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The effect of algoritmics government, artificial intelligence, and tax service on tax compliance

Akbari Adha*), Rulinawaty Rulinawaty, Faizal Madya
Universitas Terbuka, Jakarta, Indonesia

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ABSTRACT

Taxes are an essential pillar of countries and nations. It contributes to the country's economic growth and support for sustainable development. Therefore, this study aims to investigate the effect of algorithmic government, artificial intelligence, and tax services on tax compliance. This research uses a quantitative approach with a survey method. The sample was 393 taxpayers. The research instrument used was a questionnaire designed on a Likert scale with five response options. The questionnaire was distributed via the WhatsApp application and email in Google Form format. Data were analyzed using regression. The results found that algorithmic government, AI, and tax services, partially and simultaneously, affect tax compliance among taxpayers. These findings provide insight into how tax compliance can be improved through algorithmic government, AI, and tax services. Therefore, researchers and practitioners can discuss the findings of this research critically and in depth before adapting and adopting them in their future work without ignoring the limitations of this research.

Corresponding Author:

Akbari Adha,
Universitas Terbuka,
Email: akbariadhautmap@gmail.com

Intruduction

Taxes are an essential pillar for the economy and development of a nation-state. Taxes contribute to the country's economic growth (Akbulaev, 2024;, Menescal & Alves, 2024). Taxes also provide vital support for sustainable development (Dradra, 2024). Unfortunately, not all countries have succeeded in collecting taxes well. One of the triggers is taxpayer compliance. The study by Tendean et al. (2023) in Indonesia demonstrated that taxpayer compliance impacts tax revenue. It also happens at KPP Pratama Jakarta Mampang, South Jakarta, due to an increase in the number of taxpayers required to submit tax returns, report, and receive taxpayer payments. For example, in the last five years, the percentage of corporate and individual taxpayers reporting and receiving deposits has decreased for the economy and development, so it is crucial and urgent to be researched scientifically. Empirically, taxpayer compliance can be triggered by government algorithms (Oladipo et al., 2022), artificial intelligence (AI) (Belahouaoui & Attak, 2024), and tax service (Andriani & Tarmidi, 2024). However several studies indicated contradictory results. Fort example, Kamil (2022) demonstrated that AI does not significantly impact tax compliance. Neuman and Sheu (2022) also indicated that the use of advanced technologies, such as AI, does not affect compliance. Additionally, Korir et al. (2015) prove that fairness as an indicator of algorithmic government has no significant effect on tax compliance. This empirical fact raises research gaps that require scientific clarification. Based on this urgency, this research aims to investigate the effect of algorithmic government, artificial intelligence, and tax services on tax compliance.

Tax Compliance

Tax compliance is the willingness of taxpayers to act in accordance with tax laws and regulations, report their income accurately, and pay taxes on time (Tilahun, 2019). It also refers to the degree to which individuals and businesses follow tax laws and regulations by correctly reporting their income, deductions, and other pertinent details, as well as paying the taxes they owe to the government (Alkhatib et al., 2020). Tax compliance involves accurately reporting all income and paying all taxes in accordance with the requirements set by laws, regulations, and court rulings (Alshira'h & Abdul-Jabbar, 2020). There are three types of compliance that have been recognized: committed compliance, where taxpayers willingly and fully comply with tax laws; capitulative compliance, where taxpayers comply due to fear of penalties; and innovative compliance, where taxpayers find creative ways to comply with tax laws. It is also proposed that compliance can still be enforced or resisted (Alshira'h & Abdul-Jabbar, 2020).

Tax compliance, a persistent challenge for policymakers worldwide, is a crucial aspect of financial governance. Taxes, serving as the primary financial resource for governments to fund their public expenditures, have been a part of human society since its inception. Throughout history, individuals have continually sought methods to evade or avoid paying them. Consequently, tax compliance remains a prominent topic in taxation literature (Twesige et al., 2024). A wide range of actions falls under the umbrella of tax compliance, such as filing taxes on time, paying them, and reporting them, as well as promptly registering for taxes, keeping accurate accounting records, and providing the required information to assist with tax audits.

