

## Research Article

# Digital Tax Ecosystems and Compliance Behaviour: A Moderated–Mediated Framework for Self-Earning Professionals

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### Article History

Received: 01.05.2026

Accepted: 25.05.2026

Published: 11.06.2026

**Abstract:** The quick digitalisation of tax administration has changed the way taxpayers interact with revenue authorities, especially the self-earning professionals who handle their tax affairs on their own. This study explores the moderating and mediating effects of Digital Trust (DT) and Tax Awareness (TA) between Digital Tax Ecosystems (DTE) and Tax Compliance Behaviour (TCB). A quantitative research design was used, and data were gathered from self-learning professionals using a structured survey instrument. Partial Least Squares Structural Equation Modelling (PLS-SEM) was utilised for analysing the proposed moderated–mediated framework. The study results show that a Digital Tax Ecosystem has a significant positive impact on Tax Awareness and Tax Compliance Behaviour. The results showed that Tax Awareness partially mediated the link between DTE and TCB, and that Digital Trust enhanced the positive effects of DTE on compliance behaviour. The novelty of the study is that it is a technological, behavioural and institutional approach all in one. They offer policy implications for policymakers seeking to improve voluntary compliance by adopting digital transformation, increasing taxpayer education and trust.

**Keywords:** Digital Tax Ecosystem, Tax Compliance Behaviour, Tax Awareness, Digital Trust, Self-Earning Professionals, PLS-SEM, Digital Governance.

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## INTRODUCTION

The fast transformation of public services into the digital world has revolutionised how governments carry out taxation and how taxpayers can communicate with governments. With the advancement of digitalisation, tax authorities can create digital tax ecosystems, combining digital filing systems, online payment platforms, automated reporting tools, and real-time support for taxpayers. These advances have boosted the efficiency of administration, lowered compliance burden, and increased access to tax-related services (Organisation for Economic Co-operation and Development [OECD], 2020, 2024). In the context of the growing push by governments towards digital transformation, digital tax ecosystems have become an important tool in the efforts to improve tax administration and promote voluntary tax compliance.

Self-earning professionals like freelancers, consultants, trainers, digital content creators and independent service providers are more prominent than ever, with the digital tax ecosystems more relevant. Self-earners have to report their income and pay taxes, while a salary earner usually has taxes deducted from their salary. There are a variety of income sources, and their regularity and predictability vary, which makes compliance with tax regulations challenging and requires effective and user-friendly digital tax systems that facilitate accurate income reporting and timely tax submission (Bassegy & Schulte, 2022; Mulligan et al., 2022).

In recent years, the challenges have been tackled by introducing new concepts of digital tax administration, where tax procedures are integrated into digital environments well known to taxpayers for financial and business transactions. The key principles of OECD Tax Administration 3.0 are to embed taxation processes in natural digital environments to minimise compliance costs and increase transparency (OECD, 2020). These efforts have been increasingly ramped up, especially

since digital services were adopted by many people during and after the COVID-19 pandemic. Consequently, digital tax environments are no longer just technological tools, but strategic mechanisms for enhancing the engagement and compliance results for taxpayers.

Even with these developments, technology is not a guarantee for compliance. A mix of institutional, psychological, and technological factors affects tax compliance behaviour. Modern studies indicate that tax compliance is influenced by knowledge of tax requirements, ease of understanding, and accessibility of the tax process, as well as the transparency of the tax system (Alm et al., 2022; Kirchler et al., 2021). So it stands to reason that an understanding of tax issues is now critical in determining how digital tax systems affect compliance behaviours through the provision of tax awareness training/information; these digital tax systems also provide immediate access to tax-related information which is an important factor when trying to achieve voluntary compliance by developing new technologies like educational materials, automatic notifications, and similar features.

After awareness, another important factor that has become a focal point in the adoption and effective use of digital government services is trust. Digital Trust is a measure of the confidence taxpayers have in the reliability, security, and integrity of digital platforms. People, even the most tech-savvy, may be dissuaded from using digital tax services completely due to privacy issues, cybersecurity, and system effectiveness. Trust has emerged as an important factor influencing the acceptance and use of digital services in previous research (e.g. Bélanger & Carter, 2021; Wang & Benbasat, 2021; Yoon, 2022). Hence, the performance of digital tax ecosystems may not only rely on the technical aspects of such ecosystems, but may also be related to the extent of trust that taxpayers have in those systems.

While existing studies have examined individual dimensions of digital taxation, taxpayer compliance, tax awareness, and digital trust, there is a lack of research that investigates these elements collectively. This study aims to gain a better understanding of how these elements work together in a comprehensive framework, specifically in the context of self-earning professionals. This is a significant lacuna in the literature in the context of the rising economic importance of independent workers and the growing reliance on digital tax administration. The current study aims to fill this gap by exploring the role of digital tax ecosystems on tax compliance behaviour mediated by tax awareness and moderated by digital trust.

The study will investigate the effect of digital tax ecosystems on tax compliance behaviour among self-earning professionals, investigate the mediating effect of tax awareness between digital tax ecosystems and tax compliance behaviour, assess the moderating effect of digital trust between digital tax ecosystems and tax compliance behaviour, and develop and validate a moderated–mediation model that explains tax compliance behaviour in digital tax ecosystems. This study adds to the existing literature on digital taxation and provides practical suggestions for policymakers looking to enhance the outcomes of tax compliance in a more digital economy.

The impact of digital tax systems on taxpayer behaviour is crucial as these systems are more and more becoming part of the public administration, especially when it comes to self-employed professionals who work outside of the traditional payroll-based tax systems. However, the effect of digital tax ecosystems on the behaviour of compliance has received little attention in previous research, despite the increased level of digitalisation. This study aims to fill this void by exploring how digital tax ecosystems influence tax compliance behaviour; how tax awareness mediates the relationship between digital tax ecosystems and tax compliance behaviour; how digital trust acts as a moderator between digital tax ecosystems and tax compliance behaviour; and the construction of a moderated–mediated model explaining tax compliance behaviour in digital tax ecosystems.

## LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

### 2.1 Digital Tax Ecosystems and Tax Compliance Behaviour

Digital tax ecosystems consist of interoperable digital infrastructure to support taxpayer registration, filing, payment, reporting and communication via technology-enabled platforms (OECD, 2020). The digital transformation of tax administration has changed the way tax compliance has traditionally been handled, making it more accessible, transparent and efficient. These systems streamline the process and provide taxpayers with easy-to-use digital tools, automated reminders, and live support options (Basse & Schulte, 2022).

From a behavioural point of view, digital tax ecosystems can have a positive impact on compliance, particularly by reducing compliance costs and providing a simplified tax-related procedure. Digital platforms foster greater taxpayer participation and help minimise taxpayer errors and administrative burdens of traditional filing methods (Mulligan et al., 2022). Finally, empirical research indicates that digitalisation efforts like e-filing and electronic reporting contribute to better reporting accuracy and to voluntary compliance (Bellon et al., 2022; Dom et al., 2023). This is especially important for those who are self-employed and have to take care of their taxes on their own, and use digital tools a lot in their work. Hence, the effective digital tax ecosystem is expected to lead to more tax compliance behaviour.

