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Literature Study: Data Leakage Avoidance Strategy and Personal Data Protection in Core Tax Administration System (CTAS)

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A R T I C L E I N F O

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A B S T R A C T

This research aims to analyze the effectiveness of the Core Tax Administration System (CTAS) service as a renewal of the tax administration system in Indonesia. In addition, this research aims to determine the potential security of taxpayer data in terms of implementing the CTAS, namely by utilizing integrated AI technology. The research method used is qualitative with a literature study approach by analyzing various secondary data such as journals, articles, and other taxation materials published in mass media channels. The results of the research based on SWOT analysis show that the implementation of the CTAS has proven effective for the efficiency of national tax system services. In addition, this research resulted in several author recommendations based on the findings of the previous results presentation, namely the TRUST (Tax Revenue Unified Security Technology) strategy. The author considers that blockchain implementation has significant potential to be useful for providing taxpayer data protection in terms of efforts to minimize the potential for data leakage, especially in tax system services. With the sophistication of this AI technology integration, it is hoped that the CTAS can achieve optimization of its role, including in terms of increasing the security of.

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INTRODUCTION

Indonesia is still continuously striving to achieve optimal economic stability. This is certainly in line with efforts to implement one of the sustainable development goals, namely "Decent Work and Economic Growth". The achievement of optimal economic stability is influenced by several factors, one of which is fiscal or tax policy. Taxes are mandatory contributions to the state owed by individuals or entities that are compelling based on the Law, with no direct reward and are used for state purposes for the greatest prosperity of the people (Law Number 6 of 1983 concerning General Provisions and Tax Procedures). Taxes still have a significant contribution to state revenue. In January 2024, tax revenue reached IDR 149.25 trillion or equivalent to 7.5 percent of the state budget target (Minister of Finance, Sri Mulyani, 2024).

The taxation system adopted by Indonesia today is the Self-Assessment System, a self-assessment system is a tax collection system that gives full trust to taxpayers in terms of carrying out their tax obligations, namely calculating, calculating, paying and reporting their own taxes owed (Waluyo, 2007). With this self-assessment system, of course, the tax service system in Indonesia is required to provide the best service for all users, especially for taxpayers who carry out their tax obligations. In order to increase tax revenue every year, the Directorate General of Taxes (DGT) slowly and progressively began to improve tax system services. One of the latest policies in 2024 is the renewal of the Core Tax Administration System (CTAS). The renewal of the Core Tax Administration System (CTAS) is carried out to improve the DJP's technology system which is considered outdated, where the system does not cover the entire business process and to adjust to the latest digital world developments. According to Presidential Regulation (Perpres) No. 40/2018, there are several objectives of the Core Tax Administration System (CTAS) implementation. First, to automate and digitize tax administration services ranging from registration, extensification, payment, reporting, taxpayer services, third-party data, information exchange (Sri Mulyani, 2024). Second, improving data analytics in the form of risk-based taxpayer compliance. Third, the creation of taxpayer account transparency with the ability to see all transactions. Fourth, fast tax services and easy access and real-time monitoring by taxpayers. Fifth, fair law enforcement. Sixth, ensuring more credible data and expanding the data integration network with third parties. Finally, the creation of knowledge management for better decisions.

In digital transformation, data security is an important issue that requires special attention. This is because the data allows it to be accessed by unauthorized parties, creating the risk of fraud and misuse of data for harmful purposes (Nugroho et al., 2021). Reporting from the media tempo.co, Indonesia has still experienced significant cases of data leakage in recent years, of course this requires attention and real action from the government to overcome it. One of the focuses of the Core Tax Administration System (CTAS) implementation is to improve data security to prevent potential data leaks and protect information data that is considered sensitive for taxpayers. Several cases of data leakage that occurred in Indonesia over a period of five years, including:

a. In September 2019, there was an alleged leak of 21 million passenger data including KTP and passport data of Malindo Air passengers and Thai Lion Air, a subsidiary of Lion Air;
b. In May 2020, as many as 2.3 million personal data on the General Election Commission's website were allegedly hacked;
c. In May 2021, as many as 279 million Indonesians' data on BPJS Kesehatan was allegedly leaked;
d. In March 2023, there was a data breach by Bjorka related to 19.5 million BPJS Employment user data;
e. In September 2024, there was an alleged leak of 6 million Taxpayer Identification Number (NPWP) data by Bjorka hackers. The data was allegedly sold for $10,000 or the equivalent of IDR 153 million rupiah.

