
Assessing the Role of AI-Based Tax Digitalization and Supervision in Reducing Corruption in Indonesia's Tax Sector

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Abstract:

This study investigates the implementation of AI-based tax digitalization and enhanced supervision as mechanisms to reduce corruption within the taxation system. Despite ongoing reforms, tax evasion remains a common issue, as illustrated by a 2021 case managed by the Regional Directorate of Taxes in Nusa Tenggara. Artificial Intelligence provides innovative tools for detecting irregularities and preventing fraudulent activities. Adopting a quantitative descriptive design, the research utilizes primary data obtained from 99 tax officers through a census sampling approach, and analyzes the data using descriptive statistics, multiple linear regression, and hypothesis testing. The results indicate that both AI-based tax digitalization and strengthened supervision have a significant and positive impact on tax evasion prevention.

Keywords: Digital Tax System; Artificial Intelligence; Tax Control; Tax Evasion; Fiscal Corruption

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1. Introduction

Indonesia is currently in the midst of the Third Phase of Tax Reform, which emphasizes the Information Technology and Data Pillar, aimed at building a reliable and secure information infrastructure and database while modernizing the overall tax administration system (Saputra, 2023). This reform seeks to enhance the effectiveness and efficiency of tax management by optimizing revenue collection, refining regulations, improving services, promoting education and compliance, and strengthening law enforcement (DGT, 2024). Despite these progressive efforts, the persistence of tax evasion remains a critical issue that undermines Indonesia's fiscal stability and public trust in government institutions. Weaknesses in monitoring, data accuracy, and manual reporting systems continue to create opportunities for manipulation, fraud, and noncompliance among taxpayers.

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Tax evasion has long been one of the key challenges faced by Indonesia's Directorate General of Taxes (DGT). Based on official data, in April 2021, the DGT Regional Office of Nusa Tenggara transferred a taxpayer suspect and supporting evidence in a tax crime case to the East Nusa Tenggara High Prosecutor's Office after the investigation was declared complete. The case involved intentional falsification of tax reports from January 2016 to November 2019, which caused significant losses to the state due to deficiencies in both Income Tax and Value Added Tax (DGT, 2021). This case highlights how traditional, paper-based administrative mechanisms remain vulnerable to manipulation. It also illustrates that even with improved regulation and oversight, the absence of advanced digital monitoring tools limits the government's ability to detect and prevent fraudulent reporting behaviors effectively.

Over the past decade, Artificial Intelligence (AI) has emerged as a transformative force reshaping tax administration globally. AI technologies have demonstrated their capacity to process massive datasets, identify irregularities, predict taxpayer risks, and automate compliance monitoring, providing governments with more powerful tools to detect and prevent evasion (Belahouaoui & Alm, 2025; Pamisetty, 2024). Several countries have implemented AI-based tax systems to strengthen monitoring and enforcement. For instance, in Nigeria, AI-powered tax monitoring frameworks have improved compliance and transparency (Onyekachi & Ihendinihu, 2025), while in Botswana, the introduction of AI frameworks has enhanced the detection of noncompliance (Munjeyi & Schutte, 2025). In advanced economies such as the United States and Europe, AI-driven analytics have contributed to greater accuracy and efficiency in tax administration (Ezeife, 2021; Ezeife et al., 2021; Amzuică, Dumitrescu, & Albu, 2023).

Globally, the integration of AI into public taxation systems has produced a wave of innovation and reform. Iran and Libya, for example, have begun implementing AI-driven technologies to strengthen administrative transparency and mitigate risks of tax evasion (Kasaeian, 2025; Ahmed & Al-Qamoudi, 2025). Hauser (2024) and Odilla (2023) observed that AI can play a significant role in reducing corruption by limiting human discretion and increasing transparency in decision-making. However, the successful deployment of AI in tax systems requires careful ethical and legal consideration, as noted by Bogucki (2025), who emphasized that issues such as data privacy, algorithmic bias, and regulatory accountability must be addressed to ensure fairness. These global experiences offer valuable insights for Indonesia as it seeks to modernize its tax system and adopt AI within its administrative framework.