- **H1: Digital tax ecosystems positively influence tax compliance behaviour among self-earning professionals.**

### 2.2 Mediating Role of Tax Awareness

Tax awareness is the understanding by taxpayers of tax law, tax filing requirements, tax reporting requirements and implications of non-compliance. When taxpayers are more aware, they can make better decisions and comply with their obligations more effectively (Kirchler et al., 2021). In digital environments, it is becoming apparent that awareness of tax increases in response to the ease and quality of information made available via digital platforms.

Countries are making investment in the development of their country's digital tax system. You will notice that each country is working collectively to create an ecosystem to provide taxpayers with improved access to educational information that can help them understand their tax obligations (OECD, 2024). This new digital tax system will likely help to raise taxpayer awareness of what is required from them and to improve their access to relevant information (OECD, 2024; Kirchler et al., 2021; Sari & Nugroho, 2024). Additionally, research indicates that the availability of information will help to reduce asymmetry and facilitate voluntary compliance by aiding in the creation of informed taxpayers who have a greater understanding of what is required by law and how to comply (Kirchler et al., 2021; Sari & Nugroho, 2024).

Therefore, it is expected that tax awareness would act as a significant explanatory mechanism to explain how digital tax ecosystems affect the compliance behaviour.

- **H2: Digital tax ecosystems positively influence tax awareness among self-earning professionals.**
- **H3: Tax awareness positively influences tax compliance behaviour among self-earning professionals.**
- **H4: Tax awareness mediates the relationship between digital tax ecosystems and tax compliance behaviour.**

### 2.3 Moderating Role of Digital Trust

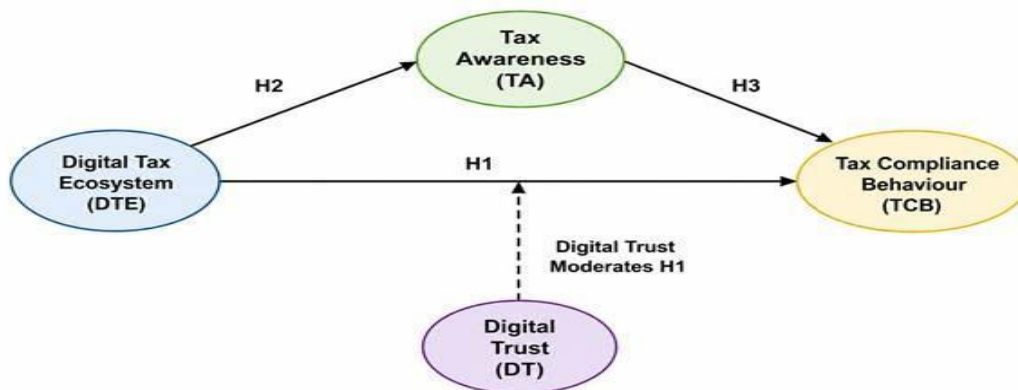
Digital trust embodies taxpayers' confidence in the security, reliability, transparency and effectiveness of digital tax platforms. Trust has always been found to be an important factor in the acceptance and use of digital services (Bélanger & Carter, 2021; Wang & Benbasat, 2021). For digital tax purposes, if a taxpayer believes that the tax system is safe and reliable, they are more inclined to interact with digital services and report on them.

Digital tax ecosystems could therefore hinge on taxpayer trust in the digital platform that supports the provision of services. Increased trust can increase user engagement and improve positive user behaviour outcomes of digital tax systems (Yoon, 2022). Therefore, digital trust is assumed to enhance the impact of digital tax ecosystems on compliance behaviour.

- **H5: Digital trust positively moderates the relationship between digital tax ecosystems and tax compliance behaviour, such that the relationship is stronger at higher levels of digital trust.**

### 2.4 Conceptual Framework

The study proposes a moderated–mediation model to explain the tax compliance behaviour of self-earning professionals based on the above theoretical arguments. The framework suggests that digital tax ecosystems have direct impacts on tax compliance behaviour and that digital tax ecosystems also have indirect impacts through increasing tax awareness, which acts as a mediator. In addition, the digital trust is suggested to amplify the impact of digital tax ecosystems on compliance behaviour. The framework combines technological, behavioural and institutional approaches to understand taxpayer behaviour in digital tax contexts.



**Note:** H1 = Direct effect; H2 = Effect on mediator; H3 = Mediator to outcome; H4 = Indirect (mediated) effect of DTE on TCB via TA; H5 = Moderating effect of DT on H1.

**Figure 1: Proposed Conceptual Framework**

Figure 1 below illustrates the proposed concept model of moderated–mediated model of tax compliance behaviour of self-earning professionals in the digital tax environment. The model suggests that Digital Tax Ecosystems (DTE) are directly and indirectly a main antecedent of Tax Compliance Behaviour (TCB). The positive direct association indicates that efficient, easily accessible, and technology-driven tax systems make it easier for taxpayers to comply, lower administrative taxes, and motivate taxpayers to meet their tax obligations.

The framework also introduces a mediating mechanism related to Tax Awareness (TA), which is how digital tax ecosystems improve compliance behaviour. By offering taxpayers access to information, guidance, regulatory changes and education, digital tax platforms enhance tax knowledge and compliance. This is hoped to lead to greater voluntary compliance through awareness.

Besides, Digital Trust (DT) is also a moderating variable. Digital trust is the taxpayers' trust in the safety, reliability, transparency and performance of digital tax platforms. It is suggested that the positive effects of digital tax ecosystems on tax compliance behaviour increase the more that taxpayers trust in digital systems. As a result, digital trust serves as a contextual element improving the effectiveness of digital tax measures.

The overall aim of the framework is to combine technology, behavioural and institutional aspects to illustrate the impact of digital tax ecosystems on compliance behaviour of self-earning professionals. This model captures both direct and indirect impacts of digital tax ecosystems, through tax awareness, as well as the moderating effect of digital trust, to bring a comprehensive view on taxpayer behaviour in increasingly digitised tax environments.

## RESEARCH METHODOLOGY

### 3.1 Research Design

The present study was designed as a quantitative (Survey) and cross-sectional design using the variables Digital Tax Ecosystem (DTE), Tax Awareness (TA), Digital Trust (DT) and Tax Compliance Behaviour (TCB) about self-earning professionals. A quantitative approach was deemed suitable in accordance with the aims of the study to test a theoretically well-grounded moderated–mediated model utilising empirical data. The analysis of the proposed relationships was carried out using the analysis technique of Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 4 because it could be used to analyse mediation and moderation effects in predictive models of research (Hair et al., 2022; Sarstedt et al., 2020).

### 3.2 Population, Sampling, and Data Collection

The target audience was self-employed professionals who work across India and are not paid by the hour, like Freelancer, Consultant, Trainer, Coach, Content Creator, Digital Marketer, Designer, Independent Service Provider, etc. They are an increasingly important component of the digital economy and are directly responsible for their own tax matters.

The size of the population of self-earning professionals in India was not known, as there is no comprehensive sampling frame available. As a result, a non-probability sampling method of 'snowball sampling' was adopted. Eligible respondents were first identified through professional networks, freelancer communities, LinkedIn groups, and entrepreneurship forums and digital business communities. Next, participants were asked to share the survey with others in their network who are self-earning professionals.

The minimum sample size was determined using Cochran's (1977) formula for an infinite population:

$$n_0 = Z^2pq / e^2$$

Based on 95% level of confidence ( $Z = 1.96$ ) along with 0.50 as an estimated proportion, with an errors/margin of error of 5%, then the minimum required sample size would be 384 respondents. Target sample size goal was in the area of 450 respondents to enhance the overall statistical power and allow for some non-complete interviews.