Two sorts of factors affect tax compliance: non-economic and economic. Tax rates, fines, audit probability, real income levels, tax benefits, and the frequency of tax audits are all considered economic variables. Opinions regarding the tax code's fairness, views on taxes, and cultural, national, and individual standards are examples of non-economic issues. These attributes are consistent with the findings of multiple other researchers (Lois et al., 2019), (Sadress et al., 2019). According to Muliari and Setiawan (2011), indicators of taxpayer compliance consist of submitting annual notification letters on time, fulfilling tax obligations, having no tax arrears, paying taxes on time, and never being punished for committing tax evasion.

Algorithmic Government and Tax Compliance

Algorithmic government, a concept that harnesses the power of algorithms, computational calculations, automated decision-making, and machine learning, holds immense potential to assess, direct, regulate, and manage the behavior of both human and non-human agents in various contexts (Gritsenko & Wood, 2022). It's a tool that can be used to regulate and manage various aspects of society, from public services to labor practices and content moderation, and it encompasses a wide range of sociotechnical practices that shape social order through the implementation of algorithmic systems (Katzenbach & Ulbricht, 2019).

Algorithmic government is also related to using algorithms in the government process to make decisions, implement policies, and coordinate social interactions. It involves deploying algorithmic systems to steer government processes, potentially shifting power relations and altering distributive outcomes within those processes (Gritsenko & Wood, 2022). It also describes the use of algorithms, particularly in the context of artificial intelligence and machine learning, to automate decision-making processes in various aspects of society (Srivastava, 2023). Algorithmic government, while structured to cater to the interests of those currently in power, also places a strong emphasis on algorithmic responsibility and accountability. The capital required to build AI at scale implies that the government of algorithms is structured to benefit the current dominant interests (Crawford, 2021). However, the challenges it presents, such as algorithmic responsibility and accountability, are being addressed through approaches like co-design, ensuring that algorithms are developed and used in a responsible and accountable manner (Dekker et al., 2022).

Algorithmic government encompasses how algorithms influence and regulate various aspects of society, highlighting the importance of understanding user behaviors, perceptions, and experiences in developing effective regulatory frameworks (Festic, 2022). The algorithm's design involved three developmental stages: selecting and pre-processing data, training and applying machine learning techniques, and post-processing (Dekker et al., 2022). According to Dwork and Roth (2014), algorithmic government comprises five indicators: transparency, causality, bias, fairness, and safety. If in good condition, these indicators can stimulate tax compliance among taxpayers. Several prior studies also indicated that transparency and tax fairness as indicators of algorithmic government impact tax compliance (Bin-Nashwan et al., 2020; Mangoting et al., 2019; Oladipo et al., 2022; Simone et al., 2020). Therefore, it can formulate the first hypothesis (H):

$\mathbf{H_1}$: Algorithmic government impacts tax compliance.

Artificial Intelligence and Tax Compliance

Tax compliance is also affected by artificial intelligence (AI). The previous studies indicated that AI influences tax compliance. For example, Kamil, (2022) and Belahouaoui and Belahouaoui & Attak (2024) demonstated that AI improving tax compliance behavior. Further, Hermawan (2022) claims that digital transformation as a part of AI affect tax compliance. Madya et al. (2022) also prove that AI improves compliance in public service. Conceptually, AI is a scientific and applied field focused on developing technological and software systems that mimic human cognitive functions. These systems, known as digital twins of human intelligence, are designed to learn, adapt, and evolve independently based on preference criteria. They aim to enhance their functional capabilities through quality decision-making and adopting creative, innovative, high-tech solutions. For this, a strategic roadmap is being created (Bryndin, 2020). AI is also described as an emerging discipline that seeks to mimic and expand upon human intelligence, building a set of research methodologies, scientific principles, and useful applications. This project aims to develop autonomous learning capabilities in intelligent machines or systems, as well as picture and speech recognition, human-computer interaction, and human-computer gaming (Hou & Xu, 2021). AI focuses on developing intelligent applications and algorithms that aid in making sound decisions (Mijwil et al., 2022).