A considerable body of research has examined the role of technology and supervision in reducing tax evasion, yet the results remain inconsistent. Studies such as those by Mpofu (2024) and Saragih, Reyhani, Setyowati, and Hendrawan (2023) concluded that digital transformation significantly improves tax compliance and reduces evasion by modernizing processes and increasing transparency. Conversely, Abidin (2016) found that although supervisory mechanisms contribute to reducing evasion, their influence is not always consistent, often limited by enforcement challenges. Similarly, other research suggests that while digital systems enhance efficiency, they do not

automatically change taxpayer behavior or ethical compliance (Bezditnyi, 2024; Topchii, Moroz, Karpenko, Khoronovsky, & Tarashchenko, 2025). These variations in findings highlight the complexity of linking technological advancement directly to behavioral compliance outcomes.

Despite the growing global literature on AI in taxation, a research gap remains concerning the integrated role of AI-driven digital systems and supervisory mechanisms, particularly in developing economies such as Indonesia. Most previous studies tend to focus on either digital transformation (Ahmed & Al-Qamoudi, 2025; Amzuică et al., 2023) or corruption prevention frameworks (Hauser, 2024; Odilla, 2023), without examining how these two dimensions interact in shaping systemic compliance. Furthermore, limited empirical studies investigate how AI can be institutionalized within Indonesia's tax governance to address structural weaknesses, corruption-prone points, and inefficiencies in oversight mechanisms. Hence, this study seeks to bridge that gap by analyzing the combined influence of AI-based digitalization and strengthened supervision on mitigating tax evasion and corruption.

The urgency of this research lies in Indonesia's ongoing efforts to build a robust and transparent tax administration system capable of supporting sustainable national revenue growth. As the global economy increasingly digitalizes, adopting AI technologies becomes not only a matter of efficiency but also a strategic necessity for fiscal resilience and governance reform (Quijano-Cabezas, Escobar-Marulanda, Restrepo-Carmona, & Jiménez-Builes, 2025; Bogucki, 2025). The novelty of this study is reflected in its integrated analytical approach that combines AI-based tax digitalization with enhanced supervision as dual mechanisms for improving tax integrity. By focusing on this intersection, the study provides a new theoretical and practical contribution to understanding how technology-driven oversight can close corruption loopholes while fostering taxpayer trust and accountability.

Accordingly, the present study aims to evaluate and validate the impact of AI-based tax digitalization and strengthened supervision as interrelated strategies to reduce corruption and tax evasion within Indonesia's taxation system. Building upon international evidence and local policy reforms, the study contributes to the empirical understanding of how AI can be effectively leveraged to improve transparency, compliance, and administrative performance in public finance governance (Belahouaoui & Alm, 2025; Onyekachi & Ihendinihu, 2025; Saragih et al., 2023). The expected outcome is to generate actionable recommendations for policymakers and tax authorities on implementing AI-based digital infrastructures aligned with Indonesia's broader fiscal reform and digital transformation agenda.

2. Theoretical Background

The Influence of AI-Based Tax Digitalization on Tax Evasion Prevention

The integration of Artificial Intelligence (AI) into tax administration represents one of the most transformative shifts in public financial governance, offering new mechanisms for enhancing transparency, efficiency, and accountability. AI-based tax

digitalization refers to the adoption of intelligent systems and data-driven technologies to automate tax processing, detect irregularities, and improve compliance monitoring (Ezeife, 2021; Ezeife, Kokogho, Odio, & Adeyanju, 2021). Through machine learning, predictive analytics, and anomaly detection, AI can analyze massive datasets, identify suspicious patterns, and predict taxpayer risk profiles with far greater precision than traditional methods (Belahouaoui & Alm, 2025; Pamisetty, 2024).

Globally, AI-driven digitalization has shown strong potential to reduce tax evasion and fraud. Studies in developed economies, such as those by Amzuică, Dumitrescu, and Albu (2023), demonstrate that the use of AI and big data analytics enhances revenue collection by minimizing manual intervention and human error. Similarly, Ahmed and Al-Qamoudi (2025) found that digital transformation of tax systems in Libya significantly improved transparency and decreased opportunities for manipulation. In Indonesia, Saragih, Reyhani, Setyowati, and Hendrawan (2023) revealed that the application of AI technologies in tax administration modernization enhanced service efficiency and compliance monitoring.

Furthermore, AI-based tax digitalization strengthens institutional capacity by improving data integrity and supporting real-time compliance monitoring (Onyekachi & Ihendinihu, 2025). It allows tax authorities to trace undeclared income, detect false reporting, and identify inconsistencies in taxpayer behavior. According to Mpofu (2024), the deployment of AI technologies in developing countries offers significant prospects for reducing evasion, although challenges related to technical readiness and governance persist. However, Bogucki (2025) cautioned that ethical and legal frameworks must accompany these systems to ensure transparency and accountability. Collectively, these findings suggest that AI-based digitalization has a direct and substantial impact on reducing tax evasion by closing data gaps, automating verification, and fostering compliance.