Data was collected using an online questionnaire that was sent via email, social media, professional networking groups, freelancer forums and entrepreneurship communities. For inclusion in the study, individuals had to be: 18 years of age or older; engaged for at least one year in a self-employment activity; responsible for self-managed taxes. Any individual whose responses to the completeness checks were incomplete and/or had inconsistent responses were excluded from the final analysis.

### 3.3 Instrument Development

Data were gathered by a structured questionnaire, which consisted of two sections. The first part collected demographic details such as age, gender, education qualification, professional category and years of professional experience. The second part assessed the study constructs using scales based on previous research on digital taxation, taxpayer compliance, digital trust, and technology adoption with multiple items.

A five-point Likert scale was used to evaluate all measurement items, on which 1 indicated "Strongly Disagree" and 5 indicated "Strongly Agree. The questionnaire was content validated, clarified and contextually relevant to academic experts and taxation practitioners before large-scale administration.

### 3.4 Measurement of Constructs

Four latent constructs were included in the proposed framework. Digital Tax Ecosystem measured perceptions on digital tax platform accessibility, efficiency, reliability, and usefulness. Tax Awareness assessed the awareness of the tax obligations, tax filing processes, and tax regulations. Digital trust translates into trust in the security, transparency and reliability of digital tax systems. Tax Compliance Behaviour assessed the tax reporting, filing, payment, and record-keeping obligations of taxpayers.

**Table 2: Measurement Items**

Construct	Code	Measurement Item
Digital Tax Ecosystem	DT E1	Digital tax platforms are easy to use.
	DT E2	Digital tax services simplify tax-related procedures.
	DT E3	Tax information is easily accessible through digital platforms.
	DT E4	Digital tax systems reduce compliance effort.
	DT E5	Digital tax services are reliable and efficient.
Tax Awareness	TA 1	I understand my tax obligations.
	TA 2	I am aware of tax filing requirements.
	TA 3	I understand tax regulations relevant to my profession.
	TA 4	I am aware of penalties associated with non-compliance.
	TA 5	I regularly update my tax-related knowledge.
Digital Trust	DT 1	I trust the security of digital tax platforms.
	DT 2	I believe my information is protected on digital tax systems.
	DT 3	Digital tax platforms are reliable.
	DT 4	Digital tax services operate transparently.
	DT 5	I trust digital tax records and transactions.
Tax Compliance Behaviour	TC B1	I file my taxes on time.
	TC B2	I accurately report taxable income.
	TC B3	I comply with tax regulations.
	TC B4	I maintain tax-related records properly.
	TC B5	I voluntarily fulfil my tax obligations.

### 3.5 Data Analysis Technique

The two-step approach recommended for PLS-SEM studies was used for data analysis using SmartPLS 4. Initially, indicator loadings, Cronbach's alpha, composite reliability (CR), average variance extracted (AVE), heterotrait–monotrait ratio (HTMT), and Fornell–Larcker criterion were examined to demonstrate the reliability and validity of the measurement model. Second, the structural model was assessed based on the path coefficients, coefficient of determination (R<sup>2</sup>), effect size (f<sup>2</sup>),

predictive relevance (Q2), and bootstrapping (5000 resamples).

Bootstrapping procedures were used to test direct effects of the Digital Tax Ecosystem on Tax Compliance Behaviour as well as the moderating and mediating effects of Digital Trust and Tax Awareness. Path coefficients, t-values, p-values and 95% confidence intervals were used to determine the statistical significance.

## RESULTS AND ANALYSIS

Partial Least Squares Structural Equation Modelling (PLS-SEM) was used to evaluate the proposed framework, using SmartPLS 4 software. The analysis was carried out in two phases: First, the measurement model was used to measure the reliability and validity, and second, the structural model was used to test the hypothesised relationships between constructs. Results are reported in the following steps: demographic characteristics of the respondents, assessment of the measurement model, structural model assessment, mediation and moderation analysis, and model predictive power.

### 4.1 Respondent Profile

450 valid responses were taken into account for analysis. The participants were individuals who work independently and represent a variety of job types including but not limited to freelance, consulting/trainer, content writing, digital marketing, etc.; this is important to note because it serves as bicultural support to the demographics as well as providing contextual information about the characteristics of the sample they have collected to represent the target population so as to use these results from the sample for this survey as data collection points in future studies.

**Table 3: Demographic Profile of Respondents (n = 450)**

Characteristic	Category	Frequency	Percentage (%)
Gender	Male	266	59.1
	Female	184	40.9
Age	18–25 years	72	16
	26–35 years	189	42
	36–45 years	126	28
	Above 45 years	63	14
Educational Qualification	Graduate	173	38.4
	Postgraduate	223	49.6
	Doctorate/Other	54	12
Professional Experience	1–3 years	158	35.1
	4–6 years	142	31.6
	More than 6 years	150	33.3

As shown in Table 3, the proportion of male and female participants was 59.1% to 40.9%. Agewise, most of the respondents were in the 26 to 35 age group (42.0%) while the lowest proportion of respondents were in the 36 to 45 age group (28.0%). This implies that the sample was primarily made up of those individuals who were working and could reasonably be expected to frequently use digital taxation systems. In terms of education, about 49.6% of respondents obtained a master's degree whereas only 38.4% obtained an undergraduate degree. This suggests that the respondent group was quite educated, as is the nature of professionals who are self-learners in digitally-enabled settings. In terms of professional experience, there was a fairly even spread for each level of experience, with approximately one-third indicating that they have more than six years of professional experience.

The overall demographic profile illustrates that the sample is a diverse group of self-employed professionals and practitioners with varying numbers of years and levels of experience and education. This diversity adds to the relevance of the study and offers an appropriate foundation to explore the adoption of the digital tax ecosystem, tax awareness, digital trust, and compliance behaviour of independent professionals.

### 4.2 Measurement Model Assessment

Before testing the proposed hypotheses, the measurement model was assessed for reliability and validity of constructs in the model. The assessment is carried out based on the recommendations of Hair et al. (2022), which include indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Specifically, outer loadings, Cronbach's Alpha, Average Variance Extracted (AVE), Fornell–Larcker criterion and Heterotrait–Monotrait Ratio (HTMT) were explored.

