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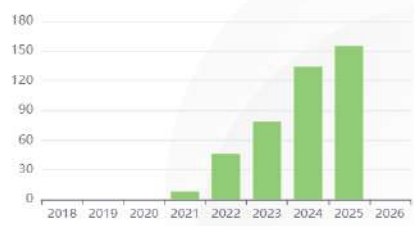
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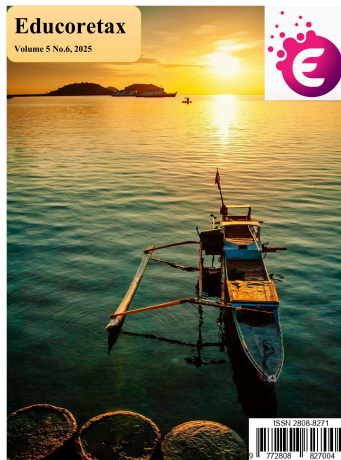
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TAX KNOWLEDGE, TAX AWARENESS, AND THE MODERATING ROLE OF E-FILING IN ENHANCING TAX COMPLIANCE

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Abstract

This study investigates the influence of tax knowledge and tax awareness on taxpayer compliance, with e-filing examined as a moderating variable. Data were collected through questionnaires from 96 individual taxpayers registered at the North Batam Pratama Tax Office (KPP Pratama Batam Utara). The research employed a quantitative associative approach with a causal design, and the data were analyzed using Structural Equation Modeling (SEM) with SmartPLS 3. The results reveal that tax knowledge has a negative effect on taxpayer compliance, while tax awareness has a positive effect. Furthermore, e-filing moderates these relationships in different ways: it weakens the negative effect of knowledge by simplifying reporting procedures, but it also reduces the direct influence of awareness as compliance becomes more associated with technological convenience. These findings underscore the relevance of the Theory of Planned Behavior in explaining compliance behavior, while also highlighting the role of technology in reshaping compliance dynamics. Future studies are encouraged to incorporate broader behavioral and institutional factors, and policymakers are advised to strengthen tax education, awareness campaigns, and the reliability of e-filing infrastructure.

Keywords: E-filing; Tax Awareness; Taxpayer Compliance; Tax Knowledge; Tax Sanctions

INTRODUCTION

Taxes are central to state revenue and crucial in financing national development. Through their budgetary function, taxes provide funding for key sectors such as education, health, and infrastructure, which directly affect the quality of life of the population (Indopajak, 2019). In Indonesia, approximately 80 percent of state revenue comes from taxes (Pajak.go.id, 2024). This situation underscores the importance of taxpayer compliance in maintaining fiscal sustainability and driving long-term economic growth. Nevertheless, the reality shows that compliance levels remain relatively low, as indicated by the country's tax-to-GDP ratio, which lags behind regional peers (Saputra, 2024). Recognizing this condition, the government has consistently made efforts to enhance compliance through tax reform initiatives, digitalization, and public campaigns aimed at boosting voluntary participation in the tax system (Sinurat, 2023).

Over the past five years, Indonesia's tax revenues have fluctuated due to global and domestic factors. The COVID-19 pandemic caused a sharp decline, but a gradual economic recovery has driven a strong upward trend, with significant growth beginning in 2022 and continuing into 2023 (Expert Tax Indonesia, 2024). These figures demonstrate Indonesia's fiscal system's resilience and improved taxpayer compliance. Furthermore, the increasing contribution of tax revenues reflects the growing commitment of citizens to support the sustainability of national development programs (Listikarini, 2024).

Despite the positive growth in tax revenues, low taxpayer compliance remains a significant issue that undermines the effectiveness and sustainability of Indonesia's revenue system. Compliance is a fundamental element in ensuring tax collection's efficiency and promoting equitable economic progress. The government has introduced various strategies, ranging from regulatory reforms to education and awareness campaigns. However, the level of compliance is still considered suboptimal. This challenge has become increasingly relevant in the era of digital transformation, where technology provides new opportunities to enhance taxpayer participation. One prominent innovation is the e-filing system, which simplifies the



tax reporting process by offering an efficient, transparent, and accessible platform. Nevertheless, taxpayer compliance warrants further investigation to better understand the underlying factors and strengthen policy effectiveness.