The following is the ratio of the number of data leaks in Indonesia to other countries in the period 2020 - 2024:

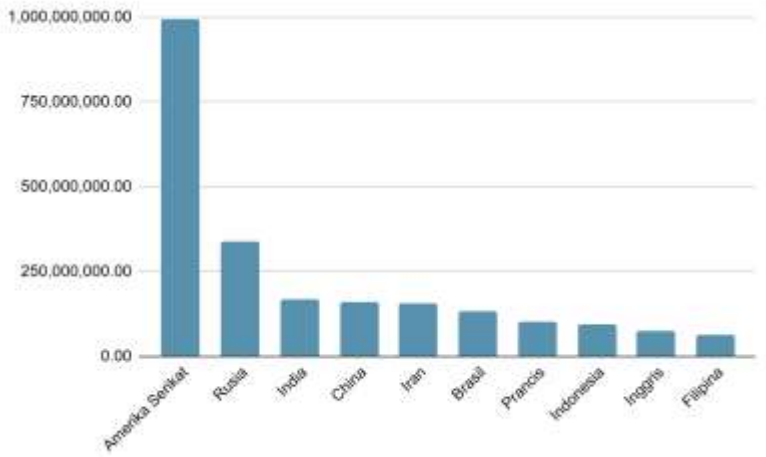

Figure 1. Ratio of the Number of Data Leaks in Indonesia
source: databoks.katadata.co.id

Looking at some of the facts above, the potential for data leakage and misuse is still a crucial issue in Indonesia that still requires preventive action from the government. Moreover, the issue of NPWP data leakage indicates the weakness of tax data security services in Indonesia. Referring to article 76 of the PDP Law, several data leakage incidents that occurred in a number of government agencies indicate a lack of government preparation in managing people's personal data (Annisa Noor Hayati, 2024). With the presence of renewal of taxation services through the Core Tax Administration System (CTAS), it is expected to be able to overcome various problematic issues that have often occurred before, such as data security, especially in the national taxation system. Therefore, this research will discuss further related to data leakage avoidance strategies and personal data protection in the Core Tax Administration System (CTAS).

Problem Formulation

1. How is the effectiveness of the Core Tax Administration System (CTAS) system in protecting taxpayer personal data by utilizing integrated AI technology?
2. What are the benefits and challenges in implementing blockchain technology in the Core Tax Administration System (CTAS) to improve personal data protection?
3. What steps should the government and relevant officials take to maximize the protection of taxpayers' personal data in the Core Tax Administration System (CTAS)?

Problem Objective

The purpose of this study is to analyse the effectiveness of the implementation of the Core Tax Administration System (CTAS) as a renewal of the national taxation system carried out with the Strength, Weakness, Opportunities, Threats (SWOT) analysis approach. In addition, this study aims to analyse preventive efforts that can be implemented to optimize data security in the implementation of the Core Tax Administration System (CTAS) with the TRUST (Tax Revenue Unified Security Technology) strategy.

LITERATURE REVIEW

Core Tax Administration System (CTAS)

Core Tax Administration System (CTAS) is an information technology system that assists the implementation of DJP and taxpayer duties, which includes business process automation (taxpayer registration, tax payment, notification letter processing, tax documents, and taxpayer accounting functions) and detecting taxpayers who fail to pay taxes. Through the Core Tax Administration System (CTAS), taxpayers can get better quality services, reduce the potential for tax disputes, lower tax compliance costs, and can increase tax compliance (Cindy & Chelsya, 2024).

The Core Tax Administration System (CTAS) was established by the government after the issuance of the Decree of the Minister of Finance Number KMK-885/KMK.03/2016 concerning the Establishment of a Tax Reform Team tasked with conducting tax reform in Indonesia. In 2018, tax reform began to be prepared and developed with the issuance of Presidential Regulation of the Republic of Indonesia Number 40 of 2018 concerning Renewal of the Tax Administration System (Tofan, 2023, 124). Following up on Presidential Regulation No. 40/2018, the Minister of Finance issued Minister of Finance Regulation No. 109/PMK.03/2018 on Procurement of Goods and/or Services for the Renewal of Tax Administration System. This regulation regulates the work tasks to be carried out by the government, namely Core Tax System Administration (CTAS).

Strength, Weakness, Opportunities, Threats (SWOT)

Strength, Opportunities, Weakness, Threats (SWOT) is a model for analysing profit and non-profit organizations. The goal is to understand the state of an organization more comprehensively. SWOT analysis is a systematic

identification of various factors to formulate company strategy. This analysis uses logic to maximize strengths and opportunities and minimize weaknesses and threats (Herlin, 2020).

a. Strengths are positive aspects or advantages that are internally owned and help achieve goals. Strengths provide unique added value and can form the basis of an advantage.
b. Weaknesses are internal aspects that limit the ability to operate optimally. Weaknesses reduce effectiveness or efficiency in achieving goals so they need to be identified and addressed to minimize their negative impact.
c. Opportunities are external conditions that can be utilized for additional growth or profit. Opportunities can create positive potential that can strengthen the situation so they need to be recognized so that strategies can be developed to take advantage of them.
d. Threats are external factors that can pose a risk or hinder the achievement of a goal. Threats can come from a variety of sources outside the control of the organization so it is necessary to identify possible threats in order to prepare for them.

