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-RESEARCH ARTICLE-

ROBOTIC PROCESS AUTOMATION AND THE ACCELERATION OF TAX ASSESSMENT PROCEDURES: EVIDENCE ON THE MEDIATED PATHWAY TO TAX REVENUE COLLECTION

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─Abstract─

Fiscal losses in transitional economies arise not exclusively from tax evasion but also from administrative delays between return submission and the issuance of legally binding assessments. This study investigates whether Robotic Process Automation (RPA) reduces such delays and whether improvements in assessment efficiency translate into stronger revenue collection. Integrating technology acceptance, task–technology fit and public value perspectives, the proposed three-construct framework examines the relationship between RPA adoption and Tax Revenue Collection (TRC), with Tax Assessment Speed (TAS) serving as a mediating mechanism. Data obtained from 284 tax inspectors, public financial auditors, revenue system administrators and departmental directors across revenue authorities and audit directorates, representing an 81.1% response rate, were examined through Partial Least Squares Structural Equation Modelling (PLS-SEM) using SmartPLS 4. All measurement-model reliability and validity criteria were satisfied, while the structural model accounted for 46.8% of the variation in TAS and 57.3% in TRC. The findings revealed a positive association between RPA adoption and TAS (β = .684), alongside a substantial relationship between

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TAS and TRC (β = .528). RPA adoption also maintained a direct influence on TRC (β = .298). The significant indirect relationship (β = .361) confirmed partial mediation, indicating that accelerated assessments accounted for 54.8% of the total effect. These findings establish procedural delays as a consequential determinant of fiscal performance and underscore the importance of strategically deploying automation bots, strengthening inter-agency data interoperability and establishing statutory recognition of automated tax assessments.

Keywords: Robotic Process Automation; Tax Assessment Procedures; Tax Revenue Collection; Public Fiscal Governance; PLS-SEM; Mediation Analysis.

INTRODUCTION

Research Background

The administrative infrastructure underpinning taxation has emerged as a central focus of digital reform within public financial management. Rather than merely replacing paper-based procedures with electronic interfaces, governmental digital transformation entails fundamental changes in organisational arrangements, service delivery mechanisms and value-generation processes, thereby reshaping how public institutions achieve administrative outcomes (Mergel et al., 2019). These developments have become particularly important for revenue administration, where operational modernisation increasingly carries direct fiscal implications. Cross-jurisdictional evidence from developed and emerging economies reveals a continuing shift towards electronic tax submissions, pre-filled declarations, automated identification of audit cases and third-party information matching. Nevertheless, considerable differences persist in the time required to translate submitted declarations into legally enforceable tax obligations (OECD, 2023). Consequently, the strategic priority for revenue authorities has shifted from determining whether digitalisation is necessary to identifying the administrative activities through which automation can generate the greatest fiscal benefits.

Within this evolving technological landscape, RPA offers a particularly relevant approach to administrative modernisation. Its functionality rests on configurable software agents capable of performing repetitive, rule-based activities through the existing user interfaces of organisational applications, replicating routine clerical interactions without requiring fundamental modifications to underlying database structures (Hofmann et al., 2020). This capacity to operate within established technological environments makes RPA especially attractive to public institutions constrained by ageing information systems. By enabling integration through application interfaces rather than expensive middleware solutions, implementation can produce operational improvements within months instead of requiring several years (Syed et al., 2020). Evidence from professional accounting organisations identifies taxation among

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the earliest and most extensive areas of RPA implementation, reflecting the concentration of standardised, repetitive and high-volume reconciliation activities within tax operations (Cooper et al., 2019). Initial empirical investigations similarly indicate that software-based digital labour can shorten processing cycles, minimise manual inaccuracies and allow qualified personnel to concentrate on activities requiring professional judgement (Kokina & Blanchette, 2019).

The procedural characteristics of tax assessment make it particularly compatible with RPA. Assessment activities typically involve retrieving declared financial information, checking reported amounts against statutory requirements and reconciling submissions with external administrative databases through predefined decision rules. Established approaches to identifying tasks suitable for robotic automation emphasise precisely these characteristics: structured information, consistent operating rules, substantial transaction volumes and limited dependence on professional scepticism (Huang & Vasarhelyi, 2019). However, successful implementation cannot be attributed solely to technological functionality. Evidence indicates that operational gains depend considerably on the standardisation of existing procedures, the reliability of organisational data and the maturity of governance arrangements (Gotthardt, 2020). Similarly, assessments of RPA adoption consistently identify institutional preparedness and senior management support as important conditions for achieving intended outcomes (Costa et al., 2022).