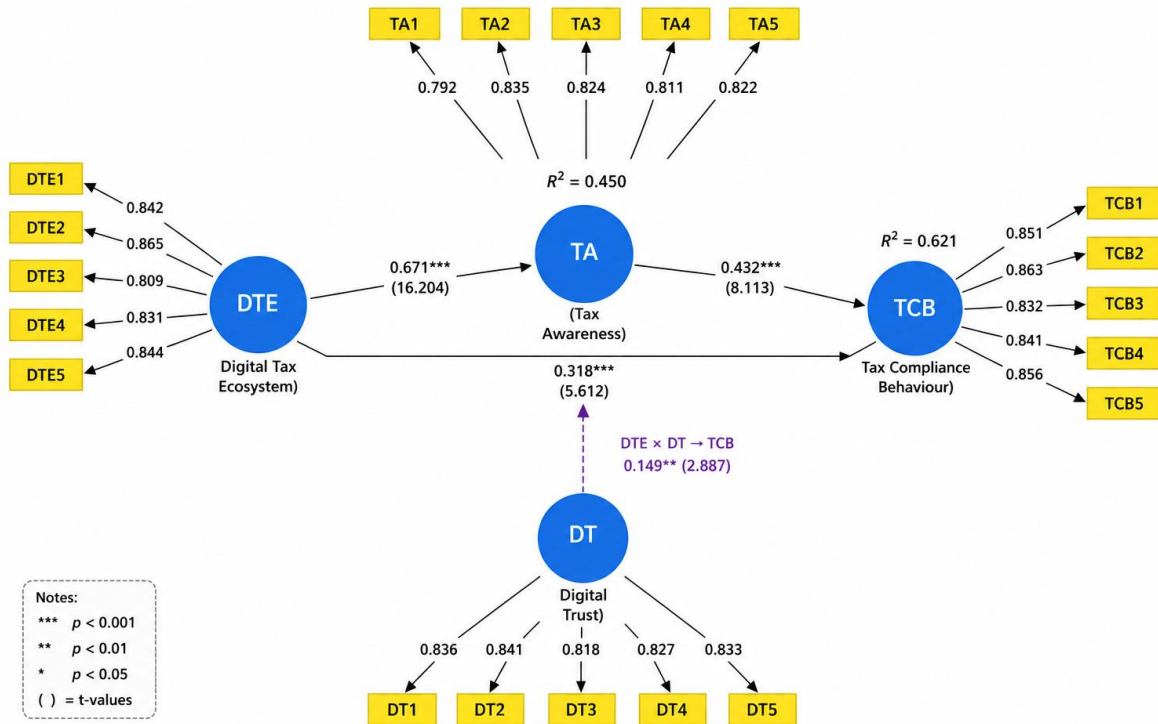


Figure 2: Measurement Model Assessment

Table 4: Indicator Reliability (Outer Loadings)

Item	Loading
DTE1	0.842
DTE2	0.865
DTE3	0.809
DTE4	0.831
DTE5	0.844
TA1	0.792
TA2	0.835
TA3	0.824
TA4	0.811
TA5	0.822
DT1	0.836
DT2	0.841
DT3	0.818
DT4	0.827
DT5	0.833
TCB1	0.851
TCB2	0.863
TCB3	0.832
TCB4	0.841
TCB5	0.856

As can be seen from the results in Table 4, the loading values of the measurement items were all above the recommended value of 0.70. These loadings were between 0.792 and 0.865, indicating high reliability of these indicators on all constructs. Higher loadings were found for DTE2 (0.865), indicating that the ease of perception of the usefulness of digital tax services to improve tax-related processes is a significant area of the Digital Tax Ecosystem construct. Likewise, TCB2 (0.863) came out as a powerful indicator of Tax Compliance Behaviour, reflecting the significance of proper reporting of income by the self-earning professionals. None of the indicators had measurements outside of the acceptable range, and all items were used in the analysis of the measurement model, thus no items were deleted from the measurement model.

Table 5: Reliability and Convergent Validity

Construct	Cronbach's Alpha	Composite Reliability	AVE
Digital Tax Ecosystem	0.892	0.92	0.697

Tax Awareness	0.874	0.909	0.668
Digital Trust	0.886	0.916	0.685
Tax Compliance Behaviour	0.901	0.927	0.719

Table 5 presents the results of the evaluation of internal consistency, reliability and convergent validity. The internal consistency of the items on the measurement was acceptable, as indicated by their ranges of Cronbach alpha values from 0.874 to 0.901, all of which exceeded the minimum value of 0.70. The Composite Reliability (CR) values also supported Construct Reliability, with values that ranged between 0.909 and 0.927. Additionally, all of the Average Variance Extracted (AVE) values were above the benchmark value of 0.50 and were in the range of 0.668 to 0.719. The results suggest there is a significant amount of variance in the indicators being explained by their latent constructs. In conclusion, the reliability and convergence validity analysis supported that the measurement scales would provide an adequate representation of the Digital Tax Ecosystem, Tax Awareness, Digital Trust, and Tax Compliance Behaviour. To establish the discriminant validity of these constructs, further evaluation of whether or not each construct is conceptually based and different from each other empirically will need to be completed before proceeding with the analysis.

**Table 6: Fornell–Larcker Criterion**

Construct	DTE	DT	TA	TCB		
DTE	0.835					
DT	0.552	0.828				
TA	0.671	0.517	0.817			
TCB	0.628	0.561	0.692	0.848		

The Fornell-Larcker criteria indicate that every construct's square root of its average variance extracted (AVE) is larger than the correlation it shares with all other constructs. This suggests that each construct has more variability in the indicators associated with it than does the variance shared with the other constructs within the model. Therefore, the Fornell-Larcker criteria provide initial support for the discriminant validity hypotheses.

**Table 7: Heterotrait–Monotrait Ratio (HTMT)**

Construct Pair	HTMT Value
DTE – DT	0.641
DTE – TA	0.742
DTE – TCB	0.701
DT – TA	0.603
DT – TCB	0.654
TA – TCB	0.781

Discriminant validity is also supported by the HTMT results, as shown in Table 7. The values of all HTMTs were less than the conservative value of 0.85, suggesting that the constructs are conceptually and empirically distinct. This is a significant finding given that the three concepts of Digital Tax Ecosystem, Tax Awareness, and Digital Trust are supposedly related concepts that may show some overlaps. The proposed framework, however, is confirmed by the observed HTMT values for the respondents being able to differentiate among these constructs.

In general, the measurement model assessment showed that the indicator reliability, internal consistency reliability, convergent validity and discriminant validity were adequate. The study then examines the structural model and tests the hypotheses, given the validity of the measurement model.

### 4.3 Structural Model Assessment and Hypothesis Testing

The reliability and validity of the measurement model were first tested, followed by the structural model, which was tested to check the relationships between Digital Tax Ecosystem (DTE), Tax Awareness (TA), Digital Trust (DT), and Tax Compliance Behaviour (TCB). The evaluation of the structural model was performed in accordance with Hair et al. (2022) by looking at path coefficients ( $\beta$ ), t-values, p-values, coefficient of determination ( $R^2$ ), effect size ( $f^2$ ), and predictive relevance ( $Q^2$ ). The statistical significance of the hypothesised relationships was determined by using 5,000 subsamples for each iteration in the bootstrapping process.

