



Multi-Group Analysis of Incentive and Institutional Factors Associated with Individual Taxpayer Compliance in Indonesia

Astrid Isyana Biki^{1*}, Ari Warokka², Oscar Jayanagara³

¹ Universitas Terbuka, Indonesia

² Tongmyong University, Republic of Korea

³ Universitas Pelita Harapan, Indonesia

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Abstract

This study examines the association between incentive factors (voice, empathy) and institutional factors (regulatory quality, enforcement effectiveness, transparency, accountability) and individual taxpayer compliance in Indonesia, and tests whether these associations differ by age, education, and income. Despite growing interest in behavioral and institutional determinants of compliance, few studies integrate both dimensions within a single model or test whether the resulting relationships hold consistently across demographic groups. Using a quantitative survey of 310 individual taxpayers, we analyzed the data with Structural Equation Modeling–Partial Least Squares (SEM-PLS) and Multi-Group Analysis (MGA). Results show that voice, empathy, regulatory quality, enforcement effectiveness, and transparency are significantly and positively associated with taxpayer compliance, while accountability is not, suggesting that perceptions of institutional accountability have not yet become a primary determinant of compliance. The model explains a substantial share of variance in taxpayer compliance. The Multi-Group Analysis indicates that these associations are largely, but not entirely, consistent across demographic groups: three of eighteen subgroup comparisons show statistically significant differences (enforcement effectiveness by income, $p = .004$; transparency by age, $p = .016$; accountability by income, $p = .013$), while the remaining comparisons show no significant difference. These findings suggest that taxpayer compliance is associated with a combination of incentive and institutional factors, with most associations holding broadly across demographic characteristics. However, exceptions exist for enforcement effectiveness, transparency, and accountability.

Keywords: *Taxpayer Compliance, Multi-Group Analysis, PLS-SEM, Taxpayer Voice, Enforcement Effectiveness, Institutional Transparency*

INTRODUCTION

Tax compliance remains one of the most persistent challenges facing tax administrations worldwide because tax revenues constitute the primary source of government financing. In contrast, opportunities for tax avoidance and tax evasion continue to evolve. Taxpayers frequently seek to reduce their tax liabilities through either legal arrangements, such as tax avoidance, or illegal practices, such as tax evasion, thereby weakening governments' fiscal capacity and undermining the sustainability of tax systems (Hakki et al., 2023; Oktavia et al., 2021). Consequently, improving taxpayer compliance has become a strategic priority for governments seeking to secure sustainable public revenue.

In Indonesia, this challenge matters because the self-assessment system relies heavily on voluntary taxpayer compliance. Although tax audits remain the primary enforcement instrument, limited administrative capacity restricts their reach. According to the Directorate General of Taxes (Direktorat Jenderal Pajak, 2025), only 2.30% of corporate taxpayers and 0.21% of individual taxpayers were audited in 2024. This limited audit coverage suggests that enforcement alone may be insufficient to shape most taxpayers' compliance behavior. Accordingly, tax authorities need complementary approaches that encourage voluntary compliance beyond traditional deterrence

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Corresponding author's email: astrid.isyana@gmail.com

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mechanisms.

These limitations have shifted scholarly attention toward behavioral taxation. Studies in tax morale, behavioral economics, and economic psychology suggest that taxpayer behavior is shaped not only by expected economic costs and benefits but also by psychological, social, and institutional influences, including perceptions of fairness, participation, trust, and civic responsibility ([Kirchler & Hoelzl, 2017](#)). This perspective implies that sustainable taxpayer compliance requires a balanced combination of behavioral incentives and institutional quality rather than relying exclusively on audits and sanctions.

Drawing on this perspective, the present study adopts two complementary explanatory dimensions—the first concerns incentive factors, represented by voice and empathy. Voice reflects taxpayers' opportunities to participate in tax-related decision-making, communicate concerns, and receive meaningful responses from tax authorities, thereby strengthening procedural fairness and legitimacy ([AbdelNabi et al., 2022](#)).

Empathy refers to taxpayers' awareness that tax revenues finance public services and social welfare, encouraging voluntary compliance through intrinsic motivation rather than coercion. In this study, empathy is treated as an incentive factor because targeted communication about the public-benefit function of taxation activates it, and it is conceptually narrower than the broader, dispositional construct of tax morale or general civic/social responsibility ([Christian & Alm, 2014](#)).

The second dimension concerns institutional factors comprising regulatory quality, enforcement effectiveness, transparency, and accountability. High-quality regulations reduce uncertainty, effective enforcement strengthens deterrence and fairness, transparency enhances public trust, and accountability reinforces institutional legitimacy ([Harahap et al., 2024](#)). Collectively, these institutional characteristics shape taxpayers' confidence in tax administration and influence their willingness to comply voluntarily. Table A5 (Appendix) summarizes relevant previous studies.

Although previous studies (Table A5, Appendix) have demonstrated positive relationships between several of these determinants and taxpayer compliance, empirical findings remain inconsistent. More importantly, most existing studies investigate behavioral incentives and institutional determinants independently, providing limited evidence regarding their combined influence within a single explanatory framework. Furthermore, relatively few studies have examined whether these relationships remain stable across demographic groups despite increasing recognition that taxpayer characteristics may shape compliance behavior.

This study addresses these gaps by integrating incentive and institutional perspectives within a unified model of taxpayer compliance. The theoretical foundation combines Responsive Regulation Theory, which emphasizes participation, dialogue, and cooperative compliance, with Institutional Theory, which highlights the importance of institutional quality in strengthening legitimacy and trust. Integrating these perspectives provides a broader explanation of taxpayer compliance than traditional economic deterrence models alone.

This study makes three principal contributions. First, it develops an integrated framework that examines incentive factors (voice and empathy) and institutional factors (regulatory quality, enforcement effectiveness, transparency, and accountability) simultaneously. Second, it provides empirical evidence from individual taxpayers in Indonesia, extending existing evidence beyond experimental studies that frequently rely on student samples. Third, the study combines Partial Least Squares Structural Equation Modeling (PLS-SEM), Multi-Group Analysis (MGA), and Importance–Performance Map Analysis (IPMA) to evaluate structural relationships, demographic heterogeneity, and managerial priorities within a single analytical framework.

Based on these considerations, this study addresses the following research questions:

1. Does voice significantly relate to individual taxpayer compliance?
2. Does empathy significantly relate to individual taxpayer compliance?
3. Does regulatory quality significantly relate to individual taxpayer compliance?
4. Does enforcement effectiveness significantly relate to individual taxpayer compliance?
5. Does transparency significantly relate to individual taxpayer compliance?
6. Does accountability significantly relate to individual taxpayer compliance?
7. Do the associations between incentive factors and institutional factors and taxpayer compliance differ across age groups, educational attainment groups, and income groups?