Legal Protection Theory

The principle of legal protection in Indonesia stems from Pancasila, which is based on recognition and respect for human dignity (Tampubolon, 2016). Personal data protection has been included in the protection of human rights. Therefore, regulations concerning personal data are a form of recognition and protection of human rights. The creation of a law on personal data protection is a necessity that cannot be delayed anymore because it is very urgent for various national interests (Law No. 27 of 2022).

Data Protection Principles

The Organization for Economic and Cooperation Development (OECD) has contributed to formulating basic principles in personal data protection that can be used as a reference in drafting regulations related to personal data protection. These basic principles are as follows: (OECD, 2018)

1. Collection Limitation Principle: The collection of personal data must have clear boundaries in order to be carried out legally and fairly, and must be followed by the consent of the data subject and with his or her knowledge.
2. Data Quality Principle: In collecting personal data, it must be ensured that the data is used for its intended purpose. Ensure that the data collected is complete and accurate. If there are any changes, the data should be updated immediately.
3. Purpose Specification Principle: The purposes for which personal data is collected must be determined at the latest when the data is collected, and its use must be limited to the purposes set.
4. Use Limitation Principle: In order to disclose, provide or use personal data for purposes different from the original purpose for which it was collected, the consent of the owner of the personal data is required in advance.
5. Security Safeguard Principle

Personal data must be protected against loss, damage, unauthorized use, disclosure or unauthorized access.

6. Openness Principle: Policies that regulate disclosure related to the development or management of personal data must be made first. Before the main purpose is carried out such as using data and building identity or controlling data.
7. Individual Participation Principle: In this principle, the aim is to control or confirm data related to granting access to delete, change or correct the data.
8. Accountability Principle: This principle explains that there must be a responsibility on the part of the data controller to comply with measures that will impact the data protection principles.

METHODOLOGY

The method used in this research is a qualitative method. In this research, the author will use secondary data sources. Secondary data is a form of desk research that collects data from government publications, literature, and document research, some of which are obtained through journals, articles, and laws. This is useful to verify, confirm, and ensure that the information provided by informants is correct based on existing documents. This research also uses a descriptive analysis approach. This descriptive research aims to provide a description of the description of facts, characteristics, and interrelationships between the phenomena under study, including the relationship between activities, attitudes, and ongoing processes and influences of a phenomenon (Silaen & Widiono, 2013). The research results obtained are then compiled to produce a final conclusion regarding the effectiveness of the implementation of the Core Tax Administration System (CTAS) in an effort to renew and improve the national tax service system.

RESULTS AND DISCUSSION

Analysis SWOT Implementation

As explained earlier, some of the benefits of the implementation of the Core Tax Administration System (CTAS) are contributing to the increase in state revenue and improving the quality of data, segmentation, and taxpayer profiles. In relation to this, the following is a SWOT analysis of the Core Tax Administration System (CTAS) implementation policy in reforming tax administration in Indonesia:

1. Strength

a. Transparency and Accountability: The presence of the Core Tax Administration System (CTAS) reduces human intervention in the tax administration process. With high automation, the risk of corruption and abuse of authority can be minimized, thus increasing public trust in the tax system. Integrated data will enable better monitoring of taxation activities, so that the government can provide more accurate reports to the public. In addition, with a transparent reporting system, the public can understand

how their data is managed and used by the government, thus increasing public trust in the tax system as a whole.

b. More Credible Data Management: The Core Tax Administration System (CTAS) provides more credible data management services. With the integration of data from various sources, the government can analyse compliance patterns and potential risks of taxpayers. Accurate and up-to-to date data enables better decision-making in tax policy and law enforcement strategies. With more credible data management, it can facilitate taxpayers and increase their compliance so as to increase state tax revenue (Humas, 2024).
c. Tax Compliance Improvement: According to Alfirdaus & Anas (2024), the implementation of the Core Tax Administration System (CTAS) in 2023 increased the effectiveness of local revenue to reach the highly effective level or more than targeted. Core Tax Administration System (CTAS) provides a user-friendly platform and better accessibility, this system makes it easier for taxpayers to fulfil their tax obligations. The simpler and more transparent process of registering, reporting, and paying taxes reduces the barriers that taxpayers often face, thus encouraging them to be more compliant. In addition, with automatic reminders and notifications, taxpayers can more easily remember deadlines, which in turn increases the overall compliance rate.