The relationship between administrative effectiveness and fiscal performance is supported by substantial empirical evidence. A quasi-experimental investigation in Indonesia found that assigning firms to tax offices with greater staffing intensity produced revenue gains comparable to those achievable through a considerable increase in statutory tax rates. This suggests that limitations in administrative capacity may constrain fiscal mobilisation more severely than prevailing tax-rate structures (Basri et al., 2021). Evidence from Brazil further demonstrates the importance of verification mechanisms, showing that third-party information obtained through consumer reporting increased the revenue declared by firms (Naritomi, 2019). More broadly, research on tax enforcement identifies information disclosure and the perceived likelihood of detection as central influences on taxpayer compliance (Slemrod, 2019). Electronic filing systems can also reduce compliance-related expenditure while limiting discretionary interactions between taxpayers and revenue officials (Okunogbe & Pouliquen, 2022). Nevertheless, technological adoption does not automatically generate improved fiscal outcomes. Findings concerning electronic sales registers in Ethiopia indicate that reporting improvements materialised only when revenue authorities actively utilised the information generated, demonstrating that fiscal benefits depend on subsequent administrative interventions rather than technological installation alone (Mascagni et al., 2021).

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Statement of the Research Problem

Although substantial resources have been committed to electronic taxation platforms, assessment-related inefficiencies remain pronounced across revenue administrations in transitional economies. The availability of digital filing mechanisms has not necessarily eliminated manual verification procedures. Revenue officers frequently re-enter information already submitted electronically, obtain documentary evidence through correspondence and undertake successive enquiries to reconcile taxpayer declarations with banking, customs and property records. Such fragmented workflows create an administrative bottleneck characterised by valuation lag, defined as the interval between the submission of a tax declaration and the issuance of a legally enforceable assessment. (Al-Yasar et al 2026) highlighted the role of blockchain technology in reducing financial corruption.

The consequences of this delay extend beyond procedural inefficiency, generating fiscal exposure through three distinct mechanisms. The first concerns the expansion of the tax gap. Prolonged verification periods provide additional opportunities for taxpayers to reposition assets, defer obligations or diminish amounts potentially recoverable by the administration. Simultaneously, delayed scrutiny weakens the perceived immediacy of detection, reducing the deterrent influence of enforcement (Slemrod, 2019). The second mechanism involves diminished enforcement productivity. Because tax audits can influence compliance behaviour over multiple subsequent reporting periods, postponing an intervention may sacrifice both the immediate assessed liability and the future compliance gains that earlier enforcement could have induced (Advani et al., 2023). The third mechanism relates to treasury liquidity. Irregular assessment completion makes revenue inflows less predictable, thereby introducing uncertainty into budget implementation and potentially increasing dependence on short-term financing.

Despite these fiscal implications, existing scholarship provides insufficient evidence regarding the extent to which targeted process automation improves revenue outcomes or the mechanisms responsible for such improvements. Three limitations are particularly important. First, studies of digital taxation commonly conceptualise technological modernisation as a unified phenomenon, combining electronic filing, analytical systems, data repositories and robotic software within a broad digitalisation measure. Consequently, the independent contribution of RPA to revenue performance remains inadequately distinguished. Second, scholarship on accounting information systems continues to rely heavily on descriptive accounts of RPA implementation, with limited variance-theoretic investigation of its organisational consequences (Plattfaut & Borghoff, 2022). Third, the causal pathway connecting automation with fiscal performance is frequently presumed rather than empirically quantified. Where revenue improvements arise primarily from shorter assessment cycles, TAS constitutes the mediating mechanism, suggesting that investment should prioritise procedural

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acceleration. Conversely, if enhanced detection capabilities account for most revenue gains, assessment speed becomes a secondary consideration. These alternatives imply different resource-allocation strategies, yet the distinction has not been adequately examined through empirical testing.