By addressing these questions, this study contributes to tax compliance research by extending the explanatory framework beyond traditional rational-choice perspectives to incorporate behavioral and institutional determinants simultaneously. Beyond RQ1–RQ7, which are tested through hypothesis-based path analysis, the study also pursues a practical objective supported by IPMA: identifying which of the significant determinants offer the greatest managerial leverage for improving compliance, given their combined importance and current performance. The findings are expected to provide both theoretical insights into the drivers of taxpayer compliance and practical guidance for tax authorities in prioritizing policy interventions that strengthen voluntary compliance.

LITERATURE REVIEW

Tax Compliance

Tax compliance has evolved from a narrow legal concept emphasizing the timely filing and payment of taxes toward a multidimensional construct encompassing behavioral, institutional, and psychological dimensions. Contemporary tax compliance is no longer viewed solely as taxpayers' adherence to statutory obligations but also as a behavioral outcome influenced by perceptions of fairness, institutional trust, and social responsibility ([Agbetunde et al., 2020](#); [Augustine et al., 2020](#)).

From a public finance perspective, high levels of taxpayer compliance are essential to ensure fiscal sustainability and support the provision of public goods. Conversely, persistent non-compliance reduces government revenue, weakens fiscal capacity, and undermines public confidence in tax administration ([Hikmah & Ratnawati, 2024](#); [Winanto et al., 2024](#)).

Consequently, recent tax compliance research increasingly recognizes that deterrence alone cannot adequately explain voluntary compliance. Instead, taxpayer behavior reflects the joint influence of behavioral incentives, institutional quality, and taxpayers' perceptions of the legitimacy of the tax system. This broader perspective provides the conceptual foundation for the present study.

Theoretical Foundation

This study draws on Responsive Regulation Theory and Institutional Theory. While these theories originate from different perspectives, both argue that sustainable compliance cannot be achieved solely through legal sanctions. Responsive Regulation Theory ([Ayres & Braithwaite, 1992](#)) emphasizes cooperation, dialogue, participation, and graduated enforcement to encourage voluntary compliance. In taxation, the theory explains why taxpayers are more likely to comply when tax authorities encourage participation (voice), strengthen taxpayers' awareness of the social value of taxation (empathy), and maintain credible enforcement.

Institutional Theory complements this perspective by explaining that the quality and legitimacy of the institutional environment influence taxpayer behavior. According to [Scott \(2014\)](#), institutions consist of regulative, normative, and cognitive pillars. These dimensions correspond

closely to regulatory quality, enforcement effectiveness, transparency, accountability, taxpayer participation, and empathy. Together, Responsive Regulation Theory explains behavioral interactions between taxpayers and tax authorities, whereas Institutional Theory explains how institutional quality shapes trust, legitimacy, and voluntary compliance.

Integrating the Two Theories

Rather than treating behavioral and institutional perspectives as competing explanations, this study integrates both theories into a unified framework. Responsive Regulation Theory explains how taxpayers respond to participatory and cooperative regulatory approaches, whereas Institutional Theory explains why institutional quality strengthens taxpayers' confidence in tax administration. Combining these perspectives offers a more comprehensive explanation of taxpayer compliance by recognizing that taxpayers respond to behavioral incentives and institutional conditions at the same time.

Incentive Factors

Behavioral taxation literature suggests that intrinsic motivations influence taxpayer compliance alongside economic incentives. Voice reflects taxpayers' opportunities to participate in tax administration, communicate concerns, and influence decision-making processes. This construct is grounded in Responsive Regulation Theory, which holds that participatory, dialogue-based regulatory approaches strengthen voluntary cooperation more effectively than purely coercive enforcement ([Ayres & Braithwaite, 1992](#)). Previous studies consistently report that greater participation strengthens procedural fairness and institutional legitimacy, thereby encouraging voluntary compliance.

Empathy represents taxpayers' awareness that tax revenues finance public services and social welfare. Empathy is likewise grounded in Responsive Regulation Theory, which posits that strengthening taxpayers' awareness of the social value of taxation fosters compliance through intrinsic motivation rather than through deterrence ([Ayres & Braithwaite, 1992](#)).

As operationalized here, empathy differs from tax morale and general social responsibility in that it targets taxpayers' awareness of the public-benefit function of tax revenue, rather than a broader normative orientation toward paying tax ([Christian & Alm, 2014](#)). This adaptation of a general-purpose empathy instrument to the tax-compliance setting follows established precedent in this literature: [Christian and Alm \(2014\)](#) similarly measured taxpayers' empathy using an established psychological empathy scale rather than a tax-specific instrument, and found it positively associated with compliance; empathy has since been treated as a measurable incentive-side construct in tax-compliance models by [AbdelNabi et al. \(2022\)](#) and [Rahayuningsih and Putra \(2025\)](#).

Taxpayers who perceive taxation as contributing to collective welfare generally demonstrate stronger tax morale and higher voluntary compliance. Nevertheless, previous empirical findings remain mixed, suggesting the need to examine voice and empathy simultaneously within an integrated explanatory framework.

Institutional Factors

Institutional quality constitutes another important determinant of taxpayer compliance. Regulatory quality reduces uncertainty by providing clear and consistent tax rules. Enforcement effectiveness strengthens deterrence while reinforcing perceptions of fairness. Transparency improves taxpayers' understanding of how taxes are administered and utilized, whereas accountability strengthens confidence in government institutions.

Collectively, these four institutional dimensions – regulatory quality, enforcement effectiveness, transparency, and accountability – reflect the broader construct of institutional quality emphasized in Institutional Theory ([Scott, 2014](#)), which holds that institutions provide stability and meaning to social life through three interrelated pillars: regulative (formal rules, oversight mechanisms, and sanctions), normative (social values and standards of appropriate conduct), and cognitive (individual perceptions and beliefs about institutional legitimacy).

When tax authorities formulate clear, consistent, and fair regulations, taxpayers are more likely to perceive the tax system as legitimate and trustworthy, which in turn encourages voluntary compliance. This is consistent with recent evidence showing that trust in tax institutions and perceptions of system fairness increase voluntary compliance ([Batrancea et al., 2019](#)), and that the balance between regulatory quality and enforcement effectiveness is a key institutional element shaping taxpayer compliance ([Kogler et al., 2023](#)).

Although previous studies generally report positive effects of these institutional factors, evidence regarding accountability remains inconsistent. Some studies identify accountability as a direct determinant of taxpayer compliance, whereas others suggest that its influence operates indirectly through institutional trust, perceived fairness, or tax morale. These inconsistencies justify re-examining institutional determinants within an integrated model.