2. Weakness

a. Limited Internet Access in Some Areas: Indonesia, which is a country with a geography consisting of many islands, there are still areas that experience limited or even no adequate internet access. This is an obstacle for taxpayers in remote areas to access the Core Tax Administration System (CTAS) effectively, thus creating injustice in tax services.
b. High Development Cost: There are high costs incurred by the government to design, develop, and maintain the technology or software. Sophisticated systems require large investments in resources such as hardware, software, and skilled personnel for development and maintenance. This also includes the cost of ensuring the system is up-to-date with the latest regulations, and to maintain security and optimal performance.
c. Digital System Instability: According to Alfirdaus & Anas (2024), one of the weaknesses in the Core Tax Administration System (CTAS) is the instability of the digital system which can be in the form of server disruptions on the Core Tax Administration System (CTAS) platform so that it can disrupt the online payment and reporting process. Given that this system must be able to process millions of data every day, if the infrastructure is not strong enough, there will be delays and disruptions in data processing, especially during peak usage periods.
d. Lack of Socialization and Education to Taxpayers: Taxpayers do not fully understand the implementation of the Core Tax Administration System (CTAS) due to the lack of detailed socialization. Socialization and education

are only carried out through news or online media, DGT's online website, and the Ministry of Finance's online website (Cindy & Chelsya, 2024).

3. Opportunities

a. Increased Tax Revenue: The renewal of tax administration with the Core Tax Administration System (CTAS) is expected to be an impetus for the government to maximize tax revenue in Indonesia. With the renewal of a more integrated tax system, the data generated will be more accurate. In addition, with the modernization of the tax system through the Core Tax Administration System (CTAS), it is hoped that the government will be able to identify the potential for tax revenue more broadly, one of which is the ability to minimize tax evasion.
b. Ease of Tax Revenue Service: The implementation of the Core Tax Administration System (CTAS) is expected to facilitate taxpayers in carrying out their tax obligations, namely with more integrated tax services. These tax services include, among others, registration, payment, tax return reporting and others. The convenience of the implementation of the Core Tax Administration System (CTAS) certainly does not only look in terms of tax authorities, but also must reach convenience for taxpayers. With this, the tax compliance ratio is expected to increase for the better.
c. Tax Revenue from Digital Companies: The renewal of the tax administration system through the implementation of the Core Tax Administration System (CTAS) has the opportunity to optimize tax revenue from the digital company sector. According to data from the Directorate General of Taxes (DGT), 2024, tax revenue from the digital economy sector reached IDR 26.75 trillion as of July 31, 2024. This fact must certainly be a momentum for the government including tax authorities, where the Core Tax Administration System (CTAS) in further implementation can boost tax revenue in Indonesia.

4. Threats

a. Cyber Threat/Data Leak: Core Tax Administration System (CTAS) as a digitization of tax administration technology that has just been implemented in Indonesia certainly requires adaptation related to its implementation. The implementation of the Core Tax Administration System (CTAS) allows it to become a target for cybercrime against taxpayer data information. Several cases of leaks in Indonesia, including the leak of NPWP data previously described, are a risk for both the government and taxpayers. This is not only a threat to the government but also has an impact on taxpayer concerns, which in turn has the potential to cause a lack of integrity of the tax authorities in the view of the public, including taxpayers.
b. Complexity of Change Adaptation: One of the government's objectives in implementing the Core Tax Administration System (CTAS) is to boost the effectiveness of tax revenue. The complexity of the new system from the Core Tax Administration System (CTAS) can potentially cause difficulties for taxpayers. Especially for taxpayers who are less capable of digitizing

technology, this is certainly a challenge for the government and taxpayers. Taxpayer confusion about a system certainly has the potential to also affect its effectiveness in carrying out its tax obligations, such as the potential for late reporting, the emergence of tax disputes, and others. This certainly requires further risk mitigation from the government for the sustainability of the effectiveness of the Core Tax Administration System (CTAS) which is able to reach all levels of taxpayers. This is in line with an excerpt from Book II of the RAPBN 2025 Financial Memorandum, which explains that the successful implementation of the Core Tax Administration System (CTAS) depends not only on the implementation of the system, but also on the perspective of the government's efforts to manage risks and build taxpayer trust.

From the SWOT analysis above, it can be concluded that the implementation of the Core Tax Administration System (CTAS) has a number of advantages and disadvantages. The advantages of this implementation are related to more integrated tax administration services. As for the disadvantages of the Core Tax Administration System (CTAS) implementation, it emphasizes the potential threat of data leakage that needs to be watched out for. The lack of understanding of taxpayers regarding system implementation and data confidentiality guarantees as well as the assumption that the implementation of the Core Tax Administration System (CTAS) by the tax authorities is merely to increase state revenue are still some points of mindset that need to be addressed. Furthermore, related to the potential threat of data leakage in the implementation of the Core Tax Administration System (CTAS) in the future, in this case the government needs to strengthen more mature regulations and formulate other strategies so that the optimization of the Core Tax Administration System (CTAS) implementation policy can be achieved.