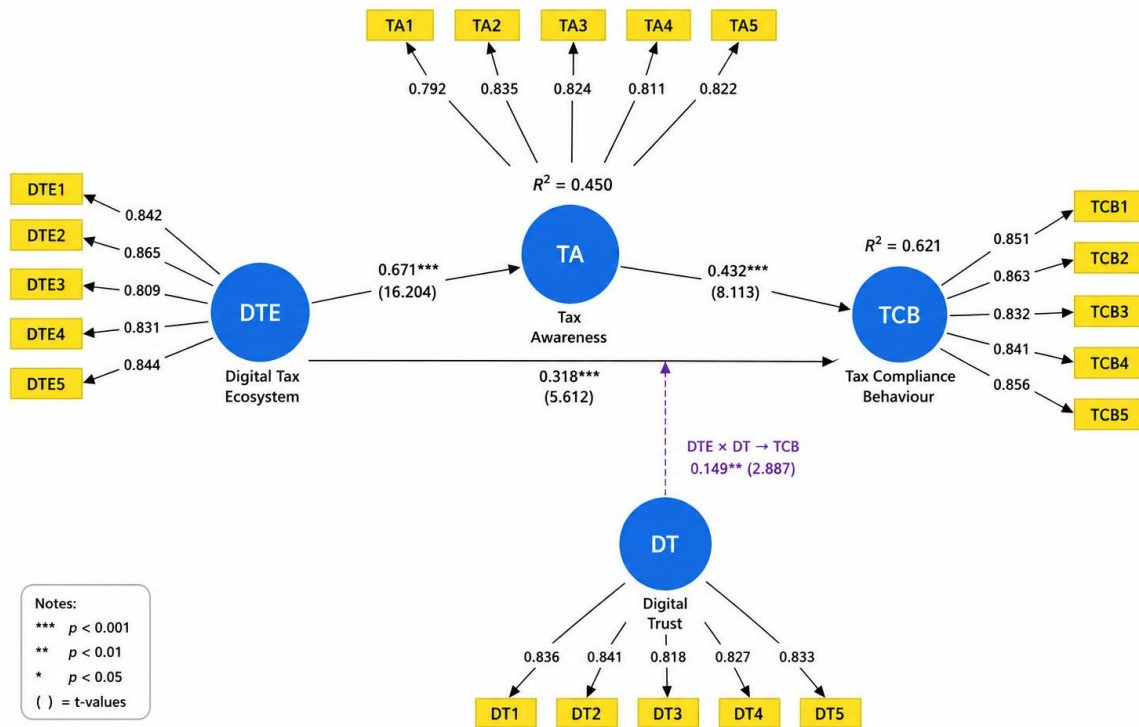


Figure 3: Structural Model Assessment

Based on the structural model, the Digital Tax Ecosystem has a significant impact on Tax Awareness and Tax Compliance Behaviour. In addition, Tax Awareness has a great positive effect on Tax Compliance Behaviour, and Digital Trust enhances the relationship between the Digital Tax Ecosystem and Tax Compliance Behaviour. The model thus encompasses both direct and indirect ways in which digital tax systems can help with taxpayer compliance.

Table 8: Structural Model Results and Hypothesis Testing

Hypothesis	Structural Path	$\beta$	t-value	p-value	Decision
H1	DTE $\rightarrow$ TCB	0.318	5.612	<0.001	Supported
H2	DTE $\rightarrow$ TA	0.671	16.204	<0.001	Supported
H3	TA $\rightarrow$ TCB	0.432	8.113	<0.001	Supported
H5	DT $\times$ DTE $\rightarrow$ TCB	0.149	2.887	0.004	Supported

The results of the structural relationships in Table 8 confirm strong support for the proposed relationships. The findings showed that the direct influence of DT on TCB was positive and statistically significant ( $\beta = 0.318$ ,  $t = 5.612$ ,  $p < 0.001$ ), which supports the hypothesis H1. The discovery indicates that the better the digital tax infrastructure, the more accessible and user-friendly the system, the greater the level of compliance among self-employed professionals. The findings are supported by the existing literature in digital governance, which highlights the potential of technology to ease compliance and enhance taxpayer participation in tax systems.

The results also show that there is a significant positive correlation between the Digital Tax Ecosystem and Tax Awareness ( $\beta = 0.671$ ,  $t = 16.204$ ,  $p < 0.001$ ), which supports H2. In particular, this is the largest path coefficient in the model, which shows that digital tax systems are a valuable medium of taxpayer education and information. Automated reminders, regulatory updates, online guidance and integrated support services seem to add to taxpayers' understanding of their duties and their filing needs.

Likewise, Tax Awareness had a significant positive effect on the tax compliance behaviour ( $\beta = 0.432$ ,  $t = 8.113$ ,  $p < 0.001$ ), which is in support of H3. The study's result underscores the significance of taxpayer knowledge as a behavioural factor in taxpayer compliance. Self-earning individuals with more knowledge about tax rules, filing processes and tax reporting are more likely to voluntarily meet their tax requirements.

The moderation analysis also suggests that the moderating effect of Digital Trust between Digital Tax Ecosystem and Tax Compliance Behaviour is positive ( $\beta = 0.149$ ,  $t = 2.887$ ,  $p = 0.004$ ). As a result, H5 is supported. The result indicates that if

digital tax regimes are to be as sophisticated as they can be, it is important that the taxpayers feel the system is safe, clear and reliable. This leads to the need to consider the role of trust as an important contextual factor in the effectiveness of digital tax measures.

The results show that the Digital Tax Ecosystem has a direct and indirect influence on compliance behaviour. Technological infrastructure is a factor that is important for better compliance results, but when paired with making taxpayers aware of their obligations and confident in the digital platforms they use to receive tax services, these results are significantly improved.

**Table 9: Coefficient of Determination (R<sup>2</sup>)**

Endogenous Construct	R <sup>2</sup>	Interpretation
Tax Awareness	0.45	Moderate
Tax Compliance Behaviour	0.621	Substantial

The explanatory power of the proposed framework was investigated by looking at the coefficient of determination (R<sup>2</sup>). Digital Tax Ecosystem has a moderate explanatory power of 45.0% of the variance in Tax Awareness (shown in Table 9). This discovery indicates that the digital tax infrastructure has a significant impact on taxpayers' knowledge of their tax obligations and requirements.

The most important aspect is that the model accounts for 62.1% of the variance in Tax Compliance Behaviour. As per the accepted PLS-SEM guideline, this is a high level of explanation, and hence, Digital Tax Ecosystem, Tax Awareness and Digital Trust together explain well the compliance behaviour among the professionals who earn their living. The relatively high R<sup>2</sup> value reflects the robustness of the proposed mechanism in accounting for the technological and behavioural dimensions impacting tax compliance in the digital context.

**Table 10: Effect Size Assessment (f<sup>2</sup>)**

Relationship	f <sup>2</sup>	Effect Size
DTE → TA	0.819	Large
DTE → TCB	0.124	Small
TA → TCB	0.271	Medium
DT × DTE → TCB	0.058	Small

Additional insights into the practical significance of the relationships in the model are gained from the effect size analysis. The Digital Tax Ecosystem-Tax Awareness f<sup>2</sup> (0.819) was the largest, which means that digital tax systems have a significant impact on taxpayer awareness. The direct impact of Digital Tax Ecosystem on Tax Compliance Behaviour, however, was comparatively smaller, indicating that a portion of this impact is indirect – via the creation of awareness. Tax Awareness had a moderate impact on compliance behaviour, thus reinforcing the importance of tax awareness as a behaviour mechanism in the proposed framework. The moderating role of Digital Trust was relatively small, but statistically significant, so it is important to create confidence in digital tax platforms.

In general, the structural model evaluation results indicate that the proposed model has good explanatory power and has good supporting power for the hypothesised relationships. The results will confirm that the Digital Tax Ecosystem is an important enabler of compliance behaviour and that the complementary role between Tax Awareness and Digital Trust will be emphasised in the context of digital tax environments and in taxpayers' reactions.

#### 4.4 Mediation and Moderation Analysis

After assessing the direct impact of Digital Tax Ecosystems on Tax Compliance Behaviour, the study explored the mediating effect of Tax Awareness and the moderating effect of Digital Trust to gain a deeper understanding of the process of how Digital Tax Ecosystems affect Tax Compliance Behaviour. The significance of indirect and interaction effects was tested using bootstrapping procedures with 5000 resamples. This will allow for a much more holistic understanding of taxpayer behaviour as it goes beyond direct relationships and captures the underlying behavioural and contextual factors that further increase compliance outcomes.