H1: AI-Based Tax Digitalization has a significant effect on Tax Evasion Prevention.

The Influence of Strengthened Tax Supervision on Tax Evasion Prevention

Effective tax supervision is central to ensuring compliance and minimizing opportunities for evasion. Strengthened tax supervision encompasses the systematic monitoring of taxpayer activities, risk-based audits, and consistent enforcement of tax laws (DGT, 2024). It plays a vital role in deterring fraudulent practices by increasing the perceived risk of detection and punishment. According to Abidin (2016), tax supervision exerts a negative but significant relationship with tax evasion, meaning that as supervision intensity increases, evasion tends to decline despite implementation challenges.

Studies have shown that improved supervision mechanisms enhance both voluntary and enforced compliance. For instance, Topchii, Moroz, Karpenko, Khoronovskiy, and Tarashchenko (2025) highlighted that strong preventive oversight contributes to financial stability by reducing the incidence of tax crimes. Likewise, Munjeyi and Schutte (2025) demonstrated that institutional frameworks supported by advanced supervisory tools help minimize noncompliance through early detection of

irregularities. Effective supervision not only identifies tax fraud but also builds public confidence in the fairness of the tax system (Hauser, 2024; Odilla, 2023).

The advancement of digital supervision also allows for more comprehensive, data-based monitoring. As Pamisetty (2024) observed, predictive analytics and AI-driven compliance tools enable tax authorities to proactively identify high-risk taxpayers, thus improving audit accuracy. Belahouaoui and Alm (2025) further confirmed that technology-enabled fraud detection systems significantly reduce tax evasion by enhancing the oversight function. Hence, strengthened tax supervision—particularly when supported by technological innovation—serves as a crucial deterrent to evasion and contributes to a culture of compliance.

H2: Strengthened Tax Supervision has a significant effect on Tax Evasion Prevention.

The Combined Impact of AI-Based Tax Digitalization and Strengthened Supervision on Tax Evasion Prevention

While AI-based tax digitalization and strengthened supervision individually influence compliance, their combined application produces synergistic effects that amplify the prevention of tax evasion. Integrating AI into supervisory processes enables tax authorities to transition from reactive to predictive monitoring, allowing earlier detection of irregularities and potential fraud (Quijano-Cabezas, Escobar-Marulanda, Restrepo-Carmona, & Jiménez-Builes, 2025). When AI-based data analytics are embedded in supervisory functions, oversight becomes continuous, data-driven, and less susceptible to human bias or corruption (Hauser, 2024; Odilla, 2023).

Saragih et al. (2023) emphasized that the modernization of Indonesia's tax system requires not only digital transformation but also institutional strengthening to ensure that technological advances are effectively implemented. Similarly, Bezditnyi (2024) argued that integrating AI into tax planning and regulatory compliance can optimize enforcement outcomes and align organizational behavior with policy goals. Studies in developing nations, such as those by Mpfu (2024) and Kasaeian (2025), suggest that the successful combination of digital systems and rigorous supervision leads to higher compliance and reduced opportunities for corruption.

Moreover, the adoption of AI-based supervision contributes to the integrity of public administration by minimizing manual intervention and improving audit transparency. Onyekachi and Ihendinihu (2025) found that in Nigeria, AI-powered monitoring systems significantly enhanced compliance levels and curbed fraudulent reporting. Ahmed and Al-Qamoudi (2025) likewise reported that integrated digital systems create closed loops that prevent revenue leakage and promote accountability. As Bogucki (2025) notes, the joint use of digital tools and ethical supervision frameworks provides a holistic model for transparent and effective governance. Therefore, combining AI-driven digitalization with strengthened supervision can serve as a comprehensive strategy to prevent tax evasion and improve fiscal integrity.

H3: AI-Based Tax Digitalization and Strengthened Tax Supervision jointly have a significant effect on Tax Evasion Prevention.

3. Methodology

This study employs a descriptive quantitative research design, which aims to systematically identify, measure, and explain the relationships among key variables associated with AI-based tax digitalization and enhanced tax supervision in preventing tax evasion and corruption. The quantitative descriptive approach was selected because it allows the researcher to objectively quantify the influence of independent variables (AI-based digitalization and strengthened supervision) on the dependent variable (tax evasion prevention) through statistical testing (Creswell & Creswell, 2018). This design facilitates the description of patterns within the population while enabling hypothesis testing using inferential methods.

