
2015	423,7
2016	412,2
2017	280,7
2018	564,7
2019	655,4

Source: Ministry of Finance of the Republic of Indonesia (2019)

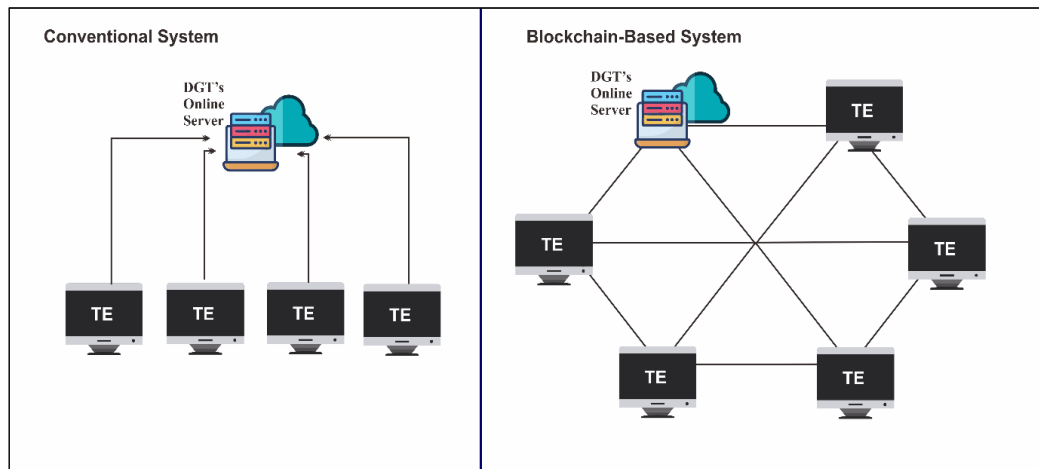
The type of private blockchain allowed in blockchain technology can be allocated to the Tax Invoice Serial Number (TISN) system. Using this type of blockchain, DataGrid Token (DGT) can run a private but customizable blockchain system to determine which party is the node and the scope of authority of that party in the blockchain network. The following are the steps are carried out in this analysis (See Figure 1).



**Figure 1.** The Scheme Of The Research Analyzes Stages

The VAT system can provide confidence to the government and Taxable Enterprise (TE), which is the network's party. Blockchain technology provides transparency and efficiency systems to the VAT system and especially in e-invoice. It makes blockchain technology an open technological innovation. Carrying out a risk assessment to store and distribute data in the system effectively and efficiently can be done by using blockchain technology. Transparent and distributable data is the main characteristic of blockchain technology so that the distribution of data and information obtained will be the same when parties acting as nodes on the blockchain network receive it. Thus, transparent data is only used for this technology, and data related to taxpayers is confidential, not transparent. However, data that other parties, including TISN, can see is not considered critical and secure. Therefore, from DGT to TE, blockchain technology can be applied to the TISN sending and tracking system in principle. Regarding the TISN system distribution from DGT to Taxable Enterprise, the following is a scheme describing the differences between the system using blockchain and the currently effective conventional TISN system.

Figure 2 shows that the conventional model of the DGT servers can be accessed online by all TEs and continuously at the same time. The existence of a server (DGT to become a client or TE) indicates that the position is not parallel between DGT and TE servers. This results in a down or error on the DGT server, accessed simultaneously by many parties. However, both DGT and Taxable Enterprise are the same in a blockchain-based system because they do not have a server and client system.



**Figure 2.** Comparison Of Conventional And Blockchain-Based Value-Added Tax (VAT) Systems

The decentralization that occurred in blockchain technology caused the position to be equal. It also causes no party to have a master role DGT, as shown in Figure 2. Therefore, the application of blockchain technology in the TISN delivery system from DGT to TE has the potential to be applied. It can make the system performance increase, and the steps that TE has to go through become fewer because of the automation system.

Each node will easily access to examine e-invoices issued by counterparties in transactions using blockchain technology. In a blockchain technology system, buyers' TEs no longer need to validate e-invoices issued by seller's TEs. Besides, the seller's TEs must also be validated by DGT. The seller's TE e-invoice is connected to the blockchain system in TISN, which has a hashing function. This function is to create unrecordable invoices used to issue e-Invoices that do not correspond to actual transactions.