Benchmark Apps from Other Countries

Benchmarking Core Tax Administration System (CTAS) applications in several countries can provide an overview of a more efficient and automated tax system for Indonesia. Here are some examples of implementation and innovation by other countries:

1. United Kingdom-Her Majesty's Revenue and Customs (HMRC): Her Majesty's Revenue and Customs (HMRC) in the UK implemented Making Tax Digital (MTD) and Real Time Information (RTI) as significant steps towards modernizing the tax system in the UK. Making Tax Digital (MTD) aims to simplify tax management by utilizing digital technology (Guide, 2022). Real Time Information (RTI) is a system that is expected to improve the accuracy and timeliness of payroll reporting and ensure tax deductions on employee salaries as a tax compliance effort (HMRC, 2014).
2. United States of America-Internal Revenue Service (IRS): Automated Collection System (ACS) is a system used by the Internal Revenue Service (IRS) in the United States that assists automatically in the tax collection and billing process (Cross Law Group, 2024). ACS has three work processes,

namely automatic notification, information collection and collection action. In this automatic notification, ACS will send notifications to taxpayers containing requests for payment of tax obligations. Then, when the taxpayer contacts the ACS, the agent will ask for information related to the taxpayer's personal data to help the billing process. Furthermore, in the collection process, such as salary deductions and bank account seizures (Tax Cure, 2024).

3. South Korea-National Tax Service (NTS): The implementation of the Smart Tax Administration System by the National Tax Service (NTS) in South Korea is an effort to digitize the tax administration system to improve efficiency and transparency in taxation (Kim, 2023). In 2015, the NTS launched the Neo Tax Integrated System (NTIS) which integrated more than 30 different information systems. NTIS integrates all tax-related systems into a single system. NTIS consists of two parts: Next-Generation Home tax (NGH), an online portal for taxpayers, and the Tax Administration Portal, for internal NTS operations. Next-Generation Home tax (NGH) provides comprehensive services to taxpayers, from sharing tax information and handling taxpayer queries to processing tax applications and payments (Kim, et al., 2022).

The implementation and innovations made by these countries illustrate that a more effective Core Tax Administration System (CTAS) implementation requires the integration of high technology such as big data analytics, machine learning, AI and blockchain technology. In Indonesia, the adoption of similar technologies in the tax service system is expected to improve compliance, transparency and efficiency in running the national tax administration.

Personal Data Protection System Core Tax Administration System (CTAS)

The personal data protection system that has been prepared for implementation in the Core Tax Administration System (CTAS) includes:

1. Two-Factor Authentication (2FA) is a feature to maintain the security of an online account by adding a double verification process when accessing an account on a particular platform (Alizanovic, 2022);
2. Intrusion Detection Prevention System (IDPS) is software that automates the monitoring of events that occur in a computer system or network and analyses them to identify signs of potential incidents and attempts to stop detected incidents (National Institute of Standards and Technology (NIST) U.S Department of Commerce);
3. Logging is a process that records information about all events related to access to a server or file. This logging process records user activity in the system, including authorized and unauthorized login attempts, resource usage, and actions related to changes, additions, subtractions, and deletions of files stored in the system;
4. Auditing is a process used to track all events, errors, and access and authentication attempts that occur on a system server. Which aims to identify

weaknesses in the system and design development and security improvements on the system server (Learning Technology, 2015).

As well as data masking and AI that help detect anomalies, both of which have not been explicitly confirmed and are being developed in the Core Tax Administration System (CTAS). Data masking is a process aimed at disguising and hiding the original data in a data centre or database. This process is done by falsifying data and hiding important data to protect sensitive data and information. Some data masking techniques that are often used by digital companies from around the world include: Data Encryption (changing and scrambling the data access code); Data Substitution (creating replacement data that is similar to the original data); Value Variance (data is scrambled and the number of values is falsified); and Nulling (displaying data as if it has disappeared) (PT All Tech Savvy, 2023). The application of AI, especially through deep learning techniques, can be used to detect anomalies in tax data. The Directorate General of Taxation (DJP) is developing the implementation of Artificial Intelligence (AI) in the Core Tax Administration System (CTAS). In the future, AI is expected to help accelerate the process of knowledge dissemination (Online Tax Editorial, 2024).

TRUST (Tax Revenue Unified Security Technology) Strategy

The TRUST (Tax Revenue Unified Security Technology) strategy was created to optimize the protection of taxpayer personal data in the Core Tax Administration System (CTAS) tax service system. This TRUST strategy tries to apply blockchain technology and AI in optimizing efforts to protect taxpayer personal data. This strategy is also expected to increase public trust, especially those who have become taxpayers, both individuals and entities. Because with increased trust, it will have a positive impact on the level of public tax compliance. This is in line with increasing state tax revenue.