Demographic Heterogeneity

Previous studies suggest that demographic characteristics may influence taxpayer behavior because taxpayers differ in experience, knowledge, financial capacity, and perceptions of taxation. Age may affect awareness and experience, educational attainment may influence understanding of tax regulations, and income may shape perceptions of tax burden and administrative fairness.

However, empirical evidence regarding whether these characteristics alter the relationships between behavioral and institutional determinants and taxpayer compliance remains inconclusive. Therefore, this study employs Multi-Group Analysis (MGA) to investigate whether the proposed relationships differ across age, educational attainment, and income groups.

Research Hypotheses

Drawing upon Responsive Regulation Theory and Institutional Theory, this study proposes that both incentive factors and institutional factors play an important role in shaping taxpayer compliance behavior. Incentive factors, represented by voice and empathy, are expected to encourage voluntary compliance by fostering taxpayer engagement and a sense of social responsibility.

Meanwhile, institutional factors, represented by regulatory quality, enforcement effectiveness, transparency, and accountability, are expected to enhance the tax system's legitimacy and credibility, thereby promoting compliance. Accordingly, the following hypotheses are proposed:

- H1 : Voice is positively and significantly associated with individual taxpayer compliance ([Casal et al., 2016](#); [Lamberton et al., 2018](#); [AbdelNabi et al., 2022](#)).
- H2 : Empathy is positively and significantly associated with individual taxpayer compliance ([Christian & Alm, 2014](#); [Sustiyo & Yudha, 2022](#); [AbdelNabi et al., 2022](#)).
- H3 : Regulatory quality is positively and significantly associated with individual taxpayer compliance ([Fadila, 2024](#); [Prasetyanti et al., 2023](#)).

H4 : Enforcement effectiveness is positively and significantly associated with individual taxpayer compliance (Slemrod, 2019; Rosid & Romadhaniah, 2023).

H5 : Transparency is positively and significantly associated with individual taxpayer compliance (Rahma, 2019; Zuijderwijk et al., 2025).

H6 : Accountability is positively and significantly associated with individual taxpayer compliance (Putri et al., 2019; Panjaitan & Yuna, 2024).

In addition, demographic characteristics may influence how taxpayers perceive and respond to incentive-based and institutional factors. Differences in age, educational attainment, and income levels may vary the strength of the relationships between the proposed determinants and taxpayer compliance. Therefore, the following hypothesis is formulated:

H7 (exploratory): The associations between incentive factors (voice and empathy) and institutional factors (regulatory quality, enforcement effectiveness, transparency, and accountability) and individual taxpayer compliance differ across (a) age groups, (b) educational attainment groups, and (c) income groups.

These hypotheses are summarized in the following research model (Figure 1):

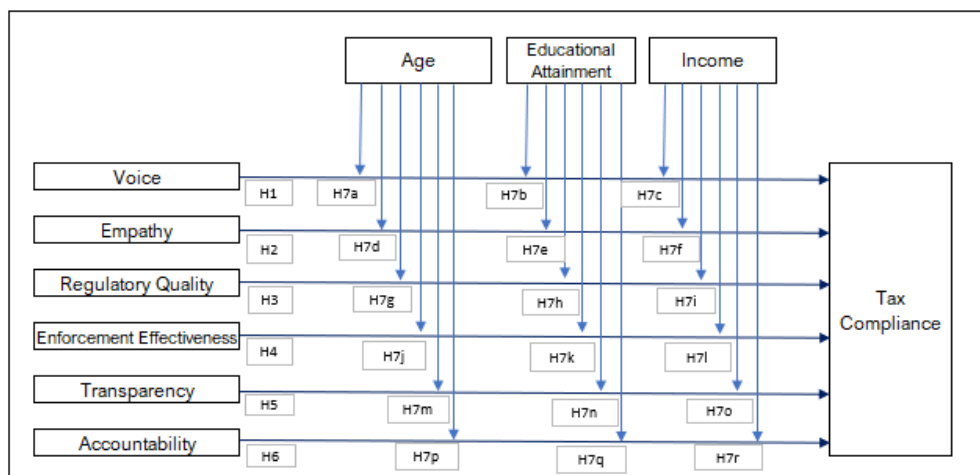


Figure 1. Research Model

RESEARCH METHOD

Research Design

This study employs a quantitative approach using an explanatory survey design to investigate the relationships between incentive factors, institutional factors, and individual taxpayer compliance. Explanatory survey research is intended to examine statistical associations among variables and explain patterns underlying a particular phenomenon through hypothesis testing (Flick, 2022). The quantitative approach is appropriate because it enables the objective testing of theoretical relationships among variables measured numerically (Creswell & Creswell, 2018).

As a cross-sectional design based on a single-point-in-time survey, this study can establish statistical associations but not causal sequences among the variables examined. By adopting an explanatory quantitative design, this study not only describes taxpayer compliance behavior but also empirically examines the association between incentive factors (voice and empathy) and

institutional factors (regulatory quality, enforcement effectiveness, transparency, and accountability), on the one hand, and individual taxpayer compliance, on the other, based on respondents' perceptions collected through a structured questionnaire.

Data Source and Sampling

The study relies on primary data collected directly from respondents through a questionnaire survey. Primary data are data obtained directly from sources without intermediaries and are specifically collected to address research objectives (Elvera & Astarina, 2021). The questionnaire was designed to capture respondents' perceptions regarding taxpayer compliance, voice, empathy, regulatory quality, enforcement effectiveness, transparency, and accountability.

The target population comprises all registered individual taxpayers in Indonesia. According to the Directorate General of Taxes (Direktorat Jenderal Pajak, 2025), the number of registered individual taxpayers reached 73,349,459 in early 2024. Given the large population size, the study employed purposive sampling. This non-probability sampling technique selects respondents based on predefined criteria relevant to the research objectives (Sunarta et al., 2023). Respondents were required to: (1) possess a Taxpayer Identification Number (NPWP); (2) reside in Indonesia; (3) earn taxable income; and (4) have previously fulfilled tax reporting or payment obligations.

Sample adequacy was determined using the Partial Least Squares Structural Equation Modeling (PLS-SEM) guideline proposed by Hair et al. (2022), commonly known as the 10-times rule. Since the endogenous construct (taxpayer compliance) receives six structural paths from exogenous variables, the minimum required sample size is 60 observations. The final sample of 310 valid responses therefore substantially exceeds the minimum requirement for PLS-SEM analysis.

The findings should be interpreted as empirical evidence derived from respondents who met the specified inclusion criteria and are not intended to represent full statistical generalizations of the entire population of Indonesian individual taxpayers.

Research Instrument

Data were collected using a structured questionnaire consisting of three sections. The first section gathered respondents' demographic information, including age, educational attainment, and income level. At the outset of data collection, age and educational attainment were each recorded using three original categories: age by generational cohort (Generation X, Y, and Z), and educational attainment as basic education (elementary/junior/senior high school), diploma-level education, and postgraduate education.