AI is driving the evolution of computer image recognition technology, enabling machines to perceive, analyze, and understand visual data in ways that are revolutionizing industries and enhancing human experiences (Xu, 2023). In an educational context, AI supports educators by enabling them to teach scientific subjects in a clear, accessible manner and to share this knowledge with students effectively (Mijwil et al., 2022). AI in computer science is building intelligent machines that can perform activities that normally require human intelligence. These activities address linguistic comprehension, learning, perception, thinking, problem-solving, and decision-making. AI technologies focus on human cognitive processes, such as experience-based learning, information adaptation, and data-driven decision-making. Narrow AI and broad AI are the categories into which AI systems fall. Facial recognition and language translation are examples of narrow AI, sometimes known as weak AI, that is intended to do particular tasks inside a limited domain. General artificial intelligence, or strong AI, on the other hand, seeks to carry out any intellectual work that a human can. Artificial intelligence (AI) is developing quickly and can change industries by improving productivity and decision-making (Shi et al., 2022).

AI consists of advanced digital systems designed to carry out tasks that usually necessitate human intelligence (Aggarwal et al., 2022). It implies that tasks can be automated, enabling individuals to make informed decisions that enhance the development of their professional lives (Rammo & Al-Hamdani, 2022), (Valle-Cruz et al., 2020). Contrary to the belief that it aims to dominate the world, artificial intelligence assists people in various fields, such as medicine, the military, space exploration, education, and more. It also helps us find the quickest travel routes and recommends movies on platforms like Netflix and Amazon Prime. Additionally, AI is used in tasks ranging from planning trajectories and operating construction machinery to enabling industrial robots to have vision. It leverages advanced analytics and machine learning algorithms to analyze events, support and automate decision-making, and take action (Mijwil et al., 2022).

In a government context, AI has the potential to revolutionize multiple aspects of government, such as processes, citizen engagement, service delivery, decision-making, and the creation and assessment of public policies. (Sun & Medaglia, 2019). AI comprises several indicators, for example, perceived usefulness, which includes improving the quality of work, greater control over work, completing tasks more quickly, supporting aspects of work, increasing work effectiveness, and making work more accessible; and ease (ease of use perceived), which consists of the artificial intelligence personal assistant being easy to operate, and the use of the artificial intelligence personal assistant being clear and understandable (Supriyadi & Asih, 2021). If in good condition, these indicators can enhance tax compliance. Hence, it can promote the second hypothesis:

H_2: AI impacts tax compliance.

Tax Service and Tax Compliance

Empirically, tax compliance is also influenced by tax services. Scholars found that service quality, tax awareness, and tax fairness are determinants of tax compliance (Andriani & Tarmidi, 2024), (Khamis & Mastor, 2021), (Rahiem & Ardillah, 2022) Good service increases taxpayer compliance where there is satisfaction and pleasure from the services provided by the account representative so that taxpayers will pay taxes voluntarily (Rahmiati & Inayah, 2022). Tax service is the quality of services provided by tax authorities to taxpayers. It encompasses various aspects such as responsiveness, reliability, informativeness, assurance, and empathy when dealing with taxpayers. Tax service quality plays a crucial role in enhancing taxpayer satisfaction, compliance, and trust in the tax system. Effective tax services can help taxpayers understand their tax obligations, navigate the tax system, and ultimately contribute to improved compliance levels (Khamis & Mastor, 2021). According to Rahman et al. (2020), the level of control and excellence taxpayers expect from tax services is the quality of the service.

Additionally, tax service quality refers to the level of excellence taxpayers expect in the services provided by tax authorities to meet their desired outcomes regarding tax compliance (Yahaya et al., 2023). It relates to how tax authorities assist taxpayers, emphasizing a friendly and appealing demeanor. It includes presenting a harmonious appearance, maintaining positive thinking, and showing respect towards taxpayers (Imakulata et al., 2023).