Potential Blockchain Implementation as a Taxpayer Data Security Effort in the Implementation of Core Tax Administration System (CTAS) Services

The development of the Core Tax Administration System (CTAS) to realize the effectiveness of its implementation in the long term requires adaptation of the implementation of various technologies. This is to achieve efficiency and long-term integrity of tax data. One of the potential technology adoptions to be applied in the Core Tax Administration System (CTAS) service is blockchain technology. The implementation of blockchain is considered to have a number of advantages for tax system innovation, including: 1) Increasing transparency, where blockchain provides various transaction records that can be verified by related parties, thereby reducing the potential for tax irregularities (Kim, 2020); 2) Efficiency, which accelerates the automation of tax system processes; and 3) More integrated audit checks. In addition, blockchain technology in the latest tax administration service, the Core Tax Administration System (CTAS), has potential in terms of data protection. The adoption of blockchain technology has the potential to provide an additional layer of security

in terms of protecting sensitive information such as the Taxpayer Identification Number (NPWP) and other personal data. One concept that can be used in the implementation of blockchain technology is the application of decentralized identity (DID). Decentralized identity (DID) can reduce the risk of tax fraud. This is because decentralized identity (DID) can increase transparency and security of personal data (Heister & Yuthas, 2021). With a decentralized identity (DID), taxpayers can regulate the limits of access to their personal data to be shared with other parties (Heister & Yuthas, 2021). The advantage of implementing blockchain technology is its ability to store data with a fairly high level of security. The data recorded in the blockchain is cryptographically encrypted and spread across the network, thus reducing the risk of data leakage or falsification. In the context of the Core Tax Administration System (CTAS), this means that tax information such as the Taxpayer Identification Number (NPWP) and financial transactions will be more secure from potential cyber threats or the like.

In 2015, the Italian government tried a so-called EU Horizon project, in cooperation with six other countries, which aimed to apply secure information sharing between the Ministry of Interior and the Ministry of Finance through blockchain technology. This was used to ensure the confidentiality and integrity of information exchange, in particular residence data and the status of Italian public security agents. The project found that the use of blockchain technology in the exchange of data between the public cloud and the private cloud occurs securely, and has even been used for employee payroll systems through Noi PA updates (OECD, 2020). In line with this, collaboration between government agencies certainly contributes as a means for administrators to integrate blockchain technology in tax services.

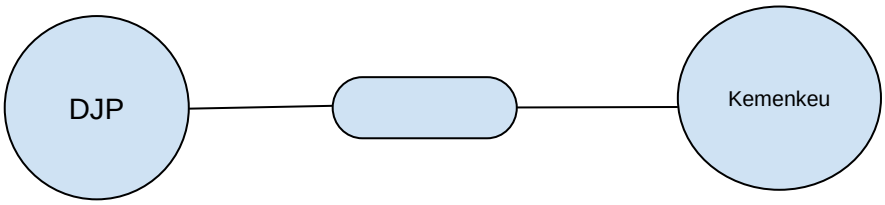

Figure 2. Collaboration Between Government Agencies Certainly Contributes

The Ministry of Finance (MoF) plays a role in managing and monitoring tax revenue from taxpayers. The taxpayer data is used for revenue analysis and fiscal planning. Meanwhile, the Directorate General of Taxes (DGT) in this case plays a role in carrying out tax administration. The taxpayer data is used by the DGT to carry out tax administration services, starting from registration, payment, reporting to compliance monitoring. In the tax system, blockchain technology can be used to verify the identity of taxpayers and register tax transactions (Kim, 2020). The taxpayer's identity will be stored neatly encrypted in blocks related to each taxpayer's transactions. Under one condition, it may be possible for the DGT to find out financial data by requesting access to the data through the Ministry of Finance. When the DGT needs access to a taxpayer's data for tax purposes, the

DGT can request permission through the DID system. By doing so, the taxpayer can review and approve the request received from the DGT.

Steps to Implement TRUST (Tax Revenue Unified Security Technology)

In order to improve the protection of taxpayer personal data in the Core Tax Administration System (CTAS), it is expected that the government and relevant officials can implement the following steps:

1. Data security assessment and planning: Data assessment and planning involves an in-depth evaluation of existing policies and infrastructure to identify weaknesses and potential risks in the system. Based on Law No. 27 of 2022, data security protection serves to protect the security of personal data from unauthorized access, unauthorized disclosure, unauthorized alteration, misuse, destruction, and/or erasure of personal data.
2. Digital security infrastructure: Digital security infrastructure can take the form of allocating State Budget funds to strengthen data protection systems and security technologies that enable better prevention and response to cyber threats. This is in accordance with the government's plan in Presidential Regulation No. 84/2023 on Updating the Government Work Plan for 2024, the government plans to allocate Rp 303.34 billion in spending funds (Elena, 2024).
3. Tax employee training: Conducted training on technology development and the use of the Core Tax Administration System (CTAS) to taxation employees.
4. Innovative socialization to taxpayers: To increase public awareness, socialization about data security can be done through seminars or teaching on social media considering that almost all young people use social media in their daily lives. This can help taxpayers understand the importance of data security and preventive measures (Cindy & Chelsya, 2024).
5. Periodic system penetration tests: System penetration tests are conducted regularly to test the security of the system, to detect and fix vulnerabilities in the system before they can be exploited by unauthorized parties. This ensures that data protection remains optimal against evolving threats.
6. Consolidate the data security team: Consolidating data security teams is an effort to strengthen and unify specialized teams responsible for data protection to be more responsive to threats. According to Nugroho (2021), the data security team is tasked with ensuring the security of people's personal data on digital servers.
7. Data security policy evaluation: Evaluate data security policies by reviewing and updating security rules to ensure their effectiveness in the face of current threats.
8. Improved GDPR (General Data protection regulation) compliance: Although there are more than 30 laws governing personal data protection in Indonesia, they are still partial. Data protection with international standards, namely the General Data Protection Regulation (GDPR) is a stricter protection to

protect people's personal data, maintain public trust and ensure that data management meets global regulations. (Elnizar, 2019)