**Table 11: Mediation Analysis**

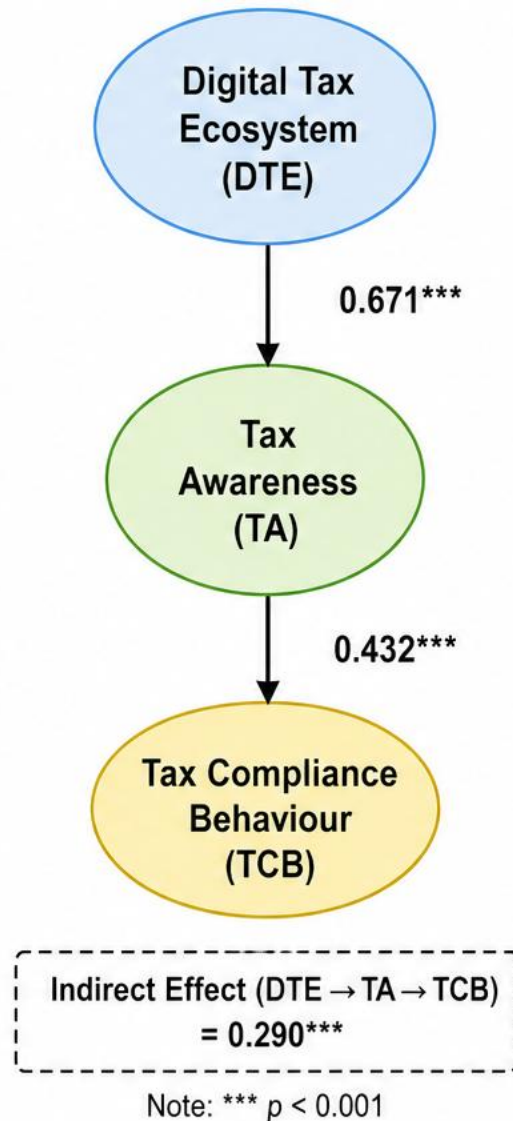
Hypothesis	Indirect Relationship	β	t-value	p-value	Decision
H4	DTE → TA → TCB	0.29	6.724	<0.001	Supported

Table 11 shows the mediation results, which imply that Tax Awareness fully mediated the relationship between Digital Tax Ecosystem and Tax Compliance Behaviour (β = 0.290, t = 6.724, p < 0.001). The indirect path is of considerable importance as it substantiates that tax awareness serves as a crucial explanation mechanism between the tax systems and compliance results. Digital tax ecosystems, therefore, are not only useful in making tax-related procedures easier, but are also expected to increase compliance by increasing taxpayers' awareness of filing obligations and reporting requirements, as well as their

expectations of compliance.

The results indicate that the self-earning professionals who interact with digital tax platforms are provided with information on education, reminders, regulation updates, and instant guidance that all contribute to raising awareness. This awareness drives better reporting behaviour, timely reporting and improved voluntary reporting. Both direct and indirect effects are significant, suggesting partial mediation, meaning that the influence of the Digital Tax Ecosystem on compliance is direct and mediated by the impact on taxpayer awareness.

At a policy level, it cautions against relying solely on investing in digital tax infrastructure to achieve the maximum compliance impact. Technological efforts should be supported by awareness-building and user education campaigns, and digital literacy campaigns by tax authorities. These can have a multiplicative effect on the behaviour of digital tax systems and boost the general level of compliance for self-employed professionals.



**Figure 4: Mediation Model Results**

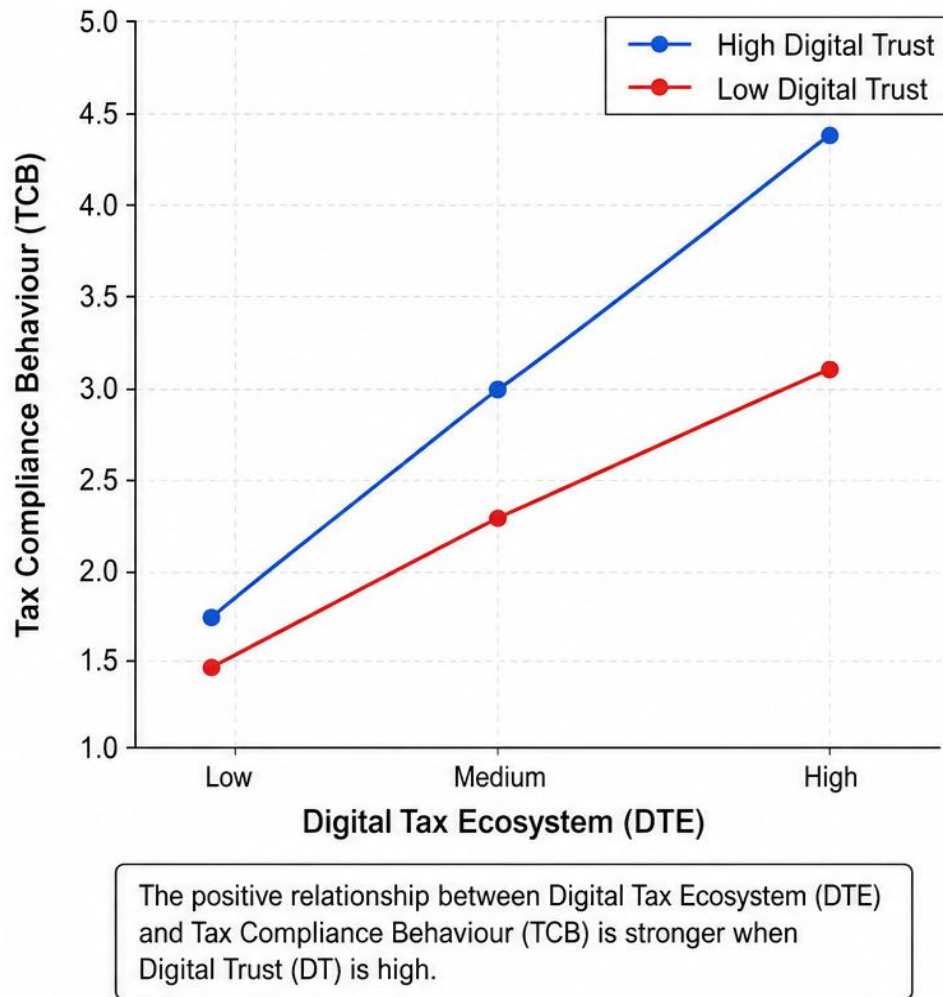
**Table 12: Moderation Analysis**

Hypothesis	Interaction Effect	$\beta$	t-value	p-value	Decision
H5	DTE × DT → TCB	0.149	2.887	0.004	Supported

Moderation analysis was conducted to determine if Digital Trust enhances the relationship between Digital Tax Ecosystem and Tax Compliance Behaviour. Table 12 indicates that there was a positive and statistically significant interaction effect ( $\beta = 0.149$ ,  $t = 2.887$ ,  $p = 0.004$ ), which supported H5. This discovery shows that dependence on the security, reliability and transparency of digital tax platforms is a crucial element in the success of digital tax ecosystems.

A positive interaction coefficient means that the Digital Tax Ecosystem and Tax Compliance Behaviour intensify with the increase of Digital Trust. Self-earning professionals who have faith in digital tax systems are more inclined to access services that are provided, to provide accurate financial information and to actively interact with digital tax compliance processes. On the other hand, digital tax platforms can also fail to deliver on their potential if taxpayers feel that there are privacy, cybersecurity, or system reliability issues.