According to Imelda & Santioso (2023), both tax knowledge and tax awareness are crucial drivers of compliance. The adoption of e-filing further complements these factors by improving convenience and reducing barriers, thereby encouraging more taxpayers to fulfill their obligations promptly and accurately. Previous studies have provided evidence that knowledge and awareness positively affect compliance behavior (Ainul & Susanti, 2021; Anggini et al., 2021; Manuel & Jonnardi, 2023; Marilyn et al., 2022; Mei & Firmansyah, 2022). However, there remains limited discussion on how e-filing, as a technological innovation, interacts with these variables to strengthen their impact potentially. This research seeks to fill this gap by offering empirical evidence on whether e-filing enhances the effectiveness of knowledge and awareness in fostering compliance, thus contributing to both the academic discourse and practical policy development in Indonesia's taxation system.

A review of the existing literature reveals that there is still a gap in understanding the interaction between tax knowledge, tax awareness, and the use of e-filing in shaping taxpayer compliance. Several studies, such as those by Hantono (2021) and Sofyan & Sudirgo (2023), emphasize that tax knowledge plays a significant role in improving compliance. Other studies, such as Amin et al. (2022), identify tax awareness as an equally important determinant of taxpayers' willingness to fulfill their obligations. Although both factors have been widely recognized as crucial drivers of compliance, the role of e-filing as a moderating factor has not been examined in sufficient depth. Most prior research has isolated these variables, focusing on direct relationships without exploring how digital platforms like e-filing might strengthen or alter the dynamics between knowledge, awareness, and compliance. This research is designed to address this gap by investigating the extent to which e-filing enhances the relationship between tax knowledge, tax awareness, and taxpayer compliance.

This study focuses on individual taxpayers registered at the North Batam Tax Office (KPP Pratama). The objective is to analyze how tax knowledge influences compliance behavior and examine whether higher awareness levels contribute to stronger compliance outcomes. Furthermore, this research seeks to understand the extent to which e-filing moderates the relationship between knowledge and compliance and the relationship between awareness and compliance. The study aims to provide a more comprehensive picture of the behavioral and technological factors that shape taxpayer compliance in Indonesia by addressing these objectives.

The theoretical framework of this research is grounded in the theory of planned behavior (TPB), which suggests that attitudes, subjective norms, and perceived behavioral control influence individuals' intentions and actions. Within the context of taxation, tax knowledge and tax awareness represent internal factors that can motivate individuals to comply with their obligations (Taing & Chang, 2020). Tax knowledge encompasses an understanding of tax regulations, procedures, and the broader benefits of taxation for national development. Tax awareness reflects the intrinsic motivation to contribute to the country's progress by fulfilling tax obligations responsibly (Amin et al., 2022). E-filing is considered a moderating variable because it provides easier access, reduces procedural barriers, and increases the perceived behavioral control of taxpayers, thereby potentially strengthening the influence of knowledge and awareness on compliance.

The novelty of this research lies in its integration of e-filing as a moderating variable in the relationship between tax knowledge, tax awareness, and taxpayer compliance. While previous studies have separately examined the role of knowledge and awareness, very few have investigated how technology, particularly e-filing, interacts with these factors to influence



compliance behavior. By bringing together behavioral and technological perspectives, this study contributes a fresh approach that deepens theoretical understanding and addresses practical challenges in tax administration. The focus on e-filing as a moderating factor distinguishes this study from earlier research, making it a timely and relevant contribution to the literature on tax compliance (AbuAkel & Ibrahim, 2023; Ainul & Susanti, 2021; Lukman et al., 2023; Santioso & Daryatno, 2024).

This research is expected to provide meaningful contributions in practice and policy formulation. From a practical perspective, the findings can help tax authorities design more effective strategies to improve taxpayer knowledge and awareness through well-targeted education programs and outreach campaigns. The study also highlights the importance of utilizing technology, especially e-filing, to simplify tax reporting procedures, making compliance easier and more attractive for taxpayers. From a policy perspective, the results of this research can inform the development of tax policies that are more inclusive, adaptive, and responsive to the needs of taxpayers. Policymakers can strengthen compliance and secure long-term revenue stability by considering technical and pedagogical aspects. Ultimately, these contributions are expected to support Indonesia's broader goal of sustainable economic development through a stronger and more reliable tax system.