The Core Tax Administration System (CTAS) Tax Service System Prototype based on the TRUST Strategy is as Follows:

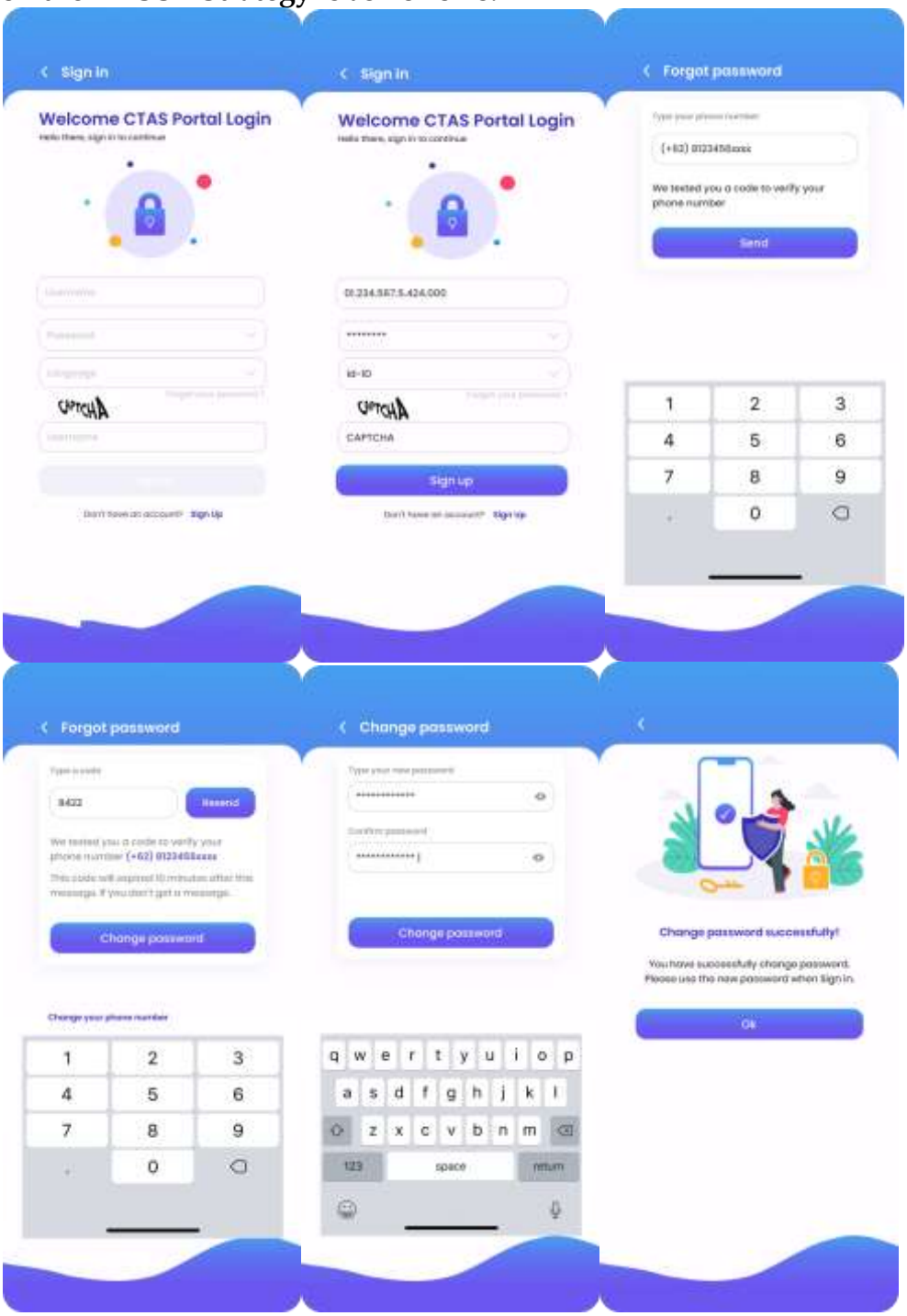

Figure 3. Multiple Safeguards on the Account Login Process

Figure 4. Detect Anomalies and Notify Users

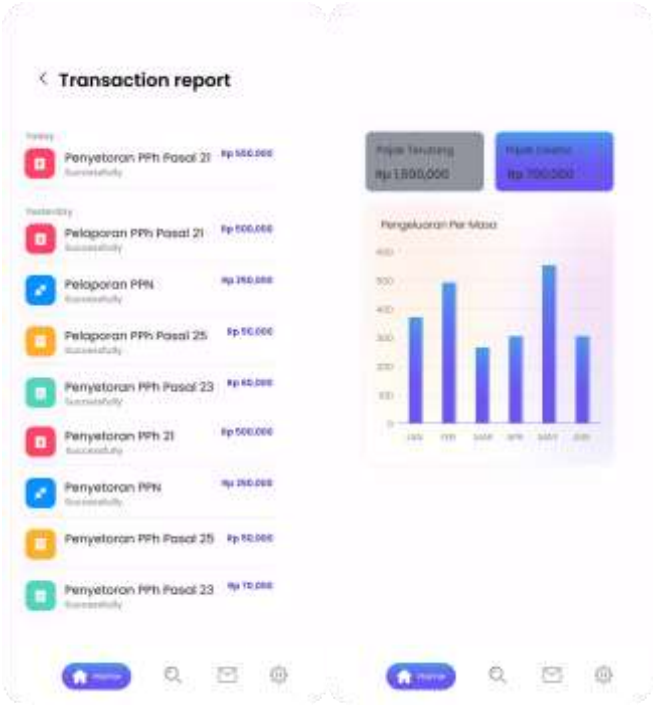

Figure 5. Transparency of User Activity that can be Monitored or Audited

CONCLUSIONS AND RECOMMENDATIONS

The Core Tax Administration System (CTAS) has great potential to enhance the security of taxpayers' personal data through the integration of advanced AI technology. With AI's ability to monitor and analyze data access patterns in real-time, the Core Tax Administration System (CTAS) can detect

breaches or unauthorized access more efficiently, thus providing assurance that sensitive information will be managed securely and in accordance with data protection regulations.

To further enhance the protection of personal data, it is recommended that the Core Tax Administration System (CTAS) consider the implementation of blockchain technology in its system. The decentralization and immutable record features of blockchain will reduce the risk of data manipulation and increase transparency in the management of tax information, thus providing an additional layer of security for taxpayers' personal data.

The government needs to apply the TRUST (Tax Revenue Unified Security Technology) strategy to maximize the protection of personal data in the Core Tax Administration System (CTAS). Some steps that can be applied include: (1) Data security assessment and planning; (2) Digital security infrastructure; (3) Tax employee training; (4) Innovative socialization to taxpayers; (5) Periodic system penetration tests; (6) Consolidation of data security teams; (7) Evaluation of data security policies; and (8) Increased compliance with GDPR (General Data protection regulation). With these measures, it is expected that the Core Tax Administration System (CTAS) can become a system that is not only efficient in tax management, but also secure in protecting taxpayers' personal data in this digital era.

At the end of this paper, we provide suggestions to the authorities, especially the government, taxpayers and the preparation of this paper. The suggestions that researchers provide are as follows:

a. Government and tax service system officials

- Security Infrastructure Improvement: The government and relevant authorities can implement strategies for implementing AI and blockchain technology as utilization of the latest technology, to improve cybersecurity infrastructure aimed at protecting taxpayers' personal data.