In order to help taxpayers fulfill their rights and obligations in the area of taxes, the government and tax institutions work to bring them comfort, security, and clarity. Quality tax services can increase taxpayers' interest in complying with their tax obligations. This includes providing supportive facilities, making things easier for taxpayers, and providing good service from tax officials (Pebrina & Hidayatulloh, 2020). In numerous emerging economies and developing countries, tax authorities have faced significant challenges with service quality, which has been a critical factor affecting poor tax revenue performance (Amoh & Ali-Nakyea, 2019). Tax service indicators comprises availability of good employees, availability of good facilities and infrastructure, responsibility for each taxpayer from start to finish, ability to serve quickly and precisely, ability to communicate, guaranteeing the confidentiality of every transaction, good knowledge and abilities, trying to understand taxpayers' needs, and being able to trust taxpayers (Kasmir, 2017). If in excellent condition, these indicators can drive tax compliance. Therefore, it can propose the third hypothesis:

H_3: Tax service impacts tax compliance.

Algorithmics Government, AI, Tax Service, and Tax Compliance

Empirical studies indicated that tax compliance is influenced by algorithmics government (Bin-Nashwan et al., 2020; Oladipo et al., 2022), AI (Belahouaoui & Attak, 2024; Kamil, 2022), and tax service (Andriani & Tarmidi, 2024; Rahiem & Ardillah, 2022). It proves that algorithmic government, AI, and tax services are crucial determinants for tax compliance. As a result, if the algorithmic government, AI, and tax service are in good condition simultaneously, it can increase tax compliance among taxpayers. Accordingly, it can formulate the fourth hypothesis:

H_4: Algoritmics government, AI, and tax service simultaneously impact tax compliance.

Methode

Research Methods and Design

This research uses quantitative methods based on positivistic philosophy (Neuman, 2014). By starting a theoretical study, summarizing it into a hypothesis, and then conceptualizing it into an analytical model, a quantitative approach seeks to understand the relationships between variables. This method is carried out through surveys, which involve selecting and analyzing samples from large and small populations (Kerlinger, 2006; Widodo, 2021) Surveys are used to obtain data so that each research variable can be described and its relationship can be known.

Research Participants

The population under study was 2,042 taxpayers at KPP Pratama Jakarta Mampang. The sample, consists of 393 taxpayers. They are individual taxpayers who will comply with reporting and payments in 2022. It was determined using the Slovin formula with a margin of error of 5%. The selection of the sample was conducted through random sampling, a method that ensures each member of the population has an equal opportunity to be chosen as a sample (Widodo, 2021).

Procedures and Materials

Likert scale questionnaire with five options—strongly disagree/never (score = 1), disagree/rarely (score = 2), neutral/sometimes (score = 3), agree/often (score = 4), and strongly agree/always (score = 5)—used to collect data. Google Forms is used to conduct online surveys via WhatsApp and email. Based on experts' theoretical dimensions or indicators, researchers developed a questionnaire. Algorithmic government indicators consist of five indicators: transparency, causality, bias, fairness, and safety (Dwork & Roth, 2014). AI consists of perceived usefulness, which includes improving the quality of work, greater control over work, completing tasks more quickly, supporting aspects of work, increasing work effectiveness, and making work more accessible; and ease (ease of use perceived), which consists of the artificial intelligence personal assistant being easy to operate, and the use of the artificial intelligence personal assistant being clear and understandable (Supriyadi & Asih, 2021). Tax service indicators include availability of good employees, availability of suitable facilities and infrastructure, responsibility for each taxpayer from start to finish, ability to serve quickly and precisely, ability to communicate, guaranteeing the confidentiality of every transaction, good knowledge and abilities, trying to understand taxpayers' needs, and being able to trust taxpayers (Kasmir, 2017). Finally, indicators of taxpayer compliance

consist of submitting annual notification letters on time, fulfilling tax obligations, having no tax arrears, paying taxes on time, and never being punished for committing tax evasion (Muliari & Setiawan, 2011). The algorithmic government and tax compliance questionnaires each consist of five items, AI consists of eight items, and tax service consists of nine items. All items are valid with a corrected item-total correlation coefficient > 0.361 and Cronbach Alpha values: 0.901, 0.940, 0.806, and 0.735 > 0.7. Thus, the questionnaire is valid and reliable (Widodo, 2021), so it is suitable for research.