Significance of the Study

The principal theoretical contribution of this investigation is the empirical specification of a relationship previously treated largely as an assumption. Incorporating TAS as an explicit mediating construct, rather than merely recognising faster processing as an operational advantage, enables the study to examine how technological implementation at the administrative level translates into broader fiscal outcomes. Decomposing the overall relationship into direct and indirect effects further clarifies the relative contribution of procedural acceleration. This approach addresses a recurring limitation in public administration technology research, where associations between technological adoption and organisational performance are often established without identifying the processes responsible for transmitting those effects. Furthermore, the proposed framework extends technology acceptance and task–technology fit perspectives beyond individual adoption behaviour to encompass organisational process capabilities. This extension is consistent with evidence that public employees' willingness to collaborate with intelligent technologies influences the transformation of administrative operations (Ahn & Chen, 2022).

From a practical perspective, the study addresses managerial decisions concerning technological investment and fiscal resource allocation. Revenue administrations facing substantial budgetary constraints must determine whether to undertake comprehensive information-system replacement or automate selected administrative functions. Demonstrating that reduced assessment duration explains a considerable proportion of the relationship between RPA and revenue performance would provide empirical justification for targeted automation. Such an approach can improve processing efficiency through existing application interfaces while avoiding the substantial capital requirements, procurement uncertainties and prolonged operational disruption associated with replacing core systems (Hofmann et al., 2020). Moreover, estimated structural relationships can provide financial controllers with quantitative evidence for identifying and prioritising reconciliation activities that offer the greatest potential benefits from RPA implementation.

The policy relevance of the research extends to the legal and institutional conditions necessary for converting operational improvements into fiscal gains. Faster assessment procedures can contribute effectively to revenue mobilisation only when automated determinations possess statutory validity, information exchange between public agencies operates under enforceable arrangements, and algorithmically generated decisions remain subject to verification and challenge. Research on automated public

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decision-making emphasises that accountability requirements must be incorporated into system design from the outset rather than introduced after implementation (Busuioc, 2021). Related scholarship further demonstrates that public-sector automation creates distinctive challenges involving administrative discretion, procedural transparency and access to remedies, which differ from those encountered in private organisations (Kuziemski & Misuraca, 2020). These considerations are especially consequential for transitional economies, where the capacity to mobilise domestic revenue directly influences the availability of resources for development expenditure (Mpofu, 2022). Accordingly, coordinating legislative reform with technological implementation represents a critical policy priority.

Research Objectives

The central objective of this study is to develop and empirically assess a structural framework that quantifies both the direct relationship between RPA adoption and TRC and the indirect relationship transmitted through TAS. To ensure correspondence between the research objectives and the reported statistical findings, the investigation pursues the following specific objectives:

- To quantify the direct influence of RPA adoption on TAS, expressed through the RPA → TAS structural path coefficient and its associated effect size.
- To determine the direct contribution of TAS to TRC, using the TAS → TRC path coefficient and corresponding effect size.
- To assess the direct relationship between RPA adoption and TRC after accounting for the influence of TAS.
- To examine the mediating role of TAS in the relationship between RPA adoption and TRC, using the bootstrapped indirect effect, its bias-corrected confidence interval and the variance accounted for.

Organisation of the Paper

The subsequent sections are organised as follows. Section 2 establishes the theoretical background, evaluates relevant empirical studies and formulates the research hypotheses. Section 3 presents the methodological framework, including the research design, sampling strategy, measurement instruments and analytical procedures. Section 4 provides the findings from the measurement and structural model assessments. Section 5 interprets the empirical results in relation to existing scholarship. Finally, Section 6 presents the study's conclusions, recommendations, implications and limitations.

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LITERATURE REVIEW

Theoretical Foundations

Three interrelated theoretical perspectives underpin the proposed research framework. The first originates from the information systems acceptance literature, which suggests that technological investments generate organisational benefits when prospective users recognise their utility, perceive them as manageable and incorporate them into established working practices. Within public administration, this perspective has evolved beyond individual behavioural intentions to encompass institutional capabilities. Empirical findings involving government personnel demonstrate that perceived usefulness and perceived threats collectively shape employees' readiness to collaborate with intelligent technologies. Such readiness, in turn, mediates the relationship between technological investment and administrative transformation (Ahn & Chen, 2022). Comparable evidence from taxation demonstrates that attitudes towards electronic tax platforms influence compliance indirectly through actual system adoption (Night & Bananuka, 2020). These findings provide an empirical foundation for examining the proposed relationships through a mediated structural framework.