Annual income was recorded in four original categories: below IDR 60 million, IDR 60–100 million, IDR >100–250 million, and IDR >250 million. Because the achieved distribution of respondents across these categories was highly uneven — leaving several cells too small to support reliable Multi-Group Analysis — each demographic variable was collapsed into two categories for the subgroup analysis reported in this study (age: below 30 years vs. 30 years and above; education: secondary vs. tertiary; income: below IDR 60 million vs. IDR 60 million and above per year), thereby achieving more balanced subgroup sizes suitable for PLS-MGA. These two-category variables were subsequently used.

The second section measured taxpayer compliance, encompassing both formal compliance (e.g., timely filing and administrative compliance) and material compliance (e.g., accurate tax calculation and payment based on actual economic conditions). The third section measured the main research constructs, namely voice, empathy, regulatory quality, enforcement effectiveness, transparency, and accountability. All latent variables were operationalized using multiple indicators derived from the relevant literature and adapted to the Indonesian taxation context.

Responses to the construct items were measured using a five-point Likert scale ranging from

1 (“strongly disagree”) to 5 (“strongly agree”). The Likert scale facilitates assessment of respondents’ attitudes, perceptions, and evaluations of the constructs under investigation.

To ensure the validity and reliability of the measurement model, we measured all constructs using items adapted from established studies in the literature. Table 1 summarizes the operationalization of each construct, along with the corresponding measurement items and their sources.

Table 1. Measurement Items and Sources

Name of Variable	Number of Indicators	Sources
Accountability	9	OECD (2020) ; Panjaitan & Yuna (2024)
Enforcement Effectiveness	9	Nainggolan, 2024 ; OECD (2019) ; OECD (2017) ; Lind and Arndt (2016)
Empathy	9	Bętkowska-Korpała et al. (2022)
Taxpayer Compliance	6	Agbetunde et al. (2020) ; Simanjuntak & Mukhlis (2012)
Regulatory Quality	9	Fadila (2024) ; OECD (2012)
Transparency	9	Zuijderwijk et al. (2025)
Voice	12	Bakar et al. (2021) ; Casal et al. (2016)

Source: Compiled by the authors based on cited sources (2026)

Data Collection Procedure

Data were collected through a field survey using a self-administered questionnaire distributed to individual taxpayers who met the study criteria. Respondents were recruited in two stages. The researchers obtained the first 100 responses through their professional networks; some did not meet the screening criteria and were excluded.

To reach the target sample, the researchers then recruited the remaining respondents through the Populix survey panel platform, which verifies respondents' identity documents (KTP) and applies the study's eligibility criteria before allowing access to the questionnaire, adding an extra layer of screening beyond the self-reported criteria described above.

The survey was administered online via a web-based form over four months, from October 2025 to January 2026. We collected 329 responses, excluding 19 for incomplete responses, failure to meet screening criteria, or indications of careless or inattentive responding (e.g., straight-lining), leaving a final valid sample of 310 responses for subsequent analysis. No imputation or other missing-data treatment was applied; only complete, valid responses were retained and analyzed.

The questionnaire captured respondents' age, educational attainment, and income level but did not capture province or region of domicile; therefore, geographic distribution is not reported and is noted as a limitation of the demographic profile collected. The questionnaire served as the primary instrument for obtaining structured quantitative data regarding taxpayers' perceptions and behaviors.

In addition, the study consulted secondary sources—including statistical reports, government publications, and academic literature—to inform the background and theoretical framing. These sources were not treated as a formal data source and were not subjected to systematic analysis.

The study adhered to fundamental research ethics principles. Participation was voluntary, and respondents were informed of the research objectives, confidentiality procedures, and their right to withdraw at any stage of the survey. All collected data were used exclusively for academic purposes and analyzed in aggregate form to ensure respondent anonymity. No formal ethics

committee approval was sought for this study, as it involved an anonymous, minimal-risk survey of adult participants; nonetheless, the research adhered to the core ethical principles described above.

Data Analysis

Data were analyzed using SmartPLS 4 software. Common method bias was assessed using the full collinearity approach (Kock, 2015). Full collinearity VIF values across constructs ranged from 1.797 to 4.807. While most constructs had VIF values below the conservative threshold of 3.3, the Regulatory Quality construct had a VIF of 4.807, marginally exceeding this threshold; this is noted as a limitation of the study, and relationships involving Regulatory Quality should be interpreted with caution regarding potential common method bias.

A post-hoc statistical power analysis was conducted for the Multi-Group Analysis subgroup comparisons, following Cohen's (1988) approach for detecting differences between two independent correlations at $\alpha = .05$. Given the achieved subgroup sample sizes, the study had approximately 80% power to detect path-coefficient differences (Cohen's q) of 0.32 or larger for the age- and income-based comparisons, and 0.36 or larger for the education-based comparison, which had the most imbalanced subgroup sizes ($n = 88$ vs. 222).

This indicates limited power to detect smaller subgroup differences, particularly for the education-based comparison, and the non-significant MGA results should be interpreted in light of this constraint. The analytical framework consisted of three complementary techniques: Structural Equation Modeling–Partial Least Squares (SEM-PLS), Multi-Group Analysis (MGA), and Importance–Performance Map Analysis (IPMA).

Structural Equation Modeling–Partial Least Squares (SEM-PLS)

SEM-PLS was the primary analytical technique used to examine the associations between incentive and institutional factors and taxpayer compliance. The study adopted a reflective measurement model in which multiple observable indicators represent latent constructs.

The analysis was conducted in two stages. First, the measurement model (outer model) was evaluated by assessing convergent validity, discriminant validity, and construct reliability. Indicator reliability was assessed using factor loadings, with values of 0.70 or higher considered acceptable. Internal consistency reliability was examined using Cronbach's alpha and composite reliability, while convergent validity was evaluated through Average Variance Extracted (AVE), with a threshold of 0.50. Discriminant validity was assessed using the Heterotrait–Monotrait Ratio (HTMT), with values below 0.90 indicating satisfactory discriminant validity.

Second, the structural model (inner model) was assessed by examining multicollinearity through variance inflation factors (VIF), explanatory power using the coefficient of determination (R^2), effect size (f^2), and predictive relevance (Q^2). Hypothesis testing was conducted using a complete bootstrapping procedure with 310 subsamples and the Bias-Corrected and Accelerated (BCa) confidence interval method. Using a one-tailed test at the 5% significance level, we considered a path coefficient statistically significant when the t -value exceeded 1.645.

Multi-Group Analysis (MGA)

To investigate whether structural relationships differ across demographic groups, Multi-Group Analysis (PLS-MGA) was conducted. This technique compares path coefficients across groups and determines whether statistically significant differences exist in the effects of the independent variables on taxpayer compliance.

