

TAX AWARENESS AS A MEDIATOR: THE IMPACT ON NON-ECONOMIC DETERMINANTS AND TAX COMPLIANCE

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Abstract. This research examines whether Tax Awareness (TA) is the mediator that affects the influence of Tax Knowledge (TK), Quality of Tax Service (QTS), Tax Morale (TM) and National Pride (NP) on Tax Compliance (TS) among Shenzhen taxpayers (N = 1,080). With the usage of PLS-SEM (SmartPLS v4), the measurement model was highly reliable and had convergent validity; model fit was moderate (SRMR \approx 0.05). All four precursors substantially raised TA (proximate paths: TM \rightarrow TA \approx 0.26, TK \approx 0.25, QTS \approx 0.14, NP \approx 0.10), contributing to R²(TA) \approx 0.29. Compliance, however, was predicted directly by QTS ($\beta \approx$ 0.33, $p <$.001) and TM ($\beta \approx$ 0.16, $p <$.001); TK, NP, and TA were non-significant, the TA \rightarrow TS path was close to zero, and no indirect (mediated) effects through TA were significant (R²(TS) \approx 0.15). The results suggest that service quality and internalized moral obligation are the most proximal compliance levers in this scenario, with awareness being more of an effect than a path to behavior.

Keywords: *tax compliance, tax awareness, quality of tax service, tax morale*

Introduction

Tax compliance is necessary in order to maintain the economic stability of China and ensure equitable growth. With the government continuing its efforts to modernise the taxation process, voluntary cooperation by the masses has also assumed equal significance as enforcement. This is particularly significant in the fast-urbanising regions where fiscal incomes are largely determined by individual contributions. Shenzhen has still been subject to non-compliance despite greater technological advancements and stricter laws. Deterrence models claim that taxpayers weigh the benefits of evasion against the risk of audits (Allingham and Sandmo, 1972). Research indicates that most individuals comply with the law even in the absence of strict enforcement. This demonstrates that deterrence alone cannot account for taxpayer behaviour (Torgler et al., 2010). This points towards the significance of considering social and psychological influences on compliance beyond sanctions.

In tax research, non-economic variables like civic identity, competence, service quality, and morale are increasingly being recognised. Subjective tax awareness, for example, enhances compliance and reduces uncertainty (Lufti et al., 2023; Loo et al., 2012). However, unless people also get a more comprehensive understanding of their social responsibilities, information might not be enough to influence behaviour. Similarly, fairness and trust promote compliance through high-quality tax services (Appiah et al., 2024; Barare, 2018; Gangl et al., 2015). However, if these gains are not backed by personal knowledge that connects fulfilling service experiences with civic responsibility, they run the risk of being short-lived. Internal motivation for compliance is provided by civic identity and tax morale, and research indicates that fairness and ethics maintain cooperation even in low-deterrence situations (Bartha and Boda, 2024; Alm and Torgler, 2011). Nonetheless, pride and morale frequently function through tax

awareness, which converts ideals into practical choices. Thus, awareness serves as the cognitive link between compliance, knowledge, intrinsic values, and service excellence. The purpose of this study is to investigate whether tax awareness mediates the relationship between tax compliance in Shenzhen, China, and tax knowledge, tax morale, tax service quality, and national pride.

Literature review

Theoretical framework: Social Cognitive Theory

Frameworks beyond economic deterrence models are necessary to comprehend why people pay taxes. Bandura established the Social Cognitive Theory (SCT), which emphasises that people are active agents who engage in self-reflection, intentionality, and forethought (Bandura, 2001). This viewpoint emphasises how cognitive processes convert social values and knowledge into action. SCT is especially pertinent in tax circumstances because it describes how awareness functions as a mediator between internal motives like pride and morale and external factors like knowledge and service quality. Economic theories such as Allingham and Sandmo (1972) model state that people rationally balance the possible benefits of escape against the costs of being caught and facing consequences. Although many people pay taxes even in cases when enforcement is lax, actual data indicates that compliance frequently surpasses the predictions of deterrence models (Mebratu, 2024; Torgler et al., 2010). The importance of psychological and social factors is thus suggested, supporting SCT's emphasis on awareness as a link between motivation, behaviour, and cognition.

Conceptual definitions and relationships

The technical comprehension of tax rules, procedures, and obligations is referred to as tax knowledge. Knowledge increases compliance intentions, according to multiple studies. While Loo et al. (2012) demonstrated that knowledge is essential in Malaysia's self-assessment system for lowering errors and guaranteeing voluntary compliance. Also, Eriksen and Fallan (1996) found that tax education enhances compliance behaviour. These results indicate that the informational foundation for compliance is knowledge. However, behaviour is not always guaranteed by knowledge alone. Kirchler (2007) highlighted that before impacting behaviour, subjective knowing needs to be internalised cognitively. Additionally, besides external variables such as tax rate, income, severity of fines and probability of audits, a few internal variables, primarily psychological, are of equal importance (Hofmann et al., 2015). Thus, this process is mediated by tax awareness, which enables people to understand not only their technical responsibilities but also the larger social and civic implications of taxes (De Clercq, 2023; Batool et al., 2022). The key piece that turns technical knowledge into consistent compliance results is awareness, which is crucial in places like Shenzhen, where tax laws are complicated.

The independence, responsiveness, and transparency of tax authorities are all characterised by the quality of tax service. Barare (2018) discovered that by boosting system trust, taxpayer education and excellent services had a favourable impact on compliance. Similarly, Kirchler (2007) contended that authorities can develop cooperative compliance climates by reducing the social distance between taxpayers and institutions by adopting a "service and client" approach instead of a "cops and robbers" one. However, service quality does not always result in continued compliance, even

though it can enhance perceptions of justice. However, e-service quality significantly affects customer behaviour (Rita et al., 2019). Enhancements in service quality might only result in short-term benefits if people are not cognisant of the civic intent underlying taxes (Suryanto et al., 2025; Mohammed and Tangl, 2024). Therefore, awareness serves as the mediating element that guarantees that favourable institutional experiences result in sustained voluntary compliance.