LITERATURE REVIEW

The theory of planned behavior (TPB), as developed by Ajzen (1991) It provides the primary theoretical foundation to understand taxpayer compliance. TPB explains that behavioral intention is the strongest predictor of actual behavior, and such intention is formed by attitudes toward behavior, subjective norms, and perceived behavioral control. In the taxation context, tax knowledge is linked to the formation of positive attitudes and perceived control, as taxpayers who understand regulations and procedures are more likely to believe they can comply. On the other hand, tax awareness is associated with subjective norms, as individuals internalize moral and social responsibilities that shape their willingness to comply with tax obligations. At the same time, technological innovations such as e-filing increase perceived behavioral control by reducing barriers and making compliance easier to perform. Together, these components provide a comprehensive framework to explain why taxpayers decide to comply or fail to comply with tax obligations.

Tax compliance is the degree to which taxpayers fulfill their obligations according to prevailing laws and regulations, including recording transactions, reporting business activities, and filing annual tax returns (SPT) promptly. Compliance represents not only a legal requirement but also the willingness of taxpayers to contribute to national development. Prior studies highlight both formal compliance, which refers to procedural adherence and deadlines, and material compliance, which refers to the accuracy and completeness of submitted information (Heliani, 2022; Mansur et al., 2023; Safelia & Hernando, 2023). In Indonesia, the level of compliance remains an issue despite continuous reforms, reflecting the importance of behavioral factors such as knowledge and awareness, and systemic support like digital reporting platforms.

Tax knowledge plays a central role as an internal factor that directly affects compliance. Knowledge of rights, obligations, procedures, and taxation benefits provides clarity and confidence for taxpayers to comply consistently. Empirical studies emphasize that tax knowledge reduces confusion, prevents unintentional errors, and allows taxpayers to adapt to frequent regulatory changes. Research on taxpayer behavior in Indonesia confirms that knowledge has a positive and significant relationship with compliance across different taxpayer categories (Ainul & Susanti, 2021; Anggini et al., 2021; Manuel & Jonnardi, 2023; Marilyn et al., 2022; Mei & Firmansyah, 2022). In the TPB framework, knowledge strengthens attitudes



toward compliance and enhances perceived behavioral control, which directly reinforces behavioral intention.

Tax awareness represents an equally important internal determinant. It reflects the intrinsic motivation of taxpayers to fulfill their obligations voluntarily, based on a moral understanding that taxes fund public services and state development. Taxpayers with strong awareness view compliance not as an imposed duty but a civic responsibility. This aligns with the TPB concept of subjective norms, in which social and moral pressures shape behavioral intentions (Ajzen, 1991). Studies conducted in Indonesia show that awareness encourages compliance, although its effect may vary depending on context. For instance, while some research confirmed that taxpayer awareness significantly improves compliance (Firmansyah et al., 2022; Guna et al., 2022; Manuel & Jonnardi, 2023). These findings highlight that awareness is closely tied to knowledge and is more effective when supported by systemic factors.

E-filing emerges as an external contextual factor that potentially strengthens the positive effects of knowledge and awareness. As an electronic reporting system, e-filing allows taxpayers to submit returns online, reducing bureaucracy, saving time, and increasing convenience. Within the TPB framework, e-filing contributes to perceived behavioral control by removing barriers to compliance. Research has found that e-filing simplifies reporting procedures, reduces compliance costs, and improves transparency, thereby encouraging higher compliance rates (AbuAkel & Ibrahim, 2023; Lukman et al., 2023; Santioso & Daryatno, 2024). Nevertheless, studies in Indonesia suggest that the moderating effect of information technology in the knowledge–compliance relationship is still debated. Some evidence indicates that IT does not significantly moderate the relationship (Marilyn et al., 2022), while others point to its effectiveness in mediating or moderating behavioral factors such as tax socialization and awareness (Firmansyah et al., 2022). This suggests the importance of further examination, particularly of e-filing, as its adoption continues to expand.