This revelation supports the notion that trust is an enabler in a digital governance environment. Trust is the prerequisite to taxpayer interactions with technology infrastructure, which is the prerequisite to compliance. Therefore, it is essential to increase transparency, to keep cyber security measures high, to increase data protection measures and to deliver reliable services to maximise the effectiveness of digital taxation initiatives.



**Figure 5: Moderating Effect of Digital Trust**

The moderating function of Digital Trust is shown in Figure 5. The greater the level of trust, the steeper the gradient, indicating that the benefit of the Digital Tax Ecosystem on Tax Compliance Behaviour increases with higher trust. A difference between the low-trust and high-trust lines suggests that trust is one of the important contextual factors affecting compliance and contributes to the behavioural effectiveness of digital tax systems.

Together, the outcomes of these two types of mediation and moderation give a more comprehensive understanding of the drivers and conditions for digital tax compliance behaviour. Digital Tax Awareness gives insights into the behavioural process that makes digital tax systems work for greater compliance, while Digital Trust assesses how effective they can be in delivering intended outcomes. These results collectively show that more is needed to make digital tax administration more successful than simply advancing the technology. When digital systems increase awareness of taxpayers and, at the same time, build trust in the digital environment, effective compliance results are achieved.

The results thus validate the proposed framework of moderated–mediated compliance and underscore the complementary effect of technological capability, taxpayers' knowledge, and institutional trust on compliance behaviour of self-earning professionals. The insights gained can be used in the discussion section and as a basis for implications for policy-makers

who want to increase voluntary compliance in the context of digital transformation initiatives.

#### 4.5 Model Predictive Power and Overall Model Assessment

After the assessment of direct, mediating and moderating relationships, the predictive power and overall explanatory power of the proposed framework were then tested. PLS-SEM model evaluation is typically conducted using the coefficient of determination ( $R^2$ ), the effect size ( $f^2$ ), the model's predictive relevance ( $Q^2$ ) and model fit indicators like the Standardised Root Mean Square Residual (SRMR). These measures combine to give a picture of how well the proposed framework explains and predicts the endogenous constructs in the model.

**Table 13: Model Predictive Power Assessment**

Construct	$R^2$	Adjusted $R^2$	$Q^2$
Tax Awareness	0.45	0.448	0.289
Tax Compliance Behaviour	0.621	0.617	0.401

The coefficient of determination ( $R^2$ ) is the percentage of the variability in the criterion that is predicted by the predictor variables. The Digital Tax Ecosystem (DTE) had moderate explanatory power ( $R^2 = 0.45$ ) as explained in the variance of Tax Awareness (see Table 13). It indicates that digital tax infrastructure is a significant factor in raising awareness and understanding of tax obligations among taxpayers. Furthermore, the model had a high predictive ability, accounting for 62.1% of the variance in Tax Compliance Behaviour. The criteria for interpreting  $R^2$  values set by established PLS-SEM rules are used to determine that  $R^2$  values above 0.50 represent strong explanatory power in the field of behavioural research. Thus, the suggested framework sufficiently reflects technological, behavioural, and trust factors that affect compliance behaviour of self-earning professionals.

Also, Stone–Geisser  $Q^2$  values were considered to measure the relevance of predictions. Positive  $Q^2$  values for both variables, Tax Awareness (0.289) and Tax Compliance Behaviour (0.401), point out the good predictive relevance of the model. The results obtained indicate that the proposed model can explain the phenomena observed and predict the next phenomena in similar situations.

**Table 14: Effect Size Assessment ( $f^2$ )**

Relationship	$f^2$	Effect Size
DTE → TA	0.819	Large
DTE → TCB	0.124	Small
TA → TCB	0.271	Medium
DT × DTE → TCB	0.058	Small

The effect size analysis sheds light on the relative contribution of each relationship in the structural model. Digital Tax Ecosystem and Tax Awareness ( $f^2 = 0.819$ ) is the strongest relationship observed with the awareness level of taxpayers, being substantially influenced by digital tax systems. This discovery adds to previous studies that have identified the educational and information value of digital tax platforms.

Tax Awareness had a moderate influence on Tax Compliance Behaviour ( $f^2 = 0.271$ ), indicating that tax awareness is one of the behavioural factors that is important for tax compliance. The effect size of the direct effect of DT on Tax Compliance Behaviour was smaller ( $f^2 = 0.124$ ), showing that a significant amount of influence is mediated by awareness. The moderating effect of Digital Trust had a relatively smaller effect size, but given its significance, it is a realistic and practical moderator that can enhance compliance results in digital environments.

**Table 15: Overall Model Fit Assessment**

Indicator	Value	Recommended Threshold	Assessment
SRMR	0.061	< 0.08	Acceptable
NFI	0.912	> 0.90	Acceptable

Standardised Root Mean Square Residual (SRMR) and Normed Fit Index (NFI) were used to assess the overall model fit. As the SRMR value of 0.061 is lower than their recommended value of 0.08, the model is deemed to be an acceptable fit. Similarly, the value of NFI was also greater than the recommended value (0.90), meaning that the proposed structure is a good approximation to the observed data structure. These indicators collectively provide evidence of the sufficiency of the model and the statistical reliability of the proposed model.

Proposed moderated–mediated framework finds strong support in the results. Digital Tax Ecosystem was a key significant predictor of Tax Awareness and Tax Compliance Behaviour, signalling the role of technology in tax administration as a driver of tax compliance outcomes. Moreover, the effect of DT on TCB was partially mediated by Tax Awareness, indicating that Tax Awareness is a significant mechanism influencing taxpayers' behaviour in the context of DT. Third, Digital Trust led to a higher attachment between Digital Tax Ecosystem and Tax Compliance Behaviour, suggesting that trust is an important enabler for tax compliance in digital environments.

The findings reveal a need for a combination of technological capacity, taxpayer education, and institutional trust in order to be successful in digital tax reforms. Digital platforms ease compliance processes and make tax services more accessible, but their effectiveness is significantly boosted when taxpayers have the necessary awareness and confidence in the digital systems used to provide tax services.

## DISCUSSION AND IMPLICATIONS

The present study focused on the impact of Digital Tax Ecosystems on Tax Compliance Behaviour among people earning on their own, whereby Tax Awareness is included as a mediator and Digital Trust as a moderator. The results justify the framework proposed and show that compliance attitude in digital tax situations is influenced by technological, behavioural and institutional elements. The results indicate that the Digital Tax Ecosystem significantly influences both Tax Awareness and Tax Compliance Behaviour, highlighting the growing importance of digital infrastructure in modern tax administration. The results indicate that digital tax platforms have grown from transactional platforms to serve as strategic tools to engage taxpayers, streamline compliance and enhance access to tax services.

An interesting data point from this research is that the correlation between the Digital Tax Ecosystem and Tax Awareness is very high and positive. This outcome has confirmed that digital tax platforms play a crucial role in tax education by delivering information, guidance for filing, automated notifications, and updates about regulatory changes to taxpayers. Digital tools like this are also valuable for self-employed individuals, who may handle their tax affairs on their own, to grasp tax requirements and compliance. The results hence build the current body of literature as they show that digital tax systems can not only be efficient in administration, but also can lead to the development of the knowledge of taxpayers.