The results reported in Table A6 (Appendix) use uncorrected significance levels for each of the 18 pairwise path-coefficient comparisons across the three demographic variables (age, education, and income); as this number of simultaneous comparisons raises the family-wise Type I

error rate, a Bonferroni-corrected threshold (e.g., [Hair et al., 2018](#)) is a recommended check. Its implications for the present findings are discussed in the Limitations.

The analysis was performed across age, educational attainment, and income groups. Before MGA, we assessed measurement invariance to ensure the constructs were interpreted consistently across groups. Differences between groups were considered statistically significant when the MGA p-value was below 0.05.

Importance–Performance Map Analysis (IPMA)

As the third component of the study's integrated analytical framework introduced above, IPMA was used to identify constructs with high importance but relatively low performance. According to [Ringle & Sarstedt \(2016\)](#) IPMA extends conventional PLS-SEM results by incorporating both the total effects (importance) and the average latent variable scores (performance).

Importance values were derived from standardized total effects, whereas performance values were calculated from latent variable scores transformed onto a 0–100 scale. Constructs characterized by high importance and relatively low performance were identified as strategic priorities for policy intervention. In the context of public administration and tax governance, IPMA provides practical insights for policymakers regarding areas requiring improvement to enhance taxpayer compliance.

FINDINGS AND DISCUSSION

Result

Respondent Profile

A total of 310 valid responses were obtained. Most respondents were 30 years and above (51%), possessed tertiary education (71.6%), and earned annual income below IDR 60 million (52.3%). These characteristics indicate that the sample largely represents economically active taxpayers and provides a relevant basis for examining compliance behavior.

Table 2. Respondent Characteristics

Characteristic	Category	Frequency (n)	Percentage (%)
Age	Below 30 years	152	49.0
	30 years and above	158	51.0
	Total	310	100
Educational Attainment	Secondary Education (Primary/Junior/Senior High School)	88	28.4
	Tertiary Education (Diploma/Bachelor/Master/Doctoral Degree)	222	71.6
	Total	310	100
Annual Income	Less than IDR 60 million	162	52.3
	IDR 60 million or above	148	47.7
	Total	310	100

Source: Processed data (2026)

Measurement Model Assessment

The measurement model satisfied all reliability and validity requirements. Two indicators (V3 and Q8) were removed because their loadings were below 0.70. All remaining 61 indicators

loaded between 0.712 and 0.887 across the seven constructs (Accountability 0.712–0.794; Enforcement Effectiveness 0.758–0.875; Empathy 0.730–0.854; Regulatory Quality 0.805–0.887; Taxpayer Compliance 0.799–0.853; Transparency 0.749–0.873; Voice 0.730–0.862), exceeding the 0.70 threshold; the full item-by-item loading matrix is reported in Table A1 (Appendix).

V3 (0.547) and Q8 (0.392) fell below the 0.70 threshold and were removed prior to further analysis; all other indicators loaded above 0.70. All remaining indicators demonstrated satisfactory reliability, convergent validity, and discriminant validity. Cronbach's Alpha values ranged from 0.910 to 0.944, Composite Reliability values ranged from 0.929 to 0.954, and AVE values exceeded 0.50 for all constructs. HTMT values were below 0.90, confirming discriminant validity.

Table 3. Heterotrait-Monotrait (HTMT) Ratio

Construct	Enforcement Effectiveness	Empathy	Taxpayer Compliance	Regulatory Quality	Transparency	Voice
Accountability	0.686	0.744	0.623	0.526	0.374	0.583
Enforcement Effectiveness		0.716	0.853	0.649	0.585	0.707
Empathy			0.330	0.566	0.484	0.672
Taxpayer Compliance				0.743	0.731	0.840
Regulatory Quality					0.534	0.625
Transparency						0.602

Source: SmartPLS output (2026)

Structural Model Assessment

The model explained 78.7% of the variance in taxpayer compliance ($R^2 = 0.787$; adjusted $R^2 = 0.783$), indicating substantial explanatory power. Effect sizes (f^2) indicated that enforcement effectiveness ($f^2 = 0.149$), transparency ($f^2 = 0.144$), and voice ($f^2 = 0.142$) made the largest individual contributions to explaining taxpayer compliance (small-to-medium effects), followed by regulatory quality ($f^2 = 0.081$) and empathy ($f^2 = 0.027$) (small effects). At the same time, accountability contributed negligibly ($f^2 = 0.000$), consistent with its non-significant path coefficient.

The Q^2 value of 0.534 confirmed strong predictive relevance. Collinearity diagnostics indicated acceptable inner-model VIF values for all structural paths (1.692–2.701, all below the conservative threshold of 3.3). At the full-collinearity level used to screen for common method bias, all constructs were likewise below 3.3 except Regulatory Quality, which returned a VIF of 4.807.

As noted in the Research Method and Limitations, this marginally elevated value means relationships involving Regulatory Quality should be interpreted with some residual caution regarding common method bias, even though the overall pattern of results does not indicate a pervasive collinearity problem.

Table 4. Result of Direct Effect

	Hypothesis		Beta	t-value	p-value	Conclusion	Decision
H1	Voice Tax Compliance	→	0.265	5.603	0.000	Positive Significant	Accepted
H2	Empathy Tax Compliance	→	0.122	2.509	0.013	Positive Significant	Accepted

H3	Regulatory Quality Tax Compliance	→	0.179	4.663	0.000	Positive Significant	Accepted
H4	Enforcement Effectiveness Tax Compliance	→	0.293	6.062	0.000	Positive Significant	Accepted
H5	Transparency Tax Compliance	→	0.228	7.115	0.000	Positive Significant	Accepted
H6	Accountability Tax Compliance	→	-0.014	0.297	0.381	Not Significant	Not Accepted

Source: SmartPLS output (2026)

Multi-Group Analysis Across Demographic Groups

Before conducting the Multi-Group Analysis, we assessed measurement invariance using the Measurement Invariance of Composite Models (MICOM) procedure to evaluate configural invariance, compositional invariance, and equality of composite mean values and variances across the age, education, and income subgroups. Configural invariance (Step 1) was established by design, as we used identical indicators, data treatment, and algorithm settings across all subgroups.

Compositional invariance (Step 2) was assessed via permutation testing, with results presented in Tables 5–7. Partial invariance was found for the age-group and education-group comparisons, while full compositional invariance was established for the income-group comparison. Because at least partial invariance was achieved for all three subgroup comparisons, the Multi-Group Analysis could proceed for path-coefficient comparisons; however, results involving constructs that did not meet the invariance criterion (see Tables 5–7) should be interpreted with additional caution.