The application of blockchain technology can ensure data security and transparency, as shown in Figure 3. Blockchain technology's hashing function will lock all TE's recorded data in buying and selling transactions or taxable services with their transaction partners. Hashing also serves to prevent TE from being unable to manipulate the data contained in the system. The blockchain technology system also allows DGT as a supervisor to carry out comprehensive monitoring and tracking of transactions. Therefore, all records of transactions that generate VAT will be securely and adequately tracked and recorded.

Figure 3 shows that DGT will immediately see the TISN remaining at the end used by TE through the blockchain technology system. Thus, monitoring the remaining TISN is very easy because it is very transparent. Through careful planning and mapping, blockchain technology will significantly improve Indonesia's VAT technical system's efficiency. However, DGT also needs to reduce risks and technologies that may hinder development. The goal is to enable blockchain technology in the value-added tax system to operate efficiently according to the DGT goals. When tax transparency increases, this will affect taxpayer's fulfillment of their tax obligations. Therefore, all content related to VAT will be clear and auditable.

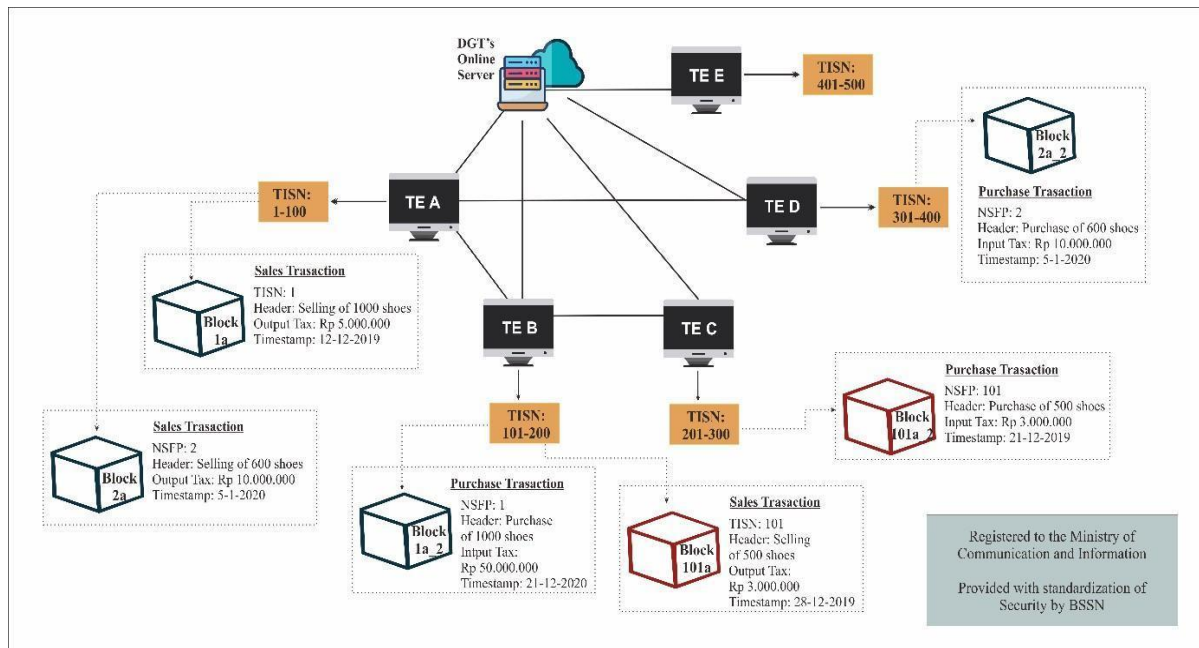


Figure 3. Illustration Of The Tax Invoice Serial Number (Tisn) Based On A Blockchain System.

#### 4. Conclusion

It can be concluded that the development of the taxation sector in e-commerce transactions by implementing blockchain technology can be realized and can be used as recommendations for the government in formulating tax policies and administration. For digital e-commerce companies, it can be used as a payment system so that the company administration system is effective and efficient. Besides, e-commerce users can rely on the security of the blockchain system.

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