It has long been known that tax morale, which is the internal drive to pay taxes, determines compliance. Higher tax morale makes people less inclined to avoid taxes (Castañeda, 2024; Owusu et al., 2022; Deglaire et al., 2021; Torgler, 2007). Furthermore, fairness and ethical standards account for the persistence of compliance even in low-deterrence situations (Dörrenberg et al., 2022; Alm and Torgler, 2011). Likewise, voluntary cooperation is reinforced by national pride (Gobena, 2025; Macintyre et al., 2023). According to Torgler and Schneider (2021), those who strongly identify with their country are more compliant. According to these results, cooperation is strongly influenced by intrinsic incentives. Nevertheless, cognitive engagement is necessary for these incentives. According to Bandura (2001), before values like pride and ethics may affect behaviour, awareness must act as a mediator. Being aware enables people to relate their inner driving forces to tangible tax-paying behaviours. Awareness is particularly important in converting pride and morale into compliance in the Chinese setting, where civic identity and national progress are highly valued.

Past mediation studies in tax behaviour

Research on mediation in tax compliance confirms the central role of awareness. Wahl et al. (2010) found that perceptions of fairness influenced compliance indirectly through awareness. Saad (2014) identified awareness as a mediator between knowledge and compliance in developing economies, while observing similar effects in emerging markets where tax education influenced compliance only through awareness. In Africa, Tatenda and Sebele-Mpofu (2019) reported that awareness significantly mediated the impact of non-economic determinants on compliance. Ntiamoah and Asare (2022) further showed that focusing on non-economic factors such as morale, identity, and awareness improved compliance outcomes far more than relying solely on deterrence. These studies reinforce the theoretical expectation that awareness is a key mediating construct. Importantly, though, the majority of mediation research is based on Western or African contexts and has little use in Asia. This suggests that mediation research should be expanded to nations like China, where institutional and cultural issues may change the way awareness shapes compliance.

Research gap, research hypotheses and conceptual model

In China, there are still few empirical mediation studies that use Partial Least Squares Structural Equation Modelling (PLS-SEM), despite the fact that the role of non-economic variables, including morale, identity, and service quality, has been investigated. The importance of morale and justice on a worldwide scale was highlighted by Kirchler (2007) and Torgler (2007), however, few Chinese studies use quantitative mediation frameworks. Although Chu et al. (2025) study does not use PLS-SEM to analyse tax compliance, it does demonstrate how belief systems impact community governance in China. The particular contradiction in Shenzhen is that non-compliance continues despite the city's strong enforcement capabilities. This suggests

that awareness-based strategies might be more important and that enforcement alone is inadequate. By extending SCT and the Slippery Slope Framework to China, filling this gap by using PLS-SEM to assess the mediating function of tax awareness advances both conceptually and practically by helping Chinese tax authorities develop more efficient compliance techniques.

H1–H4: Direct effects of TK, QT, TM, NP on Tax Awareness (TA)

H1: Tax Knowledge positively influences Tax Awareness; H2: Quality of Tax Service significantly affects Tax Awareness; H3: Tax Morale positively influences Tax Awareness; H4: National Pride positively influences Tax Awareness. According to earlier research, awareness of duties and responsibilities is improved by knowledge, service quality, pride, and morale (Loo et al., 2012; Torgler and Schneider, 2009; Torgler, 2007). Therefore, awareness is the process by which these elements become behaviour.

H5–H8: Direct effects of TK, QT, TM, NP on Tax Compliance (TC)

H5: Tax Knowledge positively influences Tax Compliance; H6: Quality of Tax Service significantly impacts Tax Compliance; H7: Tax Morale positively influences Tax Compliance; H8: National Pride positively influences Tax Compliance. According to earlier research, awareness of duties and responsibilities is improved by knowledge, service quality, pride, and morale (Loo et al., 2012; Torgler and Schneider, 2009). Therefore, awareness is the process by which these elements become behaviour. H9: Tax Awareness positively influences Tax Compliance. Raising awareness guarantees that people not only comprehend their technical responsibilities but also acknowledge the civic function of taxes. Wahl et al. (2010) verified that awareness had a major impact on compliance. SCT also highlights the importance of awareness in converting ideals and thoughts into action.

H10–H13: Tax Awareness mediates each IV → TC relationship

H10: Tax Awareness mediates the relationship between Tax Knowledge and Tax Compliance; H11: Tax Awareness mediates the relationship between Quality of Tax Service and Tax Compliance; H12: Tax Awareness mediates the relationship between Tax Morale and Tax Compliance; H13: Tax Awareness mediates the relationship between National Pride and Tax Compliance. Awareness commonly serves as a mediator, according to earlier research (Ntiamoah and Asare, 2022; Tatenda and Sebele-Mpofu, 2019). Investigating these theories in Shenzhen offers fresh perspectives on the relationship between compliance and sociopsychological factors in China.

Materials and Methods

Research design

The study uses a quantitative, cross-sectional survey of individual taxpayers in Shenzhen, China. The aim is to test whether Tax Awareness (TA) mediates the relationship between four non-economic determinants namely Tax Knowledge (TK), Quality of Tax (QT), Tax Morale (TM), National Pride (NP) and Tax Compliance (TC).

The study employs PLS-SEM as the model emphasizes prediction with multiple variables that are latent. It uses an iterative algorithm that relies on ordinary least square regressions in order to determine weights that are crucial for calculating construct scores (Schuberth et al., 2023). Additionally, it is robust to non-normal indicators. The instrument relies on validated, self-reported scales and is thus followed by a confirmatory factor analysis to assess the validity of the item in this context.