The second theoretical perspective concerns task–technology fit, which attributes technological performance improvements to the alignment between system capabilities and operational requirements. RPA is particularly suited to activities involving structured information and predetermined decision rules, whereas its effectiveness diminishes when processes require substantial professional judgement, interpretation of unstructured information or complex exception management (Syed et al., 2020). Accordingly, the contribution of RPA to fiscal performance depends on the extent to which assessment procedures possess the standardised and rule-based characteristics necessary for successful automation. This suitability must be established through the actual properties of administrative workflows rather than inferred from the technical capabilities of RPA alone.

The third perspective draws upon public value theory, which assesses technological interventions according to their contribution to socially desirable outcomes rather than improvements in internal operational efficiency alone. Applied to tax assessment, this perspective shifts the evaluation criterion from reductions in repetitive administrative activities towards revenue mobilisation, equitable taxpayer treatment and the institutional legitimacy of assessment decisions. However, these benefits are conditional upon maintaining transparency, explainability and opportunities to challenge automated determinations. Improvements in administrative efficiency cannot independently satisfy the accountability requirements associated with algorithmically supported public decisions (Busuioc, 2021).

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Robotic Process Automation: Definition, Capability and Boundary Conditions

The defining characteristic of RPA is its capacity to automate activities through existing application interfaces. Configured software agents reproduce routine interactions ordinarily performed by administrative personnel, including accessing applications, retrieving information, evaluating predefined conditions, transferring data between fields and producing procedural outputs. These operations are performed without restructuring the underlying information systems (Hofmann et al., 2020). Consequently, RPA differs fundamentally from enterprise integration technologies, which require modifications to information architectures, and from machine learning approaches, which derive decision patterns from data rather than implementing explicitly specified rules. Distinguishing these technological approaches is essential because their implementation costs, governance obligations and operational vulnerabilities differ substantially.

The ability to function within established technological infrastructures constitutes a major advantage of RPA, particularly in organisations dependent on legacy applications. By interacting directly with existing interfaces, software robots can connect otherwise isolated systems without requiring extensive architectural redevelopment. This capability is particularly relevant to revenue administrations, where taxation, customs, treasury and registry applications have often been acquired independently and lack native interoperability (Syed et al., 2020). Evidence from professional accounting practice indicates that RPA implementation is concentrated in taxation and other reconciliation-intensive activities. Reported improvements predominantly involve shorter processing periods, fewer manual errors and greater opportunities to redirect personnel towards analytical responsibilities (Cooper et al., 2019; Kokina & Blanchette, 2019).

Nevertheless, the operational effectiveness of RPA is subject to important limitations that must inform the interpretation of empirical findings. Research in accounting and auditing demonstrates that software robots can be highly sensitive to modifications in application interfaces, while sustained performance improvements frequently depend on the standardisation of procedures before implementation. Organisations may also underestimate the supervisory and governance resources required to manage expanding collections of automated processes (Gotthardt, 2020). Systematic evidence further identifies institutional preparedness, rigorous selection of suitable processes and senior executive support as critical factors distinguishing effective implementation from unsuccessful adoption initiatives (Costa et al., 2022). Despite considerable professional interest in RPA over the preceding decade, the available research remains disproportionately descriptive. Greater emphasis is therefore required on empirically estimating organisational outcomes rather than merely documenting technological characteristics and implementation experiences (Plattfaut & Borghoff, 2022).

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Established frameworks for identifying audit and assurance activities suitable for automation provide the operational basis for measuring RPA in this investigation. The relevant capabilities encompass extracting information from tax submissions, reconciling records across multiple systems, validating declared positions against predetermined rules and facilitating information exchange between legacy applications and external databases (Huang & Vasarhelyi, 2019).

Procedural Latency in Tax Assessment

Delays in tax assessment are primarily attributable to the configuration of verification procedures rather than differences in individual officers' working efficiency. Conventional assessment processes require personnel to initiate verification activities sequentially, with completion times influenced by the responsiveness of external institutions. When banking, customs and property information must be obtained through correspondence, the duration of the assessment process becomes dominated by inter-institutional waiting periods rather than substantive analytical work. Consequently, unresolved cases accumulate around the least responsive stages of the administrative workflow.

Although the fiscal implications of these delays have generally been examined indirectly, existing evidence offers consistent support for their significance. Tax enforcement research demonstrates that compliance behaviour is influenced by both the perceived likelihood of detection and the promptness of administrative intervention. As the interval between taxpayer reporting and enforcement action increases, the deterrent effect associated with detection becomes progressively weaker (Slemrod, 2019). Longitudinal investigations further indicate that tax audits can increase declared income over several subsequent years. Delaying such interventions therefore potentially sacrifices not only immediate assessment outcomes but also the continuing behavioural improvements associated with earlier enforcement (Advani et al., 2023). Comparative evidence additionally links timely assessment procedures and effective arrears administration with aggregate revenue collection outcomes across tax jurisdictions (OECD, 2023).