Data analysis

The data obtained from distributing the questionnaires were subjected to a robust analysis using regression, a powerful statistical tool processed with SPSS version 25. This software, equipped with descriptive statistical analysis and classical assumption tests, ensures the accuracy and reliability of our data analysis. Descriptive statistical analysis was used to provide a comprehensive description of each research variable, while classic assumption tests were employed to fulfill the analytical requirements needed for inferential statistical tests (regression), which were used to test hypotheses.

Results and Discussions

Descriptive Statistical Analysis

A descriptive analysis to describe the condition of each research variable, which includes the mean, maximum, minimum, and standard deviation values, is presented in Table 1. The standard deviation (SD) value, which varies between 0.382 and 0.964, is smaller than the average value, which ranges between 2.987 and 3,200. Therefore, this report provides a reasonable overview of the information and warrants further investigation.

Table 1. Descriptive statistics results

	n	Minimum	Maximum	Mean	Std. Deviation
Tax Compliance	393	2.30	4.00	3.1500	0.38230
Algorithmic Government	393	2.00	4.00	3.2000	0.49199
AI	393	2.00	3.80	2.9875	0.43805
Tax Service	393	2.00	4.00	3.0650	0.49642

Classic Assumption Test

A classical assumption test is carried out to determine whether the results of the regression estimates are free from symptoms of autocorrelation, multicollinearity, and heteroscedasticity. The normality test results show that all data is close to a straight line on the probability plot. It indicates that the residual data is normally distributed. Then, the results of the multicollinearity test show that the overall tolerance value is > 0.10, and the VIF value is < 10. It indicates that all the independent variables used in the research are free from the multicollinearity phenomenon. The heteroscedasticity test results show no clear pattern, and the points are spread above and below the number 0 on the Y-axis. This indicates that there are no symptoms of heteroscedasticity. Finally, the auto-correlation test results show a Durbin Watson value of 1,657, located at -2 < and > + 2, meaning no autocorrelation symptoms exist.

Hypothesis Testing

The results of hypothesis testing using multiple regression, as summarized in Table 2, obtained the regression equation: $Y = (a)\ 1.492 + (b1)\ 0.291X_1 + (b2)\ 0.366X_2 + (b2)\ 0.404X_3$. The Constanta value = 1.492 shows that without algorithmic government (X_1), AI (X_2), and tax service (X_3) being constant or fixed, then tax compliance among taxpayers would have a constant value of 1.492. The value (b1) = 0.291 indicates that if the algorithmic government value increases by one unit, tax compliance will increase by 0.291. The b2 value = 0.366 indicates that if the AI value increases by one unit, tax compliance will increase by 0.366. Then, the value of b3 = 0.404 indicates that if the tax service value increases by one unit, tax compliance will increase by 0.404.

Table 2. The Results of Multiple Regression

Independent Variable	Tax Compliance		
	Coefficients Beta	T/F-value	Significance
Constanta	1.492		
Algorithmic Government	0.291	5.294	0.000
AI	0.366	5.892	0.000
Tax Service	0.404	5.618	0.000
Algorithmic Government. AI, Tax Service	0.879	103,480	0,000

Additionally, the t-test results of the influence of algorithmic government (5.294), AI (5.892), and tax service (5.618) on tax compliance are greater than the t-table value (1.971) with a significance value of < 0.05. It shows that H1, H2, and H3 are accepted. It means that algorithmic government, AI, and tax services on tax compliance partially have a positive and significant effect on tax compliance. Then, the F test results of the simultaneous influence of algorithmic government, AI, and tax service on tax compliance (103.480) are greater than the F table value (3.26). It shows that H4 is accepted. It means that algorithmic government, AI, and tax services on tax compliance simultaneously have a positive and significant effect on tax compliance. Overall, the effect is positive. It shows that improvements in algorithmic government, AI, and tax service will be followed by increased tax compliance among taxpayers. The total effect is 0.753 (75.30%). It means that algorithmic government, AI, and tax services can explain the variation in tax compliance by 75.3%. Meanwhile, the remaining 24.7% was influenced by other variables that were not involved (researched) in this research.