Setting, sampling and participants

The primary data collection was carried forth across 9 administrative districts in Shenzhen namely: Futian, Luohu, Nanshan, Yantian, Baoan, Longgang, Longhua, Pingshan, and Guangming. A two-stage stratified cluster sampling plan was used. Two streets were chosen at random from each Shenzhen administrative district as part of the first stage of cluster sampling. The streets are sorted using the alphabetic sorting method. The streets of the more populated boroughs have a higher chance of being chosen than those of the less populated boroughs because the probability of selection is proportionate to the size of the local population. In the second phase, 4 resident committees were chosen at random from each street, and the neighborhood committees under the streets' jurisdiction were chosen using the alphabetic sorting method. As it was difficult to find a list of the names of the specific neighborhood committee employees, a random encounter survey was conducted among the neighborhood committees that were chosen. 15 predetermined questionnaires were examined within the purview of each neighborhood committee that was chosen, allowing for the investigation of individual taxpayers. At the same time, each district's sample size is modified based on its population, as on-site random encounter survey was conducted with a fixed quota. Note that the 2024 fieldwork yielded 1,080 questionnaires that approximately accounted for 120 per district.

Instrument and measures

A structured online survey in the form of a Tencent questionnaire was administered. Respondents were first briefed, post which they answered the questionnaire anonymously and submitted it within the stated window. All the latent variables were measured on a five-point Likert scale with 1 being strongly disagree and 5 being strongly agree. The variables recorded and their respective description are given in *Table 1*.

Table 1. Variable description.

Variable	Description
Tax Knowledge (TK)	Factual/procedural knowledge of tax functions, provisions, procedures, and Chinese tax system
Quality of Tax Service (QT)	Perceived responsiveness, reliability, empathy/assurance, clarity, and digital usability of the tax authority
Tax Morale (TM)	Internalized civic duty and fairness norms
National Pride (NP)	Affective identification with the nation/patriotism
Tax Awareness (TA)	Conscious recognition of obligations/updates
Tax Compliance (TS/TC)	Voluntary compliance intentions/behaviors

Data collection, ethics and data screening

To examine the tax compliance practices of individual taxpayers in Shenzhen, China, a questionnaire survey was administered. Thus, the researchers learnt about the code of conduct and legality of the respondents' personal information in this study. The study is solely for academic purposes, and the researchers pledge to protect the respondents' information. Prior to SEM, a standard screening was performed in SPSS to check for missingness and straight lining alongside descriptive states and outlier scans. Additionally, normality was documented. Items with pervasive missingness or obvious response artifacts were flagged for review in the measurement model.

Modelling approach

Two model estimation strategy

To models were estimated to balance the coverage of content and psychometric quality: (1) Model 1 (initial, all-item): includes the full intended item sets per construct to preserve content validity; (2) Model 2 (trimmed, final): removes weaker or cross-loading indicators to optimize reliability/validity while retaining construct meaning. The final model exhibits higher α /CR/AVE across constructs (*Table 2*). Recommended thresholds are Cronbach's $\alpha \geq 0.70$, Composite Reliability ≥ 0.70 , and AVE ≥ 0.50 , indicating strong reliability and convergent validity. For indicator loadings, items with loadings ≥ 0.70 were preferred in the final model, while those in the 0.40–0.70 range were initially retained in the first-stage model only if theoretically important and not detrimental to construct validity.

Table 2. α /CR/AVE constructs.

Construct	Cronbach's α	Composite Reliability (CR)	Average Variance Extracted (AVE)
National Pride (NP)	0.905	0.913	0.601
Quality of Tax Service (QTS)	0.943	0.944	0.660
Tax Awareness (TA)	0.891	0.894	0.698
Tax Knowledge (TK)	0.930	0.931	0.671
Tax Morale (TM)	0.895	0.899	0.578
Tax Compliance (TS)	0.908	0.935	0.725

Indicator retention rules

To reflect the analyst's procedure, item retention followed a two-threshold rule: (1) Initial liberal screen: Items with loadings $\geq .40$ were provisionally retained; those $< .40$ were removed; (2) Final refinement: Indicators in the .40–.70 range were retained only if they contributed to construct validity and their removal did not improve reliability (CR/ α) or convergent validity (AVE). The final model prioritized items with loadings $\geq .70$. This staged approach safeguarded theoretical coverage in the initial model while ensuring psychometric rigor in the final model.

Measurement model evaluation

The measurement model was assessed using standard PLS-SEM criteria: Indicator reliability: standardized loadings (target $\geq .70$ in the final model); Internal consistency: Cronbach's α and composite reliability (CR $\geq .70$); Convergent validity: average variance extracted (AVE $\geq .50$); Discriminant validity: Heterotrait–monotrait ratios (HTMT $< .85$ –.90) and cross-loadings.

Structural model and mediation test

After establishing the measurement quality, the following were tested: (1) Direct paths to TA: TK→TA, QT→TA, TM→TA, NP→TA; (2) Direct paths to TS: TK→TS, QT→TS, TM→TS, NP→TS, TA→TS; (3) Mediated paths via TA: NP/QT/TK/TM → TA → TS. Bias-corrected bootstrapping was used to obtain standard errors, t-values, p-values and 95% confidence intervals for all direct and indirect effects. Note that indirect effects were reported in the findings table as non-significant. Additionally, the explanatory power and fit have been summarized with R^2 and SMARTPLS's SRMR/d_ULS/d_G/NFI wherein the final model, SRMR ≈ .05 and NFI ≈ .875 (Table 3).

Table 3. Model fitness.

Category	Saturated model	Estimated model
SRMR	0.05	0.05
d_ULS	2.516	2.516
d_G	0.666	0.666
Chi-square	2935	2935
NFI	0.875	0.875

Collinearity and Shared-method checks

Inner VIFs were inspected for predictors of TA and TS. It was found that all VIFs were low within the range of approximately 1.06 to 1.85. The table has been given in Table 4. This indicated no concerns regarding multicollinearity. Furthermore, procedural remedies included anonymity, neutral wording, and mixed item ordering in order to mitigate common-method bias.

Table 4. VIFs.