Step 3 (equality of composite mean values and variances) was not assessed, as full invariance is required only to compare composite means across groups, which falls outside the scope of this study; partial invariance is sufficient to justify comparing structural path coefficients via MGA (Henseler et al., 2016).

Table 5. MICOM Results — Age Group (<30 vs. ≥30 years)

Construct	Original Correlation	5.0% Quantile	Permutation p-value	Decision
Accountability	0.998	0.996	0.320	Met
Enforcement Effectiveness	0.999	0.999	0.221	Met
Empathy	0.998	0.999	0.013	Not met
Taxpayer Compliance	1.000	1.000	0.407	Met
Regulatory Quality	0.999	0.999	0.025	Not met
Transparency	0.999	0.997	0.358	Met
Voice	1.000	0.999	0.776	Met

Source: SmartPLS output (2026)

Table 6. MICOM Results — Education Group (Low vs. High)

Construct	Original Correlation	5.0% Quantile	Permutation p-value	Decision
Accountability	0.999	0.996	0.499	Met
Enforcement Effectiveness	1.000	0.999	0.888	Met
Empathy	0.998	0.999	0.036	Not met

Taxpayer Compliance	1.000	1.000	0.137	Met
Regulatory Quality	1.000	0.999	0.998	Met
Transparency	0.999	0.997	0.208	Met
Voice	0.999	0.999	0.433	Met

Source: SmartPLS output (2026)

Table 7. MICOM Results — Income Group (<60m vs. ≥60m IDR)

Construct	Original Correlation	5.0% Quantile	Permutation p-value	Decision
Accountability	0.999	0.996	0.465	Met
Enforcement Effectiveness	0.999	0.999	0.146	Met
Empathy	0.999	0.999	0.239	Met
Taxpayer Compliance	1.000	1.000	0.387	Met
Regulatory Quality	1.000	0.999	0.379	Met
Transparency	1.000	0.997	0.959	Met
Voice	0.999	0.999	0.287	Met

Source: SmartPLS output (2026)

To supplement the between-group differences reported in Table A6 (Appendix), Tables 8–10 report the separate path coefficients and significance levels estimated for each subgroup (via bootstrapping conducted separately within each subgroup dataset), providing the full basis for the differences in Table A6.

Table 8. Subgroup-Specific Path Coefficients — Age

Path (→ Taxpayer Compliance)	Age < 30 β	Age < 30 p	Age ≥ 30 β	Age ≥ 30 p
Voice	0.333	<0.001	0.200	0.002
Empathy	0.123	0.110	0.127	0.034
Regulatory Quality	0.150	0.009	0.211	<0.001
Enforcement Effectiveness	0.313	<0.001	0.254	<0.001
Transparency	0.159	<0.001	0.301	<0.001
Accountability	0.003	0.969	-0.023	0.688

Source: SmartPLS output (2026)

Table 9. Subgroup-Specific Path Coefficients — Education

Path (→ Taxpayer Compliance)	Secondary β	Secondary p	Tertiary β	Tertiary p
Voice	0.174	0.075	0.298	<0.001
Empathy	0.259	0.025	0.085	0.100
Regulatory Quality	0.096	0.184	0.195	<0.001
Enforcement Effectiveness	0.297	0.002	0.297	<0.001
Transparency	0.226	<0.001	0.227	<0.001
Accountability	0.022	0.836	-0.025	0.615

Source: SmartPLS output (2026)

Table 10. Subgroup-Specific Path Coefficients — Income

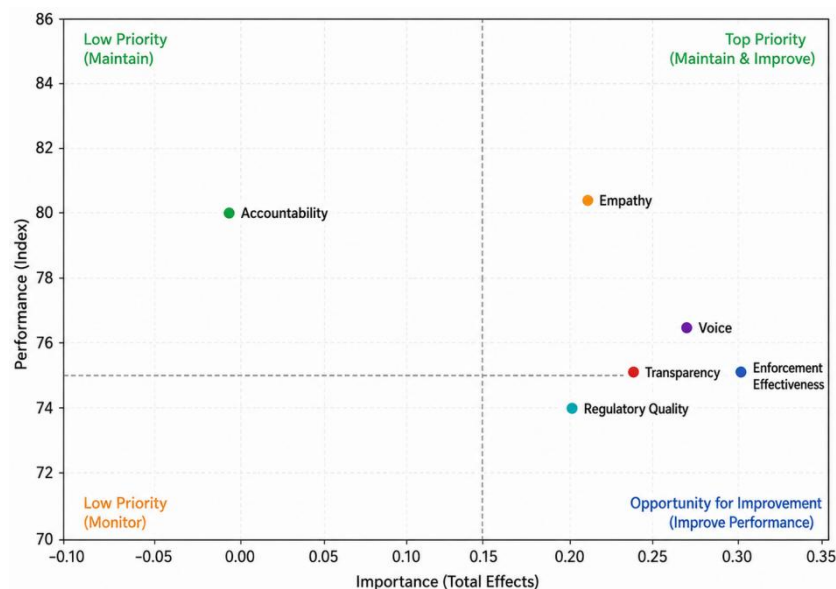
Path (→ Taxpayer Compliance)	< IDR 60M	< IDR 60M	≥ IDR 60M	≥ IDR 60M
	β	p	β	p
Voice	0.294	<0.001	0.225	<0.001
Empathy	0.166	0.015	0.062	0.384
Regulatory Quality	0.173	<0.001	0.200	0.001
Enforcement Effectiveness	0.187	0.004	0.404	<0.001
Transparency	0.207	<0.001	0.243	<0.001
Accountability	0.086	0.192	-0.097	0.081

Source: SmartPLS output (2026)

Viewed at the subgroup level, the significant differences reported in Table A6 (Appendix) reflect a shift in magnitude rather than a reversal of direction: enforcement effectiveness remains positively associated with compliance in both income groups but is markedly stronger for higher-income taxpayers ($\beta = 0.404$ vs. 0.187); transparency remains positive in both age groups but is stronger among taxpayers aged 30 and above ($\beta = 0.301$ vs. 0.159); and accountability is not significantly associated with compliance in either income group, with the significant difference reflecting a shift from a small negative, non-significant association among higher-income taxpayers to a small positive, non-significant association among lower-income taxpayers.

Importance-Performance Map Analysis

Figure 2 presents the results of the Importance–Performance Map Analysis (IPMA), which illustrates the relative importance and performance of each construct in explaining taxpayer compliance. Table 11 reports the underlying total-effect (importance) and rescaled latent-variable (performance, 0–100 scale) values.