Based on the theoretical framework of TPB and the empirical evidence discussed above, it can be concluded that tax knowledge contributes to shaping positive attitudes and perceived control, thereby encouraging compliance. Tax awareness reflects moral and social norms that strengthen voluntary compliance. E-filing improves taxpayers' control over the reporting process, thus reinforcing the influence of knowledge and awareness on compliance. Prior studies support these relationships, though the moderating role of e-filing has yet to be consistently established, making this research timely and relevant to address the gap. Accordingly, the hypotheses developed in this study are as follows:

H₁: Tax knowledge has a positive effect on taxpayer compliance.

H₂: Tax awareness has a positive effect on taxpayer compliance.

H₃: E-filing strengthens the positive relationship between tax knowledge and taxpayer compliance.

H₄: E-filing strengthens the positive relationship between tax awareness and taxpayer compliance.

METHODS

This study employs an associative quantitative approach with a causal experimental design to examine the relationships between variables. The quantitative approach is considered appropriate because it enables systematic testing of hypotheses using measurable indicators. At the same time, the causal design allows the identification of cause-and-effect relationships among the studied constructs. Data were collected through a structured survey administered directly to taxpayers, who served as the respondents of this research. The study population consisted of all registered taxpayers at the North Batam Pratama Tax Office (KPP Pratama). Since the population's exact number was unknown, the sample size was determined using the



Lemeshow formula, which is suitable for studies with large or indeterminate populations (Hatmawan & Riyanto, 2020). Based on this calculation, 96 taxpayers were selected as the sample and participated in the survey. This number is considered adequate to represent the population while ensuring statistical validity and reliability of the findings.

The operationalization of variables was carefully designed to ensure that each construct could be measured objectively and consistently. Each variable was translated into measurable indicators and assessed using a structured questionnaire with closed-ended questions on a five-point Likert scale, ranging from 1 ("strongly disagree") to 5 ("strongly agree"). The questionnaire items, totaling nine statements, were adapted from prior studies and adjusted to the context of this research to maintain validity and relevance. These nine items represented five main constructs, namely taxpayer compliance (dependent variable), tax knowledge and tax awareness (independent variables), e-filing (moderating variable), and tax penalties (control variable). The operational definitions, dimensions, and indicators of these variables are presented in the following section.

Table 1. Operationalization of Variables

No	Variable	Definition	Indicator	Source
1.	Taxpayer compliance (Y)	Taxpayer compliance in carrying out tax rights and obligations.	a. Have a Taxpayer Identification Number (NPWP) b. Complete tax forms correctly c. Calculate taxes accurately d. Pay taxes on time e. Fill tax returns correctly.	(Sari et al., 2023)
2.	Tax knowledge (X1)	Understanding of tax rules that impact compliance.	a. Understand the basics of tax legislation b. Understand the tax system in Indonesia c. Understand the general function of taxation	(Azhari & Poerwati, 2023)
3.	Tax awareness (X2)	Taxpayers' understanding of their tax obligations.	a. Awareness of tax laws, regulations, and objectives b. Understanding tax obligations according to guidelines c. Ability to calculate, pay, and report taxes voluntarily and accurately	(Umam & Arifianto, 2023)
4.	E-filing (M)	E-filing is a method of submitting annual tax returns online via the DGT website or application provider (ASP).	a. Always use e-filing for tax reporting b. Intend to continue using e-filing c. Choose e-filing because of its convenient features	(Dewi et al., 2019)
5.	Tax Penalties (C)	Tax Penalties function as a deterrent to violations of tax regulations.	a. Encourage taxpayer discipline b. Impose strict sanctions for violations c. Sanctions are tailored to the level of violation d. Implement sanctions in accordance with applicable regulations	(Munaya & Yushita, 2021)

Source: data proceed

This study employed Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) approach using SmartPLS 3. PLS-SEM was chosen because it is suitable for complex models, predictive analysis, and relatively small sample sizes. The analysis was carried out in two stages: outer model evaluation, to test the validity and reliability of the indicators (using factor loadings, composite reliability, AVE, and discriminant validity), and inner model evaluation, to examine the structural relationships among variables (using path coefficients, R², Q², and bootstrapping for significance testing).