Category	VIF
NP -> TA	1.057
NP -> TS	1.072
QTS -> TA	1.808
QTS -> TS	1.836
TA -> TS	1.417
TK -> TA	1.759
TK -> TS	1.845
TM -> TA	1.172
TM -> TS	1.269

Software

Data screening was conducted using SPSS, while the measurement and structural models were estimated in SmartPLS v4, which generated the bootstrapping, validity diagnostics, and path coefficients reported in the findings.

Results and Discussion

Descriptive statistics

The study produced 1,080 valid cases from 9 districts across Shenzhen, as discussed in section 3. All constructs were measured on a 5-point Likert scale. The screening showed no patterns that would preclude estimation hence the analysis proceeded to the

measurement and structural models directly, in lieu of addressing the hypothesized paths: H1–H4 to Tax Awareness, H5–H8 to Tax Compliance, H9 from Awareness to Compliance, and H10–H13 as indirect effects via Awareness.

Initial model

In line with the two-stage approach described in the methodology, the initial model retained the full intended item set per construct, allowing indicators with loadings $\geq .40$ to enter before refinement. Loadings were generally strong, with two Tax Knowledge items (TK3, TK10) in the high-.60s. The complete initial loadings are reproduced in *Table 5*. National Pride (NP): All eight NP indicators load 0.708–0.813 (NP8 = 0.708; NP6 = 0.813). Squared loadings therefore range ≈ 0.50 – 0.66 , so most items comfortably exceed the 0.50 indicator-reliability benchmark. No NP item poses a retention risk at this stage. Quality of Tax Service (QTS): The ten QTS items are uniformly high at 0.787–0.841 (QTS8 = 0.787; QTS9 = 0.841), implying ≈ 0.62 – 0.71 of variance explained per item. The tight band indicates a well-defined, internally consistent service-quality construct; none are near the gray zone. Tax Awareness (TA): All five items are strong, 0.781–0.875 (TA4 = 0.781; TA1 = 0.875), implying ≈ 0.61 – 0.77 indicator reliability. This shows coherent coverage of awareness with no weak items in the initial model. Tax Knowledge (TK): Most TK items load well in the 0.778–0.826 range (e.g., TK2 = 0.826; TK4 = 0.818), but two items are below .70, TK3 = 0.674 and TK10 = 0.688, with ≈ 0.45 and ≈ 0.47 variance explained, respectively. These two contribute least uniquely to the latent trait and are natural candidates for trimming during refinement (as done in the final model). Tax Morale (TM): Eight items span 0.703–0.829 (TM3 = 0.703; TM8 = 0.829). The lower bound yields ≈ 0.49 indicator reliability, borderline but acceptable given the loading $\geq .70$, while the upper bound is strong. On loadings alone, the set is adequate; any pruning would depend on whether AVE/CR or discriminant checks gain from removing the lowest items. Tax Compliance (TS): All five items are high, 0.810–0.869 (TS5 = 0.810; TS4 = 0.869), implying ≈ 0.66 – 0.76 variance explained. This block is tight and needs no trimming based on loadings.

Table 5. Factor loadings of initial model.

Category	NP	QTS	TA	TK	TM	TS
NP1	0.801					
NP2	0.790					
NP3	0.773					
NP4	0.784					
NP5	0.790					
NP6	0.813					
NP7	0.738					
NP8	0.708					
QTS1		0.821				
QTS10		0.813				
QTS2		0.814				
QTS3		0.815				
QTS4		0.820				
QTS5		0.802				
QTS6		0.811				
QTS7		0.798				
QTS8		0.787				
QTS9		0.841				
TA1			0.875			
TA2			0.808			
TA3			0.844			
TA4			0.781			
TA5			0.865			
TK1				0.789		

TK10	0.688	
TK2	0.826	
TK3	0.674	
TK4	0.818	
TK5	0.800	
TK6	0.790	
TK7	0.791	
TK8	0.800	
TK9	0.778	
TM1		0.737
TM2		0.800
TM3		0.703
TM4		0.737
TM5		0.790
TM6		0.740
TM7		0.739
TM8		0.829
TS1		0.863
TS2		0.848
TS3		0.858
TS4		0.869
TS5		0.810

Implications

Content validity preserved. Aside from TK3 (0.674) and TK10 (0.688), every indicator meets or exceeds .70, supporting the representational adequacy of each construct at entry. Targets for refinement. TK3 and TK10 are the only clear loading-based candidates for removal; dropping them is expected to raise TK's AVE/CR and reduce any cross-loading risk without narrowing construct coverage (given several other strong TK items). Anticipated psychometrics. Because NP, QTS, TA, TM, TS already show loadings $\geq .70$, their CR/AVE were expected to be satisfactory even before trimming; TK is where indicator pruning would yield the largest improvement, which is exactly what the final model delivers.

Final model

After trimming weaker indicators (notably TK3 and TK10), the final model retained items with consistently strong loadings (most $\geq .70$) and demonstrated robust internal consistency and convergent validity across all constructs. The detailed final loadings and summary reliability statistics are reported in *Table 6*. National Pride (NP): Eight indicators load 0.708–0.813 (NP8 = 0.708; NP6 = 0.813). With squared loadings ≈ 0.50 –0.66, every item contributes at least half of its variance to the latent factor. Reliability/validity: $\alpha = 0.905$, CR = 0.913, AVE = 0.601, confirming strong internal consistency and convergent validity for NP. Quality of Tax Service (QTS): Ten indicators load 0.787–0.841 (QTS8 = 0.787; QTS9 = 0.841). The tight, high band implies very consistent measurement; even the lowest loading yields ≈ 0.62 indicator reliability. Reliability/validity: $\alpha = 0.943$, CR = 0.944, AVE = 0.660, a well-defined, highly reliable service-quality construct. Tax Awareness (TA): Five indicators load 0.779–0.875 (TA4 = 0.779; TA1 = 0.875), implying ≈ 0.61 –0.77 indicator reliability. Reliability/validity: $\alpha = 0.891$, CR = 0.894, AVE = 0.698, excellent convergence, with AVE close to 0.70. Tax Knowledge (TK): After trimming sub-.70 items from the initial model, eight indicators remain and load 0.800–0.853 (TK9 = 0.800; TK2 = 0.853). The block is now uniformly strong (all ≥ 0.80). Reliability/validity: $\alpha = 0.930$, CR = 0.931, AVE = 0.671, showing that the refinement notably improved TK's convergence while preserving content coverage. Tax Morale (TM): Eight indicators load 0.703–0.829 (TM3 = 0.703; TM8 = 0.829). Even the weakest item clears the $\geq .70$ preference.