**Figure 2.** The IPMA Result**Table 11.** Importance–Performance Map Analysis (IPMA) Values

Construct	Importance	Performance
Enforcement Effectiveness	0.293	74.830
Voice	0.265	76.329

Transparency	0.228	75.235
Empathy	0.122	80.121
Regulatory Quality	0.179	74.041
Accountability	-0.014	79.902

Source: SmartPLS output (2026)

As Table 11 shows, enforcement effectiveness has the highest importance (0.293) and performance (74.830), the second-lowest among the six constructs, making it the leading strategic priority. Voice and transparency show the next-highest importance with similarly moderate performance. Empathy shows the highest performance (80.121) despite comparatively low importance, and accountability shows near-zero importance (-0.014) despite high performance (79.902), consistent with its non-significant direct path in Table 4.

Discussion

Incentive Factors and Taxpayer Compliance

In direct answer to RQ1 and RQ2, this study demonstrates that both voice and empathy are significantly and positively associated with individual taxpayer compliance, although their relative contributions differ. Voice shows a stronger association than empathy, suggesting that opportunities for taxpayer participation are more strongly linked to compliance than intrinsic moral considerations alone. These findings support Responsive Regulation Theory, which emphasizes dialogue, participation, and cooperation between tax authorities and taxpayers as key mechanisms for encouraging voluntary compliance.

The positive association of voice is consistent with previous studies by [AbdelNabi et al. \(2022\)](#), [Casal et al. \(2016\)](#), and [Lamberton et al. \(2018\)](#), which reported that participatory governance improves taxpayer compliance by strengthening legitimacy and trust. The significant but comparatively smaller association of empathy is consistent with [Christian and Alm \(2014\)](#), who found that empathy and sympathy manipulations increased self-reported tax compliance among taxpayers in the United States, and with [Jacquemet et al. \(2019\)](#), who reported that moral-emotion traits such as empathy correlate with tax compliance more strongly than moral-judgment traits, while cautioning that institutional context — rules, audits, transparency, and enforcement — matters more for compliance than individual dispositions alone.

The relatively modest magnitude of the empathy association observed here also echoes [Sustiyo and Yudha \(2022\)](#), who found that empathy's effect on Indonesian taxpayers' compliance was significant for only one of four empathy sub-dimensions when tested individually and became non-significant once all dimensions were considered jointly, suggesting that empathy is a real but comparatively fragile compliance driver relative to structural mechanisms such as voice.

Unlike previous studies that generally examined these factors separately, this study integrates voice and empathy within a single empirical framework. The findings indicate that institutionalized participation has a stronger behavioral influence than intrinsic motivation alone, suggesting that tax authorities should complement taxpayer education with participatory governance mechanisms, such as consultation forums, responsive complaint channels, and transparent public communication.

Institutional Factors and Taxpayer Compliance

In direct answer to RQ3 through RQ6, enforcement effectiveness showed the strongest association with taxpayer compliance, followed by transparency and regulatory quality, whereas accountability was not significantly associated with compliance. This ordering is corroborated by effect size: enforcement effectiveness, transparency, and voice each showed small-to-medium f^2

values (0.142–0.149), regulatory quality and empathy showed small effects (0.081 and 0.027, respectively), and accountability's f^2 of 0.000 confirms that, beyond being statistically non-significant, it contributes negligibly to explained variance.

The positive association of regulatory quality is consistent with [Prasetyanti et al. \(2023\)](#), who found that, among several ASEAN governance-quality dimensions, only Government Effectiveness was significantly associated with tax compliance during 2010–2020. It also speaks to the concern raised by [Nisrina \(2025\)](#), whose qualitative interviews with Indonesian taxpayers identified a persistent gap between formal regulation and field-level implementation. The significant path observed here suggests that, at the level of taxpayer perception captured in this study, regulations perceived as clear and well-designed are associated with higher compliance even where implementation gaps of the kind Nisrina describes may still exist.

The strong association of enforcement effectiveness aligns with [Slemrod \(2019\)](#), who concluded from a review of the enforcement literature that compliance reflects a combination of enforcement and trust rather than deterrence alone, and with [Rosid and Romadhaniah \(2023\)](#), who found using Indonesian tax-office data that the effectiveness of law enforcement depends on implementation quality, taxpayer perception, and institutional context rather than enforcement intensity alone — a pattern broadly consistent with this study's institutional framing.

The positive association of transparency corroborates [Rahma \(2019\)](#), who reported that tax transparency partially affects compliance both directly and through taxpayer trust, and [Gabriella and Frederica \(2024\)](#), who found a significant positive effect of tax transparency on compliance among Indonesian taxpayers; it is also consistent with the broader conclusion of [Al-Maghrebi et al.'s \(2022\)](#) systematic review that strategies targeting transparency and trust are more promising and more readily implementable than strategies aimed directly at changing taxpayer behavior. However, the non-significant association of accountability contrasts with several earlier studies that identified accountability as a direct determinant of compliance.

One possible explanation is that taxpayers perceive accountability primarily as an internal administrative mechanism whose influence is not immediately observable in their compliance decisions. Instead, accountability may indirectly shape taxpayer behavior through institutional trust, perceived fairness, or tax morale. This finding suggests that strengthening accountability alone may not produce measurable improvements in compliance unless accompanied by visible improvements in enforcement practices and transparency.

Demographic Heterogeneity in Taxpayer Compliance

In direct answer to RQ7, the Multi-Group Analysis (MGA) provides evidence that demographic characteristics have a limited but not negligible effect on the relationships proposed in the model. Of the eighteen subgroup path-coefficient comparisons reported in Table A6 (Appendix), three were statistically significant: enforcement effectiveness on compliance differed by income group ($p = 0.004$), transparency on compliance differed by age group ($p = 0.016$), and accountability on compliance differed by income group ($p = 0.013$).

The remaining fifteen comparisons showed no significant difference. Consequently, Hypothesis 7 is partially supported: the structural relationships are largely, though not entirely, stable across age, educational attainment, and income categories. This conclusion should be interpreted cautiously, however, given the exploratory framing of this sub-question, the partial measurement invariance identified for some constructs in the MICOM analysis (see Findings), and the unbalanced demographic distribution in the sample — which limited statistical power to reliably detect path-coefficient differences smaller than approximately 0.32–0.36 (Cohen's q ; see Research Method).

This finding is broadly consistent with, but not identical to, studies suggesting that

demographic characteristics require substantially different compliance strategies (Paleka et al., 2023; Mangoting et al., 2026). Instead, the present study indicates that associations between incentive and institutional factors and taxpayer compliance are largely stable across demographic groups, except for enforcement effectiveness, transparency, and accountability.

Higher levels of enforcement effectiveness, transparency, taxpayer participation, and empathy-oriented communication are therefore associated with higher compliance across most segments defined by taxpayers' age, educational attainment, or income level, though the three significant subgroup differences indicate that this pattern is not fully uniform.