The research results generally found empirical facts that partially and simultaneously, algorithmic government, AI, and tax service impact tax compliance among tax payers. In detail, algorithmic government partially influences tax compliance. This indicates that algorithmic government is an important determinant of tax compliance, so improvements to the algorithmic government can make a positive contribution to tax compliance. It means that improvements in transparency, causality, bias, fairness, and safety can encourage better development of submitting annual notification letters on time, fulfilling tax obligations, having no tax arrears, paying taxes on time, and never being punished for committing tax evasion. These findings are in line with and confirm the results of previous research, which proves that transparency as indicators of algorithmic government impact tax compliance (Mangoting et al., 2019; Simone et al., 2020) and tax fairness as proxy of algorithmic government effect tax compliance (Bin-Nashwan et al., 2020; Oladipo et al., 2022).

The results of this research also found the influence of AI on tax compliance. This indicates that AI is a crucial antecedent for tax compliance, so improving the implementation of AI in tax practices can encourage increased tax compliance. This means that more intensive use of AI can stimulate increased tax compliance, which is reflected in paying taxes on time and never being punished for tax evasion. This finding is consistent with studies by Kamil (2022) and Belahouaoui and Attak (2024), which demonstrated that AI improves tax compliance behavior. Apart from that, this research also partially shows that tax service affects tax compliance. This indicates that tax service is a predisposition for tax compliance, so improving the quality of tax service can positively impact increasing tax compliance among taxpayers. It means improving the availability of good employees, suitable facilities, and infrastructure, responsibility for each taxpayer, serving quickly and precisely, ability to communicate, guaranteeing the confidentiality of every transaction, having good knowledge and abilities, trying to understand taxpayers' needs, and Being able to trust taxpayers can encourage increased taxpayer tax compliance. This empirical fact confirms previous studies proving that service quality, tax awareness, and tax fairness influence tax compliance (Andriani & Tarmidi, 2024, Khamis & Mastor, 2021; Rahiem & Ardillah, 2022).

Finally, the results of this study simultaneously find empirical evidence that algorithmic government, AI, and tax service have a significant effect on tax compliance among taxpayers. These findings emphasize that these three variables are essential determinants of tax compliance so that their existence needs to be managed and improved on an ongoing basis so that they can provide a more significant contribution to taxpayers' tax compliance. Thus, the results of this research have practical implications for tax practice, especially those related to tax compliance seen from the perspective of algorithmic government, AI, and tax service. Apart from that, the results of this research also provide a theoretical contribution to the development of administrative science, especially those inherent in tax compliance based on algorithmic government, AI, and tax service.

Conclusion

Taxes are an essential pillar for the economy and development of a nation-state. It contributes to the country's economic growth and sustainable development. Therefore, this study investigates the effect of algorithmic government, artificial intelligence, and tax services on tax compliance. The results indicated that algorithmic government, AI, and tax services partially and simultaneously affect tax compliance among taxpayers. These findings provide insight into how tax compliance can be improved through algorithmic government, AI, and tax services. Therefore, researchers and practitioners can discuss the findings of this research critically and in depth before adapting and adopting them in their future work without ignoring the limitations of this research. For researchers, for example, the sample is limited to taxpayers in one KPP, does not use all theoretical indicators available in the literature, and only uses quantitative analysis with regression formulas. Future research is recommended to use a larger sample by involving taxpayers from various regions in Indonesia, adding other indicators, and using complex analysis techniques, such as path analysis or structural equation modeling (SEM).

Meanwhile, practitioners can utilize the results of this research to help increase taxpayer tax compliance through improvements to algorithmic government, artificial intelligence, and tax services.

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