RPA offers a means of addressing these delays by restructuring the verification sequence itself. Rather than depending on successive enquiries initiated by individual officers, automated workflows can perform continuous and parallel verification activities. The proposed mechanism therefore does not assume that RPA increases the personal productivity of tax officials; instead, it suggests that automation reduces the inactive intervals embedded within existing administrative procedures. This distinction provides the theoretical justification for conceptualising TAS as an independent construct rather than treating processing efficiency as an inherent characteristic of RPA adoption.

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Digital Technology and Tax Revenue Outcomes

Empirical investigations increasingly demonstrate that technological improvements in revenue administration can produce measurable fiscal benefits. Evidence from Tajikistan indicates that electronic tax filing reduced the administrative time required for business compliance and limited opportunities for discretionary interactions with tax officials. Tax payments also increased among businesses previously exposed to relatively weak enforcement (Okunogbe & Pouliquen, 2022). Cross-country findings similarly associate the adoption of electronic government systems for taxation and procurement with stronger administrative capabilities and lower compliance costs (Kochanova et al., 2020). At the broader economic level, e-government development has been linked to reduced tax evasion, although the magnitude of this relationship depends on the prevailing information and communication technology infrastructure (Uyar et al., 2021). Internet expansion has likewise been associated with the ability of developing economies to transition towards contemporary tax instruments that rely less heavily on international trade (Gnangnon, 2020).

The underlying mechanism connecting these technological developments with fiscal outcomes appears to involve greater verification coverage rather than administrative convenience alone. Independent confirmation of taxpayer declarations enables revenue authorities to identify inconsistencies and strengthen the accuracy of reported liabilities. Evidence from Brazil demonstrates that information supplied through consumer-based third-party reporting increased firms' declared revenue, highlighting the importance of external verification rather than the method through which returns were submitted (Naritomi, 2019). This mechanism is particularly relevant to RPA because automated reconciliation enables existing verification procedures to be applied systematically across large volumes of taxpayer records.

However, two important findings qualify expectations regarding the fiscal benefits of administrative technology. First, technological deployment without corresponding administrative action may generate limited improvements. Evidence concerning electronic sales registers in Ethiopia demonstrates that increased turnover reporting occurred only when tax authorities actively incorporated the resulting information into their enforcement activities. This indicates that organisational capacity, rather than technological availability alone, determines whether implementation produces fiscal gains (Mascagni et al., 2021). Second, findings from Indonesia suggest that strengthening tax administration can generate revenue improvements exceeding those associated with substantial statutory rate adjustments. Administrative capability therefore represents a particularly important determinant of collection performance (Basri et al., 2021). Considered together, these findings support a framework in which the relationship between technological adoption and revenue outcomes operates through an identifiable administrative mechanism rather than arising automatically from implementation.

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A related body of scholarship examines how fiscal improvements are distributed across administrative processes. Comparative evidence reveals substantial differences between jurisdictions in the proportion of tax returns finalised within legally prescribed periods and the duration for which outstanding liabilities remain unresolved. These operational measures are also associated with differences in collection performance (OECD, 2023). Research on domestic resource mobilisation in developing economies similarly identifies administrative processing capacity as a more immediate constraint on financing development expenditure than the generosity of statutory tax provisions (Gnangnon, 2020; Mpofu, 2022). Nevertheless, these descriptive findings do not quantify the proportion of the relationship between technological implementation and revenue performance attributable specifically to improved administrative throughput. Estimating that mediated contribution constitutes a central purpose of the present investigation.

Algorithmic Verification and Audit Selection

While RPA facilitates the automated execution of predefined procedures, analytical technologies address a different administrative requirement: identifying which taxpayer records merit further investigation. Research applying supervised and unsupervised learning techniques to taxation databases demonstrates improvements in the precision of audit selection. In collaboration with a national revenue administration, a hybrid unsupervised outlier-detection approach identified potential evasion cases with substantially greater accuracy than existing rule-based screening procedures (Savić et al., 2022). Similarly, incorporating relationships between taxpayers into predictive models improves audit efficiency compared with approaches relying exclusively on individual taxpayer characteristics, reflecting the tendency for evasion patterns to emerge through transactional networks (Baghdasaryan et al., 2022). Evidence from an African revenue authority also indicates that neural network classifiers can achieve high levels of detection performance when applied to fraudulent income tax declarations (Murorunkwere et al., 2022).