From a practical perspective, these findings imply that tax authorities may prioritize broad-based compliance policies rather than designing fundamentally different intervention strategies for specific demographic segments. Demographic segmentation may still be useful for adapting communication channels, educational materials, or service delivery; however, the core determinants of compliance identified in this study appear to operate consistently across demographic groups.

Managerial Priorities for Improving Taxpayer Compliance

The Importance–Performance Map Analysis (IPMA) complements the structural model by identifying the factors with the greatest managerial leverage. Enforcement effectiveness represents the highest strategic priority because it combines the greatest importance with performance that remains below several other constructs. Transparency and voice constitute the next priority areas, whereas empathy demonstrates the highest performance despite its comparatively lower importance.

Unlike conventional SEM results that identify statistically significant relationships alone, the IPMA findings guide policy prioritization and resource allocation. Accordingly, greater gains in taxpayer compliance may come from strengthening enforcement effectiveness while also enhancing transparency and expanding opportunities for taxpayer participation. These findings demonstrate that effective compliance policies require not only regulatory enforcement but also institutional openness and citizen engagement.

CONCLUSIONS

This study examined the associations between incentive factors (voice and empathy) and institutional factors (regulatory quality, enforcement effectiveness, transparency, and accountability), on the one hand, and individual taxpayer compliance, on the other, using PLS-SEM, complemented by Multi-Group Analysis (MGA) and Importance–Performance Map Analysis (IPMA). The findings demonstrate that voice, empathy, regulatory quality, enforcement effectiveness, and transparency are significantly and positively associated with taxpayer compliance, whereas accountability does not show a significant direct association.

The MGA results indicate that the associations between incentive and institutional factors and taxpayer compliance are largely, though not entirely, consistent across age, education, and income groups. Three of eighteen subgroup comparisons showed statistically significant differences — enforcement effectiveness by income, transparency by age, and accountability by income — while the remaining structural relationships did not differ significantly across demographic segments. Meanwhile, the IPMA identifies enforcement effectiveness as the highest strategic priority, followed by transparency and voice, indicating where policy interventions are likely to generate the greatest improvements in taxpayer compliance.

This study advances the current body of knowledge by integrating incentive-based and institutional perspectives into a single comprehensive model of taxpayer compliance while simultaneously combining PLS-SEM, MGA, and IPMA to explain behavioral relationships,

demographic heterogeneity, and managerial priorities.

Unlike previous studies that have generally examined these dimensions separately, the present research shows that taxpayer compliance is best understood by jointly considering behavioral and institutional determinants, and that these relationships remain broadly consistent across demographic groups.

Theoretical Implications

These findings extend Responsive Regulation Theory and Institutional Theory by showing that participatory (voice) and institutional-quality mechanisms are jointly, rather than independently, associated with compliance; this joint patterning — rather than the mere inclusion of both variable sets in one model — constitutes the theoretical contribution of the integrated framework. Specifically, the significant, positive associations of voice and empathy with compliance support Responsive Regulation Theory's central premise that dialogue-based, cooperative approaches to regulation are associated with voluntary compliance independently of coercive enforcement ([Ayres & Braithwaite, 1992](#)).

The comparatively larger association observed for voice than for empathy suggests that, within this framework, opportunities for participation may carry more explanatory weight than appeals to social responsibility alone, a nuance the original theory does not distinguish. For Institutional Theory ([Scott, 2014](#)), the results are more mixed: regulatory quality, enforcement effectiveness, and transparency—corresponding to the regulative and cognitive pillars—were all significantly associated with compliance, consistent with the theory's expectation that institutional quality shapes legitimacy and trust.

Accountability, which aligns more closely with the normative pillar, was not significantly associated with compliance. This non-significant result does not refute Institutional Theory but suggests a boundary condition: normative-pillar mechanisms may affect compliance indirectly, through institutional trust or perceived fairness, rather than through a direct path detectable in a single cross-sectional model—a possibility future research employing mediation designs could test explicitly.

Finally, the largely invariant multi-group pattern, with the three documented exceptions (Table A6, Appendix), implies that both theories' core mechanisms operate similarly across the demographic segments examined here, which is a novel empirical extension neither theory has previously specified, since both were developed without reference to demographic moderation.

Practical Implications

From a practical perspective, the findings suggest that tax authorities may consider strengthening enforcement effectiveness as one possible priority, based on the IPMA results, while continuing to improve transparency, taxpayer participation, and empathy-oriented tax communication. These are potential priorities suggested by the observed associations, not proven effects of specific policy interventions.

Rather than relying solely on deterrence, sustainable improvements in taxpayer compliance require a balanced approach that integrates effective enforcement with high-quality institutional governance and citizen engagement. Because these determinants appear broadly consistent across demographic groups—subject to the statistical power and multiple-testing limitations noted in the Limitations section—broad-based compliance policies may be a reasonable starting point, without necessarily requiring substantially different intervention strategies based solely on taxpayers' age, education, or income.

LIMITATION & FURTHER RESEARCH

This study has several limitations to consider when interpreting its findings. First, purposive sampling limits the generalizability of the findings to the broader population of individual taxpayers in Indonesia. Second, reliance on self-reported questionnaire data introduces the possibility of response bias and social desirability bias. Although respondent anonymity and confidentiality assurances, voluntary participation, and screening for careless (straight-lining) responses prior to analysis partially mitigated these risks, they cannot be completely eliminated.

Third, the cross-sectional design permits the identification of statistical associations but does not support causal inference. Fourth, the uneven distribution of respondents across demographic categories may have reduced the statistical power of the Multi-Group Analysis (MGA), particularly for subgroup comparisons with relatively small sample sizes. Fifth, although the empathy construct demonstrated satisfactory reliability and validity in this study, its measurement items were not formally pilot-tested prior to data collection and therefore warrant further validation in future research.

Sixth, we did not establish compositional invariance (MICOM Step 2) for the empathy construct in the age-group and education-group comparisons, nor for the regulatory quality construct in the age-group comparison. Consequently, interpret the corresponding MGA results with appropriate caution. Finally, the three statistically significant subgroup differences reported in Table A6 (Appendix) are based on uncorrected significance levels and would not remain statistically significant under a Bonferroni-adjusted significance threshold. Accordingly, these findings should be regarded as exploratory rather than conclusive. The Appendix provides additional technical details, including the complete MICOM results and the Bonferroni correction calculation.

Future research should use larger, more balanced samples to support multi-group analyses across a broader range of demographic categories, including age, educational attainment, and income. Such studies would provide a more nuanced understanding of demographic heterogeneity in taxpayer compliance and enhance the external validity of the proposed model.

Future research should also consider longitudinal or experimental designs together with objective administrative measures of tax compliance, which are better suited than cross-sectional survey data to examine causal relationships among the constructs investigated in this study. In addition, further refinement and validation of the empathy construct in the tax-compliance context would strengthen its theoretical and empirical applicability.

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