- Data Protection Regulations and Policies: The government is expected to formulate regulations related to the use of AI and blockchain technology in the state administration system, so that it becomes a guideline and legal certainty for the people who use it.
- Massive Socialization and Education: The massive socialization and introduction of personal data security guarantees in the Core Tax Administration System (CTAS) to taxpayers can increase public trust, which will have an impact on increasing the level of tax compliance.
- Periodic Monitoring and Evaluation: It is expected that relevant officials can conduct regular monitoring and evaluation of the effectiveness of the Core Tax Administration System (CTAS) in maintaining the protection and security of taxpayers' personal data, and make necessary improvements to the system.

b. Taxpayer

- Awareness of Personal Data Security: It is expected that taxpayers, both individuals and corporations, can further increase awareness about the

importance of maintaining the confidentiality of personal data and information provided to the Core Tax Administration System (CTAS).

- Participation in Educational Programs: Tax compliance and personal data protection will not increase if there is no taxpayer participation that supports the government program. By participating in the education and introduction program of the Core Tax Administration System (CTAS), it can be a means of disseminating information about the modernization of the tax administration system and the importance of personal data protection.

c. Future research is expected to complete

- Adding Advanced Studies on Blockchain Implementation: Future research is expected to complement the paper with more case studies on the use of blockchain technology in the tax system, including case studies from other countries as benchmarks.
- Stakeholder Engagement: With the involvement of stakeholders, such as the government, academics or practitioners in future research, it is expected to broaden the perspective on personal data protection and the application of AI and blockchain technology in the tax system.

FURTHER RESEARCH

This research still has limitations so further research is still needed on this topic "Literature Study: Data Leakage Avoidance Strategy and Personal Data Protection in Core Tax Administration System (CTAS)".

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