RESULTS AND DISCUSSION

Convergent validity, Average Variance Extracted (AVE), and reliability tests were conducted to evaluate the measurement model. These tests ensure that the indicators used in the study are valid and reliable when measuring the constructs. Convergent validity was assessed using the outer loading values of each indicator. According to (Ghozali & Latan, 2015) An indicator is considered valid if its outer loading value exceeds 0.70. Table 2 presents the outer loading values, which show that most indicators have values greater than 0.70. This result indicates that the indicators fulfill the convergent validity criteria and can effectively represent their respective constructs.

Table 2. Outer Loading

No.	Y	X1	X2	Z	C
1	0,980	0,848	0,836	0,837	0,935
2	0,962	0,791	0,743	0,837	0,932
3	0,963	0,818	0,805	0,788	0,893
4	0,928	0,838	0,816	0,780	0,924
5	0,944	0,913	0,836	0,764	0,875
6	0,976	0,758	0,754	0,877	0,916
7	0,912	0,859	0,803	0,847	0,821
8	0,931	0,820	0,794	0,867	0,873
9	0,946	0,763	0,827	0,892	0,925

Source: data proceed

In addition to outer loading, convergent validity can be evaluated using the Average Variance Extracted (AVE). The minimum threshold for AVE is 0.50, meaning that the construct explains at least 50 percent of the variance of the indicators (Ghozali & Latan, 2015). Table 3 shows that the AVE values of all variables are above 0.50, ranging from 0.644 to 1.000. These results indicate that the constructs have good convergent validity, as the majority of the variance in each indicator is captured by its latent variable. The reliability of the constructs was tested using Cronbach's Alpha and Composite Reliability (CR). A construct is considered reliable if its Cronbach's Alpha is greater than 0.60 (Ghozali & Latan, 2015).

Table 3. Average Variant Extracted (AVE)

Variable	Average Variance Extracted (AVE)
Taxpayer compliance	0,901
Tax knowledge	0,680
Tax awareness	0,644
E-filing	0,694
Tax Penalties	0,810

Source: data proceed

Table 4 shows that all variables have Cronbach's Alpha values well above the threshold, ranging from 0.931 to 0,986, and Composite Reliability values between 0.942 and 0,988. These results confirm that all constructs in the model meet the required reliability standards, demonstrating internal consistency among the measurement items. The results of the convergent validity, AVE, and reliability tests show that all constructs in this study are valid and reliable. This indicates that the indicators used are appropriate and consistent in measuring taxpayer compliance, tax knowledge, tax awareness, e-filing, tax penalties, and the moderating effects.



Table 4. Data Reliability Test

Variable	Cronbach's Alpha	Composite Reliability
Taxpayer compliance	0,986	0,988
Tax knowledge	0,941	0,950
Tax awareness	0,931	0,942
E-filing	0,945	0,953
Tax Penalties	0,970	0,975

Source: data proceed

The hypothesis was tested using the partial least squares structural equation modeling (PLS-SEM) approach. The results of the hypothesis testing are summarized in Table 6, which presents the path coefficients (original sample values), sample means, standard deviations, t-statistics, and p-values for each proposed relationship. The significance of the hypotheses was determined based on the t-statistics and p-values, with a threshold of $t > 1.96$ and $p < 0.05$ indicating a significant effect. In addition, the table also provides the R-square and adjusted R-square values, which reflect the explanatory power of the independent variables on taxpayer compliance.

Tabel 5. The Summary of Hypothesis Test Result

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values	R Square	R Square Adjusted
Tax knowledge -> Taxpayer compliance	-0,405	-0,369	0,150	2,700	0,004		
Tax awareness -> Taxpayer compliance	0,531	0,497	0,196	2,705	0,004		
Tax Penalties -> Taxpayer compliance	0,302	0,303	0,135	2,246	0,013	0,787	0,773
E-filing -> Taxpayer compliance	0,430	0,430	0,133	3,239	0,001		
Moderating Effect 1 -> Taxpayer compliance	0,439	0,409	0,236	1,857	0,032		
Moderating Effect 2 -> Taxpayer compliance	-0,501	-0,475	0,297	1,687	0,046		