Reliability/validity: $\alpha = 0.895$, $CR = 0.899$, $AVE = 0.578$, adequate convergence with high internal consistency across the set. Tax Compliance (TS): Five indicators load 0.803–0.871 (TS5 = 0.803; TS4 = 0.871), indicating a tight, high-performing block. Reliability/validity: $\alpha = 0.908$, $CR = 0.935$, $AVE = 0.725$, very strong convergent validity for the compliance construct.

Table 6. Factor loadings of final model with selected items.

Category	NP	QTS	TA	TK	TM	TS	Cronbach alpha	CR	AVE
NP1	0.801						0.905	0.913	0.601
NP2	0.790								
NP3	0.773								
NP4	0.784								
NP5	0.790								
NP6	0.813								
NP7	0.738								
NP8	0.708								
QTS1		0.821					0.943	0.944	0.66
QTS10		0.813							
QTS2		0.814							
QTS3		0.815							
QTS4		0.820							
QTS5		0.803							
QTS6		0.811							
QTS7		0.798							
QTS8		0.787							
QTS9		0.841							
TA1			0.875				0.891	0.894	0.698
TA2			0.810						
TA3			0.844						
TA4			0.779						
TA5			0.865						
TK1				0.812			0.93	0.931	0.671
TK2				0.853					
TK4				0.838					
TK5				0.814					
TK6				0.808					
TK7				0.813					
TK8				0.813					
TK9				0.800					
TM1					0.737				
TM2					0.800				
TM3					0.703				
TM4					0.737				
TM5					0.790				
TM6					0.740				
TM7					0.739				
TM8					0.829				
TS1						0.868	0.908	0.935	0.725
TS2						0.855			
TS3						0.859			
TS4						0.871			
TS5						0.803			

Implications

All retained indicators meet the $\geq .70$ preference (lowest ≈ 0.703), and every construct satisfies $\alpha \geq .70$, $CR \geq .70$, $AVE \geq .50$. The most notable gain from refinement appears in Tax Knowledge (TK), where removing the two sub-.70 items from the initial model yields uniformly $\geq .80$ loadings and $AVE = .671$. Overall, the final measurement model provides precise, internally consistent, and convergent measurement for NP, QTS, TA, TK, TM, and TS, forming a solid foundation for structural-path interpretation.

Discriminant Validity (HTMT)

HTMT (heterotrait–monotrait ratio) assesses how distinct any two latent constructs are. Lower values indicate better discriminant validity. Common decision rules are $HTMT < .85$ (conservative) or $< .90$ (more liberal). The matrix is reported in lower-triangular form (one side only, because it's symmetrical). Key results from *Table 7*: Range: HTMT values span 0.139 to 0.694; Highest pair: TK–QTS = 0.694, which is the closest to the threshold but still safely below .85; Next-highest pairs: TA–TK = 0.478, TA–TM = 0.453, QTS–TM = 0.373, TS–QTS = 0.351; Lowest associations: Pairs involving NP are uniformly small, NP with TS = 0.139, NP with TK = 0.177, NP with QTS = 0.209, NP with TM = 0.199, NP with TA = 0.238, indicating National Pride is empirically quite distinct from the other constructs; Compliance's distinctiveness: TS shows modest HTMT with the antecedents, TS–QTS = 0.351, TS–TM = 0.273, TS–TK = 0.203, TS–TA = 0.187, TS–NP = 0.139, suggesting Tax Compliance is measured distinctly from predictors (even though it correlates most with QTS, it is still well below .85). Interpretation: Discriminant validity supported: Because all HTMT values are $< .85$, the constructs are empirically distinguishable under conservative criteria. Conceptual proximity to watch: The comparatively higher TK–QTS (0.694) reflects plausible conceptual overlap (better service quality often co-occurs with greater taxpayer knowledge). It remains below the threshold, so it does not threaten discriminant validity. Discriminant validity was assessed using the HTMT criterion. All inter-construct HTMT ratios ranged from 0.139 to 0.694 and were below the conservative .85 threshold, indicating adequate discriminant validity; the highest value was TK–QTS = 0.694.

Table 7. Discriminant validity HTMT matrix.

Category	NP	QTS	TA	TK	TM	TS
NP						
QTS	0.209					
TA	0.238	0.444				
TK	0.177	0.694	0.478			
TM	0.199	0.373	0.453	0.348		
TS	0.139	0.351	0.187	0.203	0.273	

Correlations among latent variables

The bootstrapped correlation matrix reveals positive, statistically significant relationships between all the latent constructs. Correlations (original sample, $r(O)$) vary from 0.139 to 0.648, p -values $< .001$ across the board (*Table 8*). The highest correlation is that of Tax Knowledge (TK) and Quality of Tax Service (QTS), $r = .648$ ($t = 28.75$), which indicates that those respondents who experience better service also report higher tax knowledge. Awareness (TA) is significantly correlated with QTS, $r = .411$, and TK, $r = .438$, as predicted by the notion that knowledge and service quality together enable awareness. Tax Morale (TM) is related to TA ($r = .407$), QTS ($r = .346$), and TK ($r = .321$), suggesting that greater morale is associated with improved information and service quality. Compliance (TS) has its greatest relationships with QTS, $r = .355$, and TM, $r = .262$; its relationships with TK ($r = .218$), TA ($r = .169$), and National Pride (NP; $r = .139$) are weaker. This trend precedes the structural findings: compliance is most closely related to perceived service quality and moral orientation, less to knowledge, awareness, or pride. NP has the weakest connectivity of all, showing only

modest connections with QTS (.199), TA (.218), TK (.166), TM (.178), and TS (.139). Noe that they are all significant.