Two implications of these findings are particularly relevant to the proposed framework. First, the improvements in detection accuracy were achieved using information already maintained within revenue administration databases. This suggests that the principal limitation may concern the ability to analyse existing records comprehensively rather than the absence of relevant information. Second, improved risk identification produces fiscal benefits only when flagged cases receive subsequent administrative attention. Analytical systems and assessment processing capacity must therefore operate together. Where predictive models identify more potentially non-compliant cases than officers can resolve, improved detection merely transfers the administrative bottleneck to a later stage of the enforcement process.

Accordingly, RPA and analytical risk-identification technologies should be regarded as

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complementary components of revenue administration rather than competing approaches. Predictive systems support the allocation of professional scrutiny towards higher-risk cases, while automated processing of routine assessments creates the administrative capacity necessary for that prioritisation. Evidence from assurance activities suggests that intelligent automation can enhance output quality while reducing dependence on routine human labour (Fedyk et al., 2022). Nevertheless, experimental research demonstrates that professionals do not consistently accept machine-generated evidence, particularly when evaluating complex estimates. The organisational value of automation therefore depends partly on how technological outputs are incorporated into professional decision-making (Commerford et al., 2022).

Governance Constraints on Automated Administration

Because tax assessment involves the exercise of statutory authority, its automation introduces institutional responsibilities that cannot be satisfied through operational efficiency alone. Research on algorithmic governance highlights the possibility that automated decision systems may obscure responsibility within complex technological arrangements. Maintaining the legitimacy of such decisions consequently requires accessible explanations, meaningful opportunities for challenge and effective mechanisms of administrative redress (Busuioc, 2021). Comparative investigations of automated decision-making in democratic governance systems similarly suggest that implementation difficulties arise predominantly from institutional arrangements rather than computational limitations (Kuziemski & Misuraca, 2020). Reviews examining artificial intelligence adoption across public institutions further identify legal certainty, information protection and organisational capability as major obstacles to effective implementation (Wirtz et al., 2019). These considerations directly qualify the policy implications of the present research, as improvements in TAS can generate sustainable fiscal benefits only when accelerated determinations remain legally defensible and institutionally accountable.

Research Gap and Hypothesis Development

Existing scholarship provides substantial evidence that administrative effectiveness influences fiscal performance, digital verification strengthens the accuracy of declared liabilities, and RPA possesses capabilities compatible with routine tax assessment procedures. However, the structural relationships connecting these elements remain insufficiently established. Previous investigations have not independently examined RPA within the wider digital taxation environment while estimating its contribution to TRC through an explicitly specified procedural mediator. The proposed hypotheses address this limitation by formalising the relationships between technological adoption, assessment efficiency and revenue outcomes.

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Tax assessment procedures commonly involve structured information, predetermined validation requirements and substantial transaction volumes, creating conditions favourable to task–technology fit. Furthermore, interface-based automation can reduce the inactive intervals associated with sequential manual verification, thereby addressing a major source of administrative delay. On this basis, greater RPA adoption is expected to shorten assessment processing cycles and improve TAS:

H1: *RPA adoption has a positive direct effect on Tax Assessment Speed.*

Given that effective deterrence relies on prompt administrative intervention, while delayed determinations undermine immediate revenue recovery and the sustained behavioural effects of enforcement, improvements in TAS are expected to strengthen the magnitude, predictability and integrity of TRC:

H2: *Tax Assessment Speed has a positive direct effect on Tax Revenue Collection.*

By enabling systematic cross-verification across a broader range of taxpayer records, RPA can identify understated liabilities that conventional manual sampling may overlook, irrespective of improvements in assessment processing time. Accordingly, RPA adoption is expected to exert an independent direct influence on TRC after controlling for TAS:

H3: *RPA adoption has a positive direct effect on Tax Revenue Collection.*

Finally, insofar as improvements in TAS constitute the primary mechanism linking RPA adoption to TRC, a substantial proportion of the overall relationship is expected to operate through a statistically significant indirect pathway:

H4: *Tax Assessment Speed mediates the relationship between RPA adoption and Tax Revenue Collection.*