Source: data proceed

The test results reveal an unexpected finding, namely that tax knowledge negatively influences taxpayer compliance. In principle, tax knowledge covers an individual's understanding of tax regulations, reporting and payment procedures, and consequences of non-compliance. From the perspective of the theory of planned behavior (Ajzen, 1991), such knowledge is expected to foster favorable attitudes and enhance perceived behavioral control, thereby encouraging stronger intentions to comply with tax obligations. Ideally, when taxpayers believe that compliance benefits both themselves and the state, their willingness to comply should increase (Sofyan & Sudirgo, 2023; Taing & Chang, 2020).

However, greater tax knowledge does not automatically lead to compliance among individual taxpayers in North Batam. Many respondents with relatively high education levels and professional backgrounds may use their knowledge not to comply better, but to recognize and exploit regulatory loopholes to minimize their tax burden. In this context, knowledge creates room for strategic behavior, shifting attitudes away from compliance. This aligns with the view that knowledge, when not accompanied by trust in the tax system or effective regulation, can reduce rather than increase compliance (Mei & Firmansyah, 2022).

The complexity of Indonesia's tax system further contributes to this outcome. Taxpayers with more knowledge of detailed procedures may perceive compliance as burdensome, costly, and administratively challenging, which weakens their positive attitudes toward fulfilling



obligations. Within the TPB framework, this represents a shift where attitudes and perceived control turn negative despite sufficient knowledge. The condition in North Batam, where many taxpayers are entrepreneurs and self-employed with unstable income, reinforces this tendency. For them, more profound knowledge of tax obligations highlights the financial risks associated with compliance, making delays or avoidance appear more rational. As noted in studies of taxpayer behavior, awareness of burdens and uncertainty often outweighs technical knowledge in shaping compliance choices (Guna et al., 2022).

Moreover, without adequate systemic support, knowledge alone does not guarantee compliance. While technological platforms such as e-filing are intended to simplify reporting, their effectiveness depends on integration with awareness and trust. In cases where taxpayers possess knowledge but perceive the system as complex or unreliable, compliance is not strengthened. This observation supports the view that supportive institutions and accessible systems must complement knowledge to produce positive outcomes (Marilyn et al., 2022).

Therefore, although TPB suggests that knowledge should support compliance through attitudes and perceived control, the North Batam evidence shows that contextual factors, such as high educational exposure to system weaknesses, regulatory complexity, and economic vulnerability, can reverse the expected outcome. For policymakers, this finding emphasizes the need not only to increase taxpayer knowledge but also to ensure that regulations are simplified, taxpayer trust in the Directorate General of Taxes is reinforced, and positive social norms are cultivated so that knowledge functions as a foundation for compliance rather than a pathway to avoidance.

The results of this study demonstrate that tax awareness positively affects taxpayer compliance, affirming that intrinsic motivation and recognition of taxation as a civic responsibility are central determinants of compliance behavior. Tax awareness reflects an internalized belief that paying taxes is not merely a legal obligation but also a moral and civic duty that sustains state revenue and supports public development programs. Within the theory of planned behavior (Ajzen, 1991), awareness corresponds to subjective norms, which capture the influence of moral obligations, cultural values, and social expectations in shaping compliance intentions. Taxpayers who perceive their tax contributions as meaningful for society are therefore more likely to develop favorable attitudes toward compliance and to sustain their intention to fulfill obligations.

Empirical findings in the Indonesian context strongly support this result. Firmansyah et al. (2022) showed that awareness directly correlates positively with compliance, particularly when reinforced by effective tax information systems. Similarly, Tan et al. (2021) identified awareness as one of the most consistent predictors of compliance, alongside service quality and regulatory clarity, highlighting that internalized obligations foster sustainable compliance. Furthermore, Angelina et al. (2024) confirmed that when reinforced by education, sanctions, and socialization, taxpayer awareness plays a critical role in encouraging compliance among MSMEs. These findings underline that awareness consistently emerges as a robust predictor of compliance across diverse taxpayer groups.