Table 8. Correlations within latent variables in bootstrapped model.

Category	r (O)	r (M)	SD	T-stat	P values
QTS <-> NP	0.199	0.201	0.035	5.665	0.000
TA <-> NP	0.218	0.221	0.036	6.056	0.000
TA <-> QTS	0.411	0.413	0.032	12.67	0.000
TK <-> NP	0.166	0.168	0.036	4.549	0.000
TK <-> QTS	0.648	0.649	0.023	28.75	0.000
TK <-> TA	0.438	0.439	0.032	13.66	0.000
TM <-> NP	0.178	0.180	0.04	4.503	0.000
TM <-> QTS	0.346	0.347	0.037	9.435	0.000
TM <-> TA	0.407	0.409	0.037	11.15	0.000
TM <-> TK	0.321	0.322	0.039	8.305	0.000
TS <-> NP	0.139	0.142	0.035	3.984	0.000
TS <-> QTS	0.355	0.354	0.031	11.38	0.000
TS <-> TA	0.169	0.167	0.034	4.933	0.000
TS <-> TK	0.218	0.216	0.036	6.115	0.000
TS <-> TM	0.262	0.263	0.031	8.508	0.000

Structural model and mediation tests

Table 9 reports standardized path coefficients from the bootstrapped PLS-SEM. Each row shows the original estimate (Coeff O), the bootstrapped mean (Coeff M), its standard deviation (SD), the t statistic, and p value.

Table 9. Path coefficients as per bootstrapped SEM-PLS model.

Category	Coeff (O)	Coeff (M)	SD	T-stat	P values
NP -> TA	0.102	0.104	0.027	3.735	0.000
NP -> TS	0.058	0.06	0.035	1.647	0.100
QTS -> TA	0.142	0.142	0.049	2.885	0.004
QTS -> TS	0.326	0.327	0.047	6.919	0.000
TA -> TS	-0.025	-0.028	0.041	0.607	0.544
TK -> TA	0.245	0.244	0.048	5.093	0.000
TK -> TS	-0.045	-0.048	0.050	0.901	0.367
TM -> TA	0.261	0.262	0.035	7.400	0.000
TM -> TS	0.163	0.166	0.038	4.254	0.000

Predictors of Tax Awareness (TA) (H1-H4)

All four antecedents significantly increase TA: Tax Morale → TA: $\beta = 0.261$, $t = 7.400$, $p < .001$ (strongest); Tax Knowledge → TA: $\beta = 0.245$, $t = 5.093$, $p < .001$; Quality of Tax Service → TA: $\beta = 0.142$, $t = 2.885$, $p = .004$; National Pride → TA: $\beta = 0.102$, $t = 3.735$, $p < .001$. These results support the hypotheses that NP, QTS, TK, and TM each positively shape awareness.

Predictors of Tax Compliance (TS) (H5-H9)

Two variables have significant direct effects on compliance: Quality of Tax Service → TS: $\beta = 0.326$, $t = 6.919$, $p < .001$ (largest effect); Tax Morale → TS: $\beta = 0.163$, $t = 4.254$, $p < .001$. The remaining paths are not significant: National Pride → TS ($\beta =$

0.058, $p = .100$), Tax Knowledge \rightarrow TS ($\beta = -0.045$, $p = .367$), and Tax Awareness \rightarrow TS ($\beta = -0.025$, $p = .544$). While non-economic factors strongly raise awareness, only service quality and morale translate into higher compliance. The non-significant TA \rightarrow TS path foreshadows the absence of mediation via awareness in later tests.

Mediation Via Tax Awareness (H10-H13)

Given the non-significant TA \rightarrow TS path, the indirect effects from each antecedent to compliance via awareness are expected to be negligible, and this is confirmed in *Table 10*. None of the four indirect effects differs from zero; bootstrapped confidence intervals (not shown) include zero, and VAF values are therefore trivial. Consequently, H10–H13 are not supported.

Table 10. Indirect effects in bootstrapped SEM-PLS model.

Category	Coeff (O)	Coeff (M)	SD	T-stat	P values
NP -> TA -> TS	-0.003	-0.003	0.005	0.558	0.577
QTS -> TA -> TS	-0.004	-0.004	0.006	0.568	0.570
TK -> TA -> TS	-0.006	-0.006	0.01	0.611	0.542
TM -> TA -> TS	-0.006	-0.008	0.011	0.577	0.564

The SmartPLS diagram in *Figure 1*, shows the final PLS-SEM model, both the measurement (outer) model and the structural (inner) model, with standardized coefficients printed on the arrows. The blue circles are latent constructs: QTS (service quality), TK (knowledge), TM (tax morale), NP (national pride), TA (tax awareness), and TS (tax compliance). The yellow boxes are the retained indicators. Numbers beside each arrow are outer loadings; they are all high in the final model: QTS items ≈ 0.787 – 0.841 ; TA items ≈ 0.779 – 0.875 ; TK items ≈ 0.800 – 0.853 ; TM items ≈ 0.703 – 0.829 ; NP items ≈ 0.708 – 0.813 ; TS items ≈ 0.803 – 0.871 . These confirm strong indicator reliability for every construct. Determinants of Awareness (TA): TM \rightarrow TA = 0.261, TK \rightarrow TA = 0.245, QTS \rightarrow TA = 0.142, NP \rightarrow TA = 0.102. All are positive and significant (per the bootstrapped tests), so morale, knowledge, service quality, and national pride each raise awareness. Determinants of Compliance (TS): QTS \rightarrow TS = 0.326 (largest, significant), TM \rightarrow TS = 0.163 (significant), while NP \rightarrow TS = 0.058, TK \rightarrow TS = -0.045 , and TA \rightarrow TS = -0.025 are non-significant. Thus, compliance is driven directly by service quality and morale, not by awareness or knowledge once everything is modeled together. Explained variance (inside circles): R^2 for TA = 0.294 (the four antecedents explain $\sim 29\%$ of variance in awareness); R^2 for TS = 0.153 (predictors explain $\sim 15\%$ of variance in compliance). The diagram visually consolidates that awareness is an outcome of NP/QTS/TK/TM but does not carry their effects to compliance; instead, QTS and TM influence TS directly.