Data collection was conducted through a structured questionnaire distributed directly to respondents, ensuring primary, first-hand insights from tax officials actively involved in the implementation and monitoring of digitalized tax systems. The questionnaire items were developed based on validated constructs drawn from previous studies on AI in taxation, compliance, and governance (Saragih, Reyhani, Setyowati, & Hendrawan, 2023; Onyekachi & Ihendinihu, 2025; Belahouaoui & Alm, 2025). In addition to the questionnaire, observation, interviews, and documentation techniques were employed to enrich the data and cross-verify responses. Observations were made on the operational use of digital platforms and AI-assisted monitoring systems, while interviews with key officials provided deeper contextual understanding regarding tax supervision practices. Documentation involved the examination of internal records, official circulars, and reports related to tax digitalization and compliance monitoring at the institutional level.

The study was conducted at the Pratama Tax Service Office (KPP Pratama) Kupang, which was selected as the research locus due to its active involvement in the national tax modernization initiative and early adoption of AI-based tax administration technologies. A census sampling technique was utilized, meaning that all members of the accessible population were included as respondents to maximize data coverage and avoid sampling bias. The total population comprised 99 tax officials, encompassing various functional roles including tax examiners, auditors, and compliance officers. This approach ensured comprehensive representation of experiences and perspectives relevant to the implementation of AI-based tax systems and supervision activities.

Data analysis was performed using both descriptive and inferential statistical methods. Descriptive analysis was applied to summarize the demographic characteristics of respondents, such as gender, education, and job position, as well as to describe the distribution and central tendency of each variable (mean, standard deviation, and frequency). This stage provided an overview of the data quality and respondent perceptions regarding AI-based digitalization, strengthened supervision, and tax evasion prevention.

To test the research hypotheses, multiple linear regression analysis was employed. The regression model was formulated to examine the influence of the independent variables — AI-based digitalization (X_1) and strengthened tax supervision (X_2) — on the dependent variable, tax evasion prevention (Y). Prior to regression analysis, classical assumption tests (including normality, multicollinearity, and heteroscedasticity) were conducted to ensure that the model met statistical validity requirements. The t-test was used to determine the partial or individual influence of each independent variable on the dependent variable, whereas the F-test assessed their simultaneous or joint effect. A significance level (α) of 0.05 was adopted as the decision criterion, indicating that relationships between variables were considered statistically significant when $p < 0.05$.

The analytical procedure enabled the researcher to draw valid and evidence-based conclusions regarding how AI-based digitalization and enhanced supervision contribute to preventing tax evasion. By combining descriptive insights with inferential testing, the study not only identified the magnitude and direction of effects but also provided empirical evidence supporting the integration of digital and supervisory mechanisms in tax governance systems. The quantitative approach thus ensured objectivity, reproducibility, and robustness in assessing the causal relationships proposed in the research hypotheses.

4. Empirical Findings/Result

Descriptive statistics

Descriptive statistics are used to provide an overview of the research data by presenting key measures such as the mean, median, standard deviation, variance, range, minimum, and maximum values. This analysis describes the characteristics and distribution of the study variables without establishing causal relationships.

Table 1. Descriptive Statistics Results

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Implementation of AI-Based Tax Digitalization	99	20	35	27.64	2.742
Strengthening Tax Supervision	99	28	50	39.46	4.556
Prevention of Tax Evasion	99	33	55	45.73	5.577
Valid N (listwise)	99				

Source: 2025 processed original data

Table 1. presents the results of the descriptive statistical analysis. The number of valid observations (N) is 99. The minimum values for each variable are as follows: AI-Based Tax Digitalization (20), Strengthened Tax Supervision (28), and Tax Evasion Prevention (33). Meanwhile, the maximum values recorded are 35, 50, and 55, respectively. The mean scores for each variable indicate average values of 27.64 for AI-Based Tax Digitalization, 39.46 for Strengthened Tax Supervision, and 45.73 for

Tax Evasion Prevention. The standard deviations are 2.74, 4.58, and 5.58, respectively, showing moderate variability among respondents perceptions. Overall, these results suggest that the responses across all variables are relatively consistent, indicating a stable pattern in the dataset.