In the specific case of individual taxpayers at the North Batam Pratama Tax Office, the positive role of awareness can be explained by local socio-economic and cultural characteristics. Many taxpayers in this region are engaged in entrepreneurial and small-scale business activities deeply embedded in community networks. In such contexts, values of social cohesion and collective responsibility reinforce subjective norms, creating social pressure to comply. Non-compliance may thus be seen not only as a legal breach but also as neglect of communal responsibilities. Moreover, Batam's dynamic economic development, driven by infrastructure expansion, trade, and public services, links tax contributions and tangible



development outcomes more visibly, further encouraging taxpayers with strong awareness to comply voluntarily.

This finding also contrasts with the negative role of tax knowledge. While knowledge may sometimes generate skepticism or strategic non-compliance due to familiarity with regulatory loopholes, awareness functions differently because it is rooted in values, social identity, and moral responsibility. From the TPB perspective, awareness reinforces subjective norms and moral obligations, potent drivers of behavioral intention compared to purely technical considerations. For individual taxpayers in North Batam, higher tax awareness therefore translates into stronger voluntary compliance, reflecting a rational recognition of the benefits of taxation and a moral commitment to fulfilling obligations as responsible citizens.

The findings indicate that e-filing weakens the adverse effect of tax knowledge on taxpayer compliance, highlighting the critical role of technology as a moderating factor in this relationship. Higher tax knowledge was shown to influence compliance negatively, as well-informed taxpayers may become more aware of regulatory loopholes or view the system as overly complex, reducing their willingness to comply. However, the availability of e-filing mitigates this negative tendency by providing a more straightforward, transparent, and efficient reporting process. Through online tax reporting, e-filing reduces bureaucratic burdens and enables taxpayers to fulfill their obligations more quickly and accurately (AbuAkel & Ibrahim, 2023).

From the perspective of the theory of planned behavior, e-filing strengthens perceived behavioral control, one of the three determinants of behavioral intention. A reporting system that is easy to use and accessible helps taxpayers who might otherwise feel overwhelmed by complex procedures regain confidence in their ability to comply. Technology translates tax knowledge, which could sometimes encourage avoidance or skepticism, into practical compliance behavior by removing procedural barriers.

This result is particularly relevant in the specific case of individual taxpayers at the North Batam Pratama Tax Office. Many taxpayers in the region are small business owners or entrepreneurs who face fluctuating incomes and administrative challenges. For these taxpayers, greater knowledge of the tax system may initially emphasize the costs and risks of compliance. However, with the adoption of e-filing, practical obstacles such as lengthy procedures and physical interactions with tax officers are significantly reduced. This makes it easier for them to act upon their obligations, ensuring that knowledge is redirected from being a potential deterrent into a supporting factor for accurate and timely reporting.

Overall, this result demonstrates how integrating behavioral theory and technology can create better outcomes in tax administration. While knowledge alone may not always guarantee compliance and produce unintended effects, combining knowledge with supportive systems such as e-filing enhances taxpayers' perceived ability to comply. As emphasized in the TPB framework, when attitudes, subjective norms, and perceived behavioral control are aligned, behavioral intentions become stronger and more consistent. In the North Batam context, e-filing ensures knowledgeable taxpayers are more likely to translate their understanding into concrete compliance behavior.

Furthermore, the result shows that e-filing weakens the positive effect of tax awareness on taxpayer compliance, pointing to the moderating role of technology in shaping compliance behavior. Tax awareness reflects an individual's intrinsic motivation and moral obligation to contribute to state revenue. Taxpayers with strong awareness understand that paying taxes supports national development and thus feel compelled to comply voluntarily. Within the theory of planned behavior, awareness aligns with subjective norms, which represent moral obligations and social expectations that guide compliance intentions. In principle, higher awareness should



strengthen intentions to comply, as evidence supports that awareness plays a central role in encouraging consistent compliance behavior (Amin et al., 2022).

However, the moderating role of e-filing reveals a more complex dynamic. While e-filing undeniably enhances efficiency, convenience, and accessibility in reporting (Lukman et al., 2023) its presence may dilute the unique influence of awareness on compliance. Taxpayers already intrinsically motivated to fulfill their obligations may not gain substantial additional encouragement from technology, since their compliance is grounded in moral values and civic responsibility. In such cases, e-filing does not amplify their awareness-driven compliance but instead shifts the driver of behavior toward external convenience. This explains why the positive effect of awareness appears weaker when moderated by e-filing.