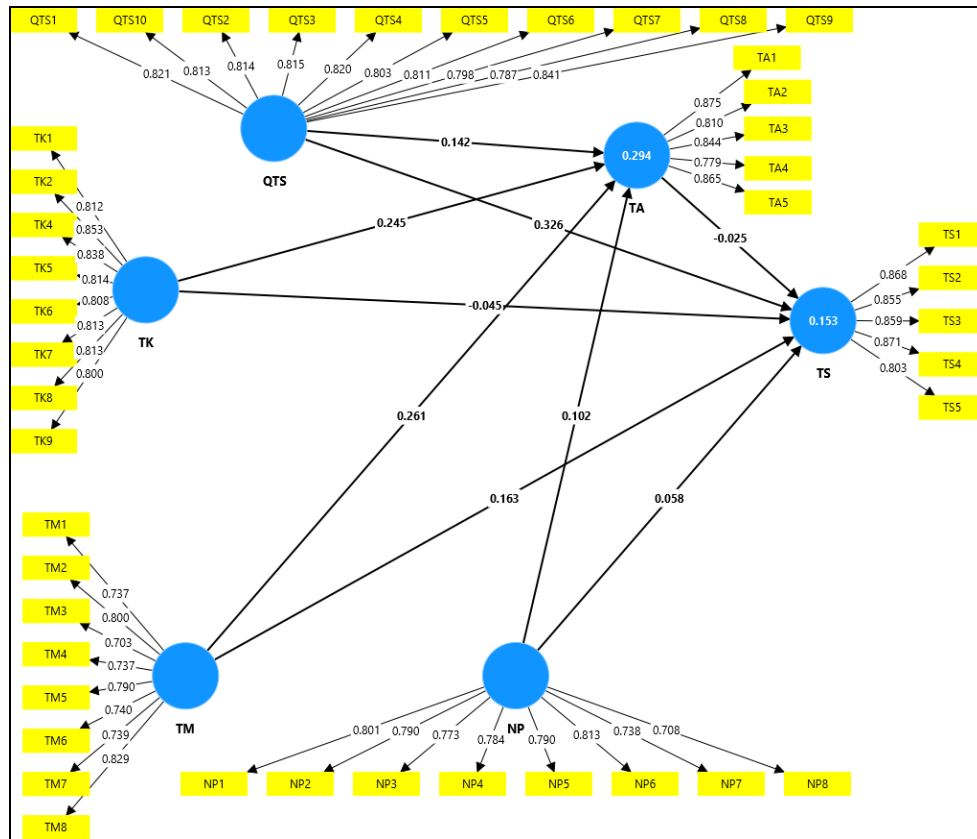


Figure 1. Final PLS-SEM model in SMART PLS.

Interpretation of mediation results

Bootstrapped PLS paths show that all four antecedents—Tax Morale (TM), Tax Knowledge (TK), Quality of Tax Service (QTS), and National Pride (NP)—significantly increase Tax Awareness (TA), with TM the strongest predictor ($\beta_{TM \rightarrow TA} = 0.261$; $\beta_{TK \rightarrow TA} = 0.245$; $\beta_{QTS \rightarrow TA} = 0.142$; $\beta_{NP \rightarrow TA} = 0.102$). However, compliance (TS) is explained directly by QTS ($\beta = 0.326$, $p < .001$) and TM ($\beta = 0.163$, $p < .001$), while $TA \rightarrow TS$ is non-significant ($\beta = -0.025$, $p = .544$). Consequently, the indirect (mediated) effects via TA are not supported for any antecedent. These inferences are credible given strong psychometrics (all constructs $\alpha/CR \geq .89$; $AVE \geq .57$) and low inner VIFs (~1.06–1.85). Two interpretations follow. First, service encounters and moral norms appear sufficiently proximal to action that their influence reaches compliance without needing an awareness conduit. Second, the operationalization of TA (informational recognition) may be necessary but not sufficient for action when QTS and TM already capture procedural clarity and internalized duty. Either way, the non-significant $TA \rightarrow TS$ link explains the absence of mediation despite strong $IV \rightarrow TA$ paths.

H1–H4 ($IVs \rightarrow TA$): Supported. TM, TK, QTS, and NP each significantly increase Tax Awareness, with TM the strongest predictor. This aligns with prior work that knowledge and positive institutional experiences foster awareness, and that civic-value orientations can heighten attentiveness to tax obligations (Loo et al., 2012; Torgler and Schneider, 2009; Kirchler, 2007). H5–H9 (Direct paths to TS): Partially supported. QTS and TM exhibit robust direct effects on compliance, while TK, NP, and TA do not. This pattern is consistent with the “service-and-client” view that high-quality, responsive

administration builds cooperative climates (Kirchler, 2007) and with evidence that ethical norms sustain compliance even under low deterrence (Alm and Torgler, 2011). H9 (TA → TS): Not supported. Although TA rises with all antecedents, its path to behavior is non-significant-foreshadowing null mediation. Prior studies often found awareness predictive of compliance (Wahl et al., 2010), but our Shenzhen data suggest awareness, as operationalized here, functions more as a consequence of knowledge/service/morals than a conduit to behavior. H10–H13 (Mediation via TA): Not supported. Despite literature that reports awareness mediating fairness/knowledge effects (Ntiamoah and Asare, 2022; Tatenda and Sebele-Mpofu, 2019; Saad, 2014; Wahl et al., 2010), none of the IV→TA→TS indirect paths are significant in our model. In Shenzhen, service quality and moral commitment appear sufficiently proximal to action to bypass awareness as a mediator.