Instrument Test

Validity test

The validity test aims to determine whether the questionnaire items distributed to respondents are appropriate and accurately measure the intended constructs. An indicator is considered valid if the calculated correlation coefficient (r-count) is greater than the critical value (r-table) and has a positive value (Ghozali, 2018). In this study, a total of 99 questionnaires were analyzed, resulting in a degree of freedom (df) of 97 with a 95% confidence level ($\alpha = 5\%$), where the r-table value is 0.199. Based on the Pearson correlation results, all question items showed correlation coefficients higher than the critical value (r-count > r-table = 0.199). Therefore, it can be concluded that all items in the questionnaire are valid and suitable for further analysis.

Reliability Test Results

The reliability test is conducted to assess the consistency and dependability of the measurement instrument. In this research, the reliability analysis was performed to ensure that the questionnaire responses were stable and dependable across all items. A questionnaire is deemed reliable when the Cronbach's Alpha coefficient exceeds 0.70 (Ghozali, 2018).

Table 2. Reliability Test Results

No.	Variable	Cronbach's Alpa	Role of Thumb	Result Details
1	Implementation of AI-Based Tax Digitalization	0.774	0.70	Reliable
2	Strengthening Tax Supervision	0.872	0.70	Reliable
3	Prevention of Tax Evasion	0.868	0.70	Reliable

Source: 2025 processed original data

As presented in Table 2, all variables in this study recorded Cronbach's Alpha values greater than 0.70, indicating that each construct demonstrates strong internal consistency. Hence, the questionnaire items used in this research can be classified as reliable and consistent.

Traditional assumption test

Test of normalcy

The normality test was conducted to determine whether the residuals in the regression model were normally distributed, as a good regression model requires both dependent and independent variables to exhibit a normal or near-normal distribution (Ghozali,

2018). According to Santosa (2012), data are considered normally distributed when the significance value exceeds 0.05.

Table 3. Data Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
Unstandardized Residual		
N		99
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	4.75272486
Most Extreme Differences	Absolute	.087
	Positive	.087
	Negative	-.062
Test Statistic		.087
Asymp. Sig. (2-tailed)		.062 ^c
Exact Sig. (2-tailed)		.419
Point Probability		.000

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Source: 2025 processed original data

As shown in Table 3, the Kolmogorov–Smirnov test produced an Exact. Sig (2-tailed) value of 0.419, which is greater than 0.05. This indicates that the residual data follow a normal distribution, suggesting that the regression model satisfies the normality assumption.

Test of Multicollinearity

The multicollinearity test aims to verify whether any high correlation exists among the independent variables in the regression model. A reliable regression model should not exhibit multicollinearity. This can be assessed using the Variance Inflation Factor (VIF) and Tolerance values.

Table 4. Results of Multicollinearity Testing

Model		Coefficients ^a					Collinearity Statistics	
		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Tolerance	VIF
		B	Std. Error	Beta				
1	(Constant)	29.285	4.990		5.869	.000		
	Implementation of AI-Based Tax Digitalization	-1.168	.471	-.574	-2.482	.015	.141	7.081
	Strengthening Tax Supervision	1.235	.283	1.009	4.358	.000	.141	7.081

a. Dependent Variable: Prevention of Tax Evasion

Source: 2025 processed original data

Based on Table 4, all independent variables have tolerance values greater than 0.1 and VIF values less than 10. Specifically, the VIF value for AI-Based Tax Digitalization (X1) and Strengthened Tax Supervision (X2) is 7.081 each. These results confirm that no multicollinearity problem is present in the regression model.

Test of Heteroscedasticity

The heteroscedasticity test was conducted to examine whether the residual variance in the regression model remained constant across observations. The Glejser test was employed, where the absolute residual values are regressed against the independent variables. If the significance value (Sig) exceeds 0.05, heteroscedasticity is absent; conversely, a value below 0.05 indicates its presence.

Table 5. Heteroscedasticity Test Results

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	20.232	2.370		.000
	Implementation of AI-Based Tax Digitalization	-.368	.224	-.357	.103
	Strengthening Tax Supervision	-.159	.135	-.256	.241

a. Dependent Variable: abs_res

Source: 2025 processed original data

As presented in Table 5, the significance values for both AI-Based Tax Digitalization (X1) and Strengthened Tax Supervision (X2) are greater than 0.05. Therefore, it can be concluded that the regression model is free from heteroscedasticity, confirming the homogeneity of residual variance across all observations.

Multiple Linear Regression Analysis

Multiple linear regression analysis was performed to evaluate both the strength and direction of the relationship between the dependent and independent variables.

Table 6. Multiple Regression Analysis Results

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	29.285	4.990		.000
	Implementation of AI-Based Tax Digitalization	-1.168	.471	-.574	.015
	Strengthening Tax Supervision	1.235	.283	1.009	.000

a. Dependent Variable: Prevention of Tax Evasion

Source: 2025 processed original data

Based on the results presented in Table 6, the regression equation obtained is:

The interpretation of this model is as follows: The constant value (29.285) implies that if both independent variables—Implementation of AI-Based Tax Digitalization (X_1) and Strengthening of Tax Supervision (X_2)—are assumed to be zero, the predicted value of Tax Evasion Prevention (Y) is 29.285. The coefficient for X_1 (-1.168) indicates that a one-unit increase in AI-Based Tax Digitalization leads to a 1.168-unit decrease in Tax Evasion Prevention, assuming other variables remain constant. This suggests that technological digitalization alone may not effectively reduce tax evasion without adequate supervision. The coefficient for X_2 (1.235) signifies that each one-unit increase in Strengthening of Tax Supervision increases Tax Evasion Prevention by 1.235 units, assuming other variables remain unchanged. This reflects the significant contribution of tax supervision in reducing evasion practices. According to the decision rule, the variable with the highest absolute t-value or largest standardized beta coefficient (β) is considered the most influential factor. The results show that Strengthening of Tax Supervision (X_2) is the dominant predictor of Tax Evasion Prevention (Y), with a t-value of 4.358 and a β coefficient of 1.009, which are higher than those of AI-Based Tax Digitalization (X_1). Thus, supervisory measures have a stronger impact on tax evasion prevention compared to digitalization alone.

Coefficient of Determination (R Square)

The coefficient of determination (R^2) essentially measures how well the regression model explains the variation in the dependent variable. The explanatory power of the model is assessed using the Adjusted R-Square value, which provides a more accurate estimate by accounting for the number of predictors included.

Table 7. Determination Coefficient Results

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.523 ^a	.274	.259	4.802

a. Predictors: (Constant), Strengthening Tax Supervision, Implementation of AI-Based Tax Digitalization

Source: 2025 processed original data

As presented in Table 7, the R-Square value is 0.274, indicating that approximately 27.4% of the variation in the dependent variable—Tax Evasion Prevention (Y)—can be explained by the independent variables, namely Implementation of AI-Based Tax Digitalization (X_1) and Strengthening of Tax Supervision (X_2). The remaining 72.6% of the variation is attributed to other factors not included in the current model, suggesting that additional variables outside the scope of this study may also influence tax evasion prevention.

Hypothesis Test

t-Test Results

The t-test was conducted to examine the partial effect of each independent variable—Implementation of AI-Based Tax Digitalization (X_1) and Strengthening of Tax Supervision (X_2)—on the dependent variable, Tax Evasion Prevention (Y). This test

aims to identify whether each independent variable has a statistically significant impact when analyzed separately.

Table 8. T-Test Results

Coefficients ^a					
Model		Unstandardized Coefficients		Standardized Coefficients	Sig.
		B	Std. Error	Beta	
1	(Constant)	29.285	4.990		.000
	Implementation of AI-Based Tax Digitalization	-1.168	.471	-.574	.015
	Strengthening Tax Supervision	1.235	.283	1.009	.000

a. Dependent Variable: Prevention of Tax Evasion

Source: 2025 processed original data

Based on Table 8, the variable Implementation of AI-Based Tax Digitalization (X_1) has a p-value of 0.015, which is less than 0.05, indicating that H_0 is rejected and H_1 is accepted. This result implies that AI-Based Tax Digitalization has a significant negative effect on Tax Evasion Prevention ($B = -1.168$). Therefore, the first hypothesis (H_1) is supported. Meanwhile, the variable Strengthening of Tax Supervision (X_2) shows a p-value of 0.000, which is also below 0.05, leading to the rejection of H_0 and acceptance of H_1 . This demonstrates that Strengthening of Tax Supervision has a significant positive effect on Tax Evasion Prevention ($B = 1.235$), confirming the second hypothesis (H_2). Among the two variables, Strengthening of Tax Supervision (X_2) exerts the most dominant influence, as it has a higher t-statistic (4.358) compared to AI-Based Tax Digitalization (X_1) with a t-statistic of -2.482. This finding suggests that enhanced tax oversight plays a more substantial role in preventing tax evasion than digitalization alone.

F-Test Results

The F-test was employed to determine whether the independent variables collectively influence the dependent variable. This test evaluates the simultaneous significance of Implementation of AI-Based Tax Digitalization (X_1) and Strengthening of Tax Supervision (X_2) on Tax Evasion Prevention (Y).

Table 9. F-Test Results

ANOVA ^a					
Model		Sum of Squares	df	Mean Square	Sig.
1	Regression	833.974	2	416.987	18.083
	Residual	2213.663	96	23.059	
	Total	3047.636	98		

a. Dependent Variable: Prevention of Tax Evasion

b. Predictors: (Constant), Strengthening Tax Supervision, Implementation of AI-Based Tax Digitalization

Source: 2025 processed original data

According to Table 9, the calculated F-value is 18.083, with a significance level of 0.000, which is below 0.05. Hence, H_0 is rejected and H_1 is accepted, indicating that the independent variables, when considered together, have a statistically significant effect on Tax Evasion Prevention (Y). These findings confirm that the integration of digitalization and supervisory measures significantly contributes to reducing tax evasion within the Indonesian taxation system.

5. Discussion

The findings of this study reveal that AI-based tax digitalization has a significant yet negative effect on the prevention of tax evasion. Although artificial intelligence offers automation, accuracy, and transparency in tax administration, its success is contingent upon technological readiness, system integration, and digital literacy among both taxpayers and officials. Similar observations were made by Kasaeian (2025), who noted that the adoption of AI in public tax administration in Iran faced challenges due to limited technological infrastructure and insufficient human resource capacity. Mpofu (2024) also highlighted that in developing countries, the implementation of AI systems often encounters obstacles such as outdated databases, inadequate inter-agency coordination, and weak digital governance. These limitations diminish the capability of AI-based systems to identify irregularities and detect fraud efficiently. In addition, Ezeife (2021) and Ezeife et al. (2021) demonstrated that the success of AI-driven tax technology in the United States depends heavily on the maturity of data analytics frameworks and continuous system upgrades. When digital systems are poorly integrated or operate on limited bandwidth, the predictive accuracy of AI declines, leading to inefficiencies in identifying suspicious transactions. Therefore, while AI-based automation enhances transparency, it does not guarantee deterrence against evasion unless accompanied by robust infrastructure and well-trained personnel (Amzuică, Dumitrescu, & Albu, 2023; Bezdityni, 2024).

The empirical evidence further indicates that technological readiness and user competence are decisive factors in determining the positive impact of AI-based digitalization. Belahouaoui and Alm (2025) found that AI-based tax fraud detection systems in advanced economies only achieve optimal performance when supported by standardized databases, data-sharing policies, and ethical guidelines. Bogucki (2025) cautioned that legal and socioeconomic considerations must also accompany digital reform to avoid algorithmic bias, misuse of data, and inequality in enforcement. These insights resonate with the Indonesian context, where digital transformation is still evolving under the Third Phase of Tax Reform. Without adequate investments in cloud infrastructure, cybersecurity, and staff training, AI-based reforms risk creating a “digital divide” between central and regional tax offices. Consequently, as supported by Ahmed and Al-Qamoudi (2025), digital transformation in taxation should be complemented by continuous capacity building to ensure that technological innovation translates into measurable compliance outcomes.

The study also found that strengthened tax supervision has a positive and statistically significant relationship with the prevention of tax evasion. Effective oversight

mechanisms—supported by transparent audits and consistent enforcement—are vital in fostering taxpayer compliance and curbing fraudulent behavior. This result reinforces the conclusion of Topchii et al. (2025), who emphasized that preventive tax control significantly contributes to the financial stability of the state by reducing the incidence of criminal fiscal offenses. Similarly, Hauser (2024) and Odilla (2023) asserted that anti-corruption initiatives leveraging digital tools can only succeed when accompanied by strong supervisory institutions and credible enforcement of sanctions. Weak supervision can undermine even sophisticated AI-based tax systems, as ineffective oversight diminishes the perceived risk of detection among taxpayers. Thus, strengthening risk-based audits, increasing monitoring frequency, and ensuring consistent application of penalties are essential to sustaining deterrence and fairness in tax governance.

The positive impact of supervision observed in this study is also consistent with the findings of Munjeyi and Schutte (2025) in Botswana, who demonstrated that developing an AI framework to combat tax noncompliance must include embedded human oversight to interpret data-driven alerts accurately. In contrast, an overreliance on automation without human verification can lead to false positives and inefficiencies. Saragih, Reyhani, Setyowati, and Hendrawan (2023) similarly emphasized that in Indonesia, modernization of tax systems through AI should not replace supervision but rather enhance it through real-time analytics and predictive modeling. The fusion of human expertise and AI intelligence is therefore key to achieving sustainable tax governance.

The combined analysis of this study confirms that AI-based tax digitalization and strengthened supervision jointly exert a significant influence on tax evasion prevention. Integrating these two dimensions allows tax authorities to detect, monitor, and address noncompliance more effectively. This outcome aligns with Pamisetty (2024), who demonstrated that predictive analytics and AI-driven compliance monitoring tools enhance oversight efficiency when embedded in an integrated management system. Onyekachi and Ihendinihu (2025) likewise found that AI-powered tax monitoring in Nigeria substantially improves compliance when supported by real-time supervisory feedback loops. Furthermore, Quijano-Cabezas et al. (2025) argued that intelligent fiscal systems generate optimal results only when technological and institutional reforms progress simultaneously, ensuring that data-driven insights translate into enforcement actions.

However, the findings also underscore that technology alone is insufficient to ensure compliance. Bogucki (2025) and Hauser (2024) warned that digital systems must be accompanied by governance frameworks that uphold transparency, accountability, and ethical use of data. This view echoes the deterrence theory, which posits that taxpayer compliance increases when the perceived probability of detection and punishment is high (Becker, 1968). In other words, automation must be complemented by credible enforcement. The synergy between AI-based systems and supervisory mechanisms enables tax authorities to strengthen both administrative convenience and the deterrent effect, thereby improving voluntary compliance.

Furthermore, this integrated model supports a shift toward data-driven oversight, where AI tools identify anomalies and human supervisors conduct targeted audits, optimizing both efficiency and accuracy. This hybrid strategy mirrors the recommendations of Bezditnyi (2024), who highlighted the importance of AI for optimizing tax planning and compliance monitoring, and of Amzuică et al. (2023), who observed that AI implementation requires adaptive business responses to sustain compliance under digital transformation. The alignment of technological and supervisory functions ensures that policy objectives—such as reducing evasion, increasing transparency, and restoring public trust—are achieved cohesively.

Ultimately, the results indicate that Indonesia's path toward AI-enabled tax governance should focus not merely on technological deployment but on institutional readiness. Consistent with Ahmed and Al-Qamoudi (2025) and Mpofu (2024), developing nations must prioritize capacity building, cross-agency collaboration, and digital literacy enhancement to overcome infrastructural and cultural barriers. The combination of digital innovation and robust supervision forms the foundation for a transparent, accountable, and corruption-resistant tax system. Therefore, sustainable coordination between AI technology and supervisory frameworks is essential for enhancing compliance, strengthening institutional credibility, and supporting Indonesia's long-term fiscal resilience.

6. Conclusions

The findings of this research conclude that both AI-Based Tax Digitalization (X_1) and Strengthening of Tax Supervision (X_2) significantly influence Tax Evasion Prevention (Y), both individually and jointly. The partial test results show that AI-Based Tax Digitalization has a negative and significant effect on the prevention of tax evasion, suggesting that despite technological progress, its effectiveness depends on the readiness of infrastructure and human resource competence. In contrast, Strengthening of Tax Supervision exerts a positive and significant impact, indicating that improved monitoring, risk-based auditing, and consistent enforcement play an essential role in minimizing tax evasion. The simultaneous test further confirms that the integration of AI technology and supervisory mechanisms has a significant collective effect, emphasizing the importance of synergy between digital innovation and institutional oversight in enhancing tax transparency, accountability, and compliance.

In line with these conclusions, several recommendations are proposed. The Kupang Pratama Tax Service Office and the Indonesian Directorate General of Taxes should prioritize the strengthening of AI-based digitalization through reliable technological infrastructure, data protection, and system integration. Equally important, the human element must be reinforced through continuous training and digital literacy improvement to ensure smooth adaptation to AI-based systems. Tax authorities should also enhance risk-based supervision, provide consistent sanctions, and intensify taxpayer education and outreach to build trust in digital tax administration. For future researchers, it is suggested to expand the study scope by involving larger samples or additional factors such as taxpayer ethics, moral values, and public trust, to develop a

broader understanding of the behavioral and institutional aspects influencing tax evasion prevention in the era of digital transformation.

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