This finding is particularly relevant for individual taxpayers at the North Batam Pratama Tax Office. Many respondents are small-scale entrepreneurs and self-employed individuals whose compliance behavior is powerfully shaped by community norms and personal responsibility. Awareness of tax obligations is a powerful motivator for these taxpayers. The introduction of e-filing, while simplifying reporting, can make compliance behavior more closely associated with technological ease rather than internalized awareness. This does not suggest compliance declines; rather, it indicates that external facilitation overshadows intrinsic motivation as the primary driver of compliance.

From the perspective of TPB, this highlights the interaction between subjective norms (awareness) and perceived behavioral control (e-filing). While awareness forms intentions through social and moral pressures, perceived control offered by e-filing can dominate when the reporting system is simplified and user-friendly. As a result, the direct effect of awareness on compliance is weakened, even though overall compliance remains strong. This finding underscores the importance of integrating both behavioral and technological dimensions: awareness fosters civic responsibility, while e-filing ensures that this responsibility can be carried out efficiently. Together, they create a more sustainable foundation for consistent taxpayer compliance (Santioso & Daryatno, 2024).

CONCLUSION

This study examined the influence of tax knowledge, tax awareness, and the moderating role of e-filing on taxpayer compliance among individual taxpayers at the North Batam Pratama Tax Office. The findings highlight several key insights. First, tax knowledge was found to have a negative effect on compliance, showing that greater understanding of tax regulations and procedures does not continually strengthen compliance; instead, it may encourage taxpayers to identify loopholes or view the system as overly complex. Second, tax awareness positively affected compliance, confirming that intrinsic motivation and subjective norms are crucial in shaping taxpayers' intentions to fulfill their obligations. Third, e-filing moderated these relationships in different ways. For example, it reduced the negative impact of knowledge on compliance by simplifying reporting procedures. However, it also weakened the positive impact of awareness, as technological convenience shifted compliance behavior from intrinsic motivation to external facilitation. Overall, the study underscores the importance of behavioral factors within the theory of planned behavior framework, while also emphasizing how technology reshapes compliance dynamics in practice.

Although this study provides important contributions, several limitations should be acknowledged. First, the research focused only on individual taxpayers in North Batam, which may limit the generalizability of the findings to other regions with different socio-economic characteristics. Second, the study relied on self-reported survey data, which may be subject to social desirability bias and do not fully reflect actual compliance behavior. Third, the moderating effect of e-filing was examined at a single point in time, without capturing changes



in taxpayers' perceptions and behaviors over the longer term. Finally, this research did not include other potential moderating or mediating variables, such as trust in government, perceptions of tax fairness, or the quality of tax services, that may influence compliance behavior.

Future research could broaden the scope by including taxpayers from multiple regions or comparing urban and rural settings to improve generalizability. Longitudinal approaches would also be valuable in tracking behavioral changes over time, especially as the use of e-filing becomes more widespread and taxpayers gain greater familiarity with digital platforms. In addition, future studies should incorporate other behavioral and institutional variables, such as risk preferences, perceptions of justice and fairness, or the credibility of tax authorities, to build a more comprehensive compliance model. Employing mixed methods, combining quantitative surveys with qualitative interviews, would also enrich insights into taxpayers' motivations, challenges, and barriers to compliance.

Several practical recommendations emerge from these findings. First, the Directorate General of Taxes (DJP) should aim to increase taxpayers' knowledge and ensure that this knowledge fosters positive compliance through communication strategies emphasizing fairness, transparency, and tangible benefits. Second, strengthening tax awareness campaigns is essential, particularly by linking tax contributions to visible improvements in public services and development outcomes, reinforcing subjective norms and intrinsic motivation. Third, the e-filing system must be continuously enhanced to ensure accessibility, user-friendliness, and reliability, particularly for small-scale taxpayers facing technological challenges. Finally, DJP should integrate education, awareness-building, and technological support into a cohesive strategy aligned with behavioral theory to foster voluntary compliance and build long-term trust in the tax system.

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