Although TA does not mediate behavior here, it's consistent sensitivity to TK, QTS, TM, and NP confirms its centrality as a cognitive state that aggregates informational and normative inputs. In other words, awareness is an outcome marker of learning and value internalization in this setting, even if it did not transmit those effects to action once QTS and TM were in the model. The Literature Review positions TA precisely as this “cognitive link” translating ideals and knowledge into choices, which the present data partially affirm (via strong IV→TA effects) while circumscribing its role in the last step to behavior. Two refinements follow for future work: (i) broaden TA toward procedural self-efficacy/behavioral control, which SCT suggests is closer to enactment than awareness-as-knowledge, and (ii) test conditional roles (e.g., TA×QTS) or sequences (QTS→TK/TA→TS) rather than a single-step mediation. The measurement base is strong enough to support such extensions. SCT views behavior as co-determined by environmental affordances and personal determinants through cognitive processes. Your pattern-environmental quality (QTS) and personal moral standards (TM) exerting direct effects on TS, with TA rising in response to these inputs-fits SCT's triadic reciprocity while indicating that, in this policy context, environmental clarity and moral agency are proximal drivers. That awareness did not mediate does not contradict SCT; rather, it implies that cognition may operate in parallel or conditionally (e.g., as efficacy) rather than as a uniform mediator. The theoretical positioning in your review-awareness as the mechanism converting values/knowledge into action-remains valid, but the Shenzhen evidence suggests a shorter path from service quality and moral commitment to behavior.

Service design first. Prioritize investments that raise reliability, clarity, usability, and responsiveness of tax services (digital and face-to-face). The large QTS→TS coefficient indicates that improvements here translate most strongly into compliance. Campaigns should foreground procedural simplicity, timely support, and transparent resolutions as suggested by Barare (2018) and Kirchler (2007). Ethics-framed messaging. Because TM→TS is robust, integrate civic-duty, fairness, and mutual-benefit frames into outreach. Narratives that highlight how taxes fund visible local public goods can strengthen internalized duty and sustain voluntary compliance as posited by Alm and Torgler (2011) as well as Torgler (2007). Make awareness actionable. Use education to convert TA from information to doing micro-modules that build procedural mastery (how to file, correct, appeal), checklists, and interactive walkthroughs. This targets the gap between high TA and action implied by the non-significant TA→TS path. Segmented outreach. For groups high in NP but not yet compliant, link patriotic appeals to concrete, easy actions (e.g., “five-minute filing” flows), ensuring national-identity

messages are paired with clear service prompts. Measurement & monitoring. Maintain your strong psychometric discipline and add predictive checks (e.g., PLSpredict) and field A/B tests for message framing and service tweaks, closing the loop between awareness, experience, and behavior. Overall, the study shows that awareness rises with knowledge, good service, morale, and pride, but behavior is most powerfully moved by service quality and moral motivation. Policy should therefore design for clarity and speak to civic duty, while upgrading education so that awareness reliably converts to action.

Conclusion

The current research examined if Tax Awareness (TA) is mediating the impacts of four non-economic precursors-Tax Knowledge (TK), Quality of Tax Service (QTS), Tax Morale (TM), and National Pride (NP)-on Tax Compliance (TS) among Shenzhen taxpayers (N = 1,080) based on PLS-SEM. The measurement model was good and overall fit was satisfactory. Substantively, all four predictors had a strong positive effect on TA (most strongly by TM; estimated standardized paths: TM→TA \approx 0.26, TK→TA \approx 0.25, QTS→TA \approx 0.14, NP→TA \approx 0.10), providing moderate explanatory power for awareness ($R^2(\text{TA}) \approx 0.29$). Yet, compliance was directly explained by QTS ($\beta \approx 0.33$, $p < .001$) and TM ($\beta \approx 0.16$, $p < .001$) but not by TK, NP, or TA; the path TA→TS was close to zero ($\beta \approx -0.03$, n.s.), resulting in a moderate $R^2(\text{TS}) \approx 0.15$ and no indication for indirect (mediated) effects from any of the antecedents through awareness. Together, the findings show that service quality and internalized moral obligation are the closest proximal drivers of compliance in this situation, while awareness acts more as a product of knowledge, experience and identity than as a mechanism converting these inputs into action. Meanwhile, the robust antecedent→awareness associations indicate that awareness is still a contentful cognitive state, albeit one whose operation here was not the ultimate "last-mile" cause of action.

There are few caveats to these findings. The cross-sectional, self-report design limits causal inference and may have residual common-method bias, despite procedural fixes. The operational definition of TA highlighted recognition/knowledge over procedural self-efficacy or perceived control, which may weaken its behavioral effect. Generalizability is limited to Shenzhen's administrative and cultural environment and the targeted sampling frame; nonresponse and social-desirability biases cannot be completely excluded. The structural model accounts for a modest proportion of compliance variance, indicating missing constructs (such as trust in authorities, procedural justice, perceived fairness, or deterrence/enforcement). Subsequent research should further develop the awareness construct to include mastery and efficacy (e.g., the ability to manage filing, troubleshoot, and assert control), examine conditional and sequential mechanisms (e.g., TA \times QTS interactions or QTS→TK/TA→TS chains), and include possible mediators such as trust and procedural justice in addition to deterrence and fairness covariates. Methodologically, experimental or longitudinal designs, field A/B tests of service tweaks and message frame manipulations, and linkage to administrative compliance records would provide causal claims and ecological validity. Reporting f^2 and Q^2 , predictive checks (e.g., PLSpredict), multi-group invariance, and subgroup analyses by digital literacy, income, and age can demonstrate for whom morale and service interventions work best. Lastly, cross-city and cross-country

replications can ascertain if the "direct QTS/TM → TS" trend generalizes or if awareness-based mediation arises under alternative institutional conditions.

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Conflict of interest

The authors confirm that there is no conflict of interest involve with any parties in this research study.

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