The study also showed that Tax Awareness positively affects Tax Compliance Behaviour, and it is a significant mediator between Digital Tax Ecosystem and Tax Compliance Outcomes. This discovery indicates that digital taxation measures cannot be understood purely based on technological features. Rather, digital systems streamline compliance by providing a better understanding of taxpayers' obligations and responsibilities. In the mediation effect, awareness is a behavioural mechanism that brings positive compliance effects from digital tax reforms. Meanwhile, investment in digital tax infrastructure needs to be complemented by efforts to raise tax awareness and education among taxpayers. This should have a positive effect on voluntary compliance and on the overall effect of digital governance strategies.

The influence of Digital Trust as a moderator is also an important finding of the study. The results show that the positive impact of the Digital Tax Ecosystem on Tax Compliance Behaviour increases as taxpayers have higher trust in digital platforms. In a digital governance context, this outcome demonstrates the need for trust and indicates that implementing a technically sophisticated system is not enough for desired compliance outcomes. Digital systems must also appear to be secure, reliable, transparent and able to safeguard sensitive information for the taxpayer. Even with sophisticated digital tax platforms, there is a risk of low adoption rates and lower effectiveness if there is no trust. Thus, trust is identified as a key enabler and is critical for supporting the behavioural effectiveness of digital tax measures.

The conclusions have several policy implications for the policy maker and tax authority. Governments need to keep investing in digital tax ecosystems that include integrated tax systems that make compliance easier and services more accessible. Compliance burdens can be minimised, and participation of self-learning professionals can be increased using user-friendly platforms, automated support systems, and seamless digital experiences. Second, tax authorities should also take an education aspect into account in digital platforms in order to raise awareness and understanding of taxpayers. The use of interactive tutorials, individualized instructions and automated reminders can be helpful to enhance compliance behaviour. Third, enhancing cybersecurity, privacy protections, and communication practices to foster digital trust and promote continued digital service users is critical.

Theoretically, the study is a significant addition to existing literature by combining Digital Tax Ecosystem, Tax Awareness, Digital Trust and Tax Compliance Behaviour in a moderated–mediation framework. The results show that, beyond the technological infrastructure, cognitive and institutional factors also affect compliance behaviour in a digital context. The study sheds more light on taxpayer behaviour by introducing Tax Awareness as a mediator and Digital Trust as a moderator, and advances the current research on digital governance and digital technology in public administration.

### Conclusion, Limitations and Future Research Directions

The high degree of digitalisation of tax administration has changed the manner in which taxpayers are interacting with the revenue administration, offering additional opportunities to enhance efficiency, transparency and compliance results in tax administration. In this backdrop, the current study explored the impact of Digital Tax Ecosystems on Tax Compliance Behaviour with the inclusion of the mediating effect of Tax Awareness and the moderating effect of Digital Trust among the self-earning professionals. Self-earning professionals are becoming more significant in the digital economy, and reliance on technology-driven tax administration systems has been rising, which justifies the study. The study has proposed and

validated a holistic framework that combines technological, behavioural and institutional angles, facilitating the understanding of how digital taxation initiatives affect taxpayers' compliance in the digital age.

The results show that Digital Tax Ecosystems are important drivers of behaviour towards compliance by SEPs. The findings suggest that digital tax platforms are not just about simplifying tax-related tasks; they can also foster taxpayer engagement and enhance tax compliance results. With governments still spending money on digital governance projects, the overall effectiveness of these systems is increasingly determined by how well they can offer user-friendly, efficient and accessible services that lower the compliance burden for taxpayers and enable them to participate. The positive correlation found between Digital Tax Ecosystem and Tax Compliance Behaviour indicates that digital tax transformation could be a highly effective tool to boost voluntary tax compliance and strengthen tax administration performance.

One of the key findings of the study is that it provides evidence that Tax Awareness is a major behavioural determinant between Digital Tax Ecosystems and Tax Compliance Behaviour. The results indicate that digital platforms impact compliance and not only by making things easier to operate, but also by increasing taxpayers' awareness of tax responsibilities, filing obligations and reporting processes. This finding underscores the role of digital tax systems in the education of taxpayers and the impact of taxpayer knowledge on compliance. This important mediating role also underscores the need to consider awareness creation as a part of digital tax reforms, and not as a standalone policy measure.

The study further underscores the significance of Digital Trust in the effectiveness of Digital Tax Ecosystems. In the analysis, the moderating effect found shows how taxpayers are more likely to be positive towards digital tax regimes when they believe in the trustworthiness of digital tax regimes. The moderating effect found in the analysis illustrates that taxpayers are more favourable in digital tax regimes when they trust them. As a result, trust acts as a pivotal enabling factor that enhances the behavioural effect of digital tax measures. In an era of greater and growing concerns with data privacy, cybersecurity, and the governance of digital platforms, it is important to ensure taxpayer (or user) trust and confidence in digital platforms if technology is to be used to drive the success of public service infrastructure. Thus, policymakers should take note that investments in digital infrastructure need to go hand-in-hand with parallel activities to build institutional trust and protect taxpayer information.

The study has its limitations and should be taken into account when interpreting the results. The type of research design used in the study was cross sectional design, which allows for the identification of cause and effect relationship between the variables to be studied. The proposed framework provides insights on the relationship between Digital Tax Ecosystem, Tax Awareness, Digital Trust and Tax Compliance Behaviour, however, longitudinal research studies can offer deeper insights of how these relationships evolve over time. Secondly, the study only applied to self-employed professionals, and the results were not necessarily applicable to other types of taxpayers, such as small business owners, corporate taxpayers, or salaried employees. Individual citizens may react differently and behave differently to digital tax measures.

Third, self-reported instruments were used which may suffer from social desirability bias and recall problems. Usually, self-reports are used in behavioural research; however, compliance measures or administrative records could be used in future studies if available. Fourth, the proposed framework only included one mediating variable and one moderating variable. Other factors like digital literacy, perceived usefulness, perceived fairness, cybersecurity, taxpayer satisfaction and institutional reputation were identified as possible factors and are worth exploring. Lastly, the evolution of digital taxation technologies means that taxpayer reactions could change as the technology gets more complex and is increasingly used. Therefore, ongoing empirical investigation is still required to identify new patterns and changes in behaviour.

These constraints are the basis for several possible avenues for future research. Longitudinal research could be used in future studies to explore how digital tax ecosystems affect taxpayer behaviour over the longer term and various phases of tax service adoption. Analyses of cross-border or cross-regulatory contexts could also offer insights into the factors that influence digital tax compliance. The proposed framework could be further enriched by the inclusion of other behavioural, technological, and institutional factors to gain a deeper insight into taxpayer decision-making processes. The fact that the analysis is being conducted across different taxpayer segments, such as freelancers, salaried employees, entrepreneurs and corporate bodies, may highlight significant differences in compliance practices and utilisation of digital platforms.

Further research could also shed light on the impact of new technologies like AI, blockchain, machine learning, predictive analytics, and digital identities on tax administration and taxpayer attitudes. With the increasing use of these sophisticated tools and solutions by governments, it will be crucial to research how these tools are impacting trust, awareness and compliance. Overall, the present study offers a basis for further research and adds to the evolving pool of knowledge on digital taxation, taxpayer behaviour, and technology-driven governance. The results highlight the importance of an integrated framework for digital tax administration, combining the use of technology, taxpayer capacities and institutional trust, to achieve better and more sustainable tax compliance results in the new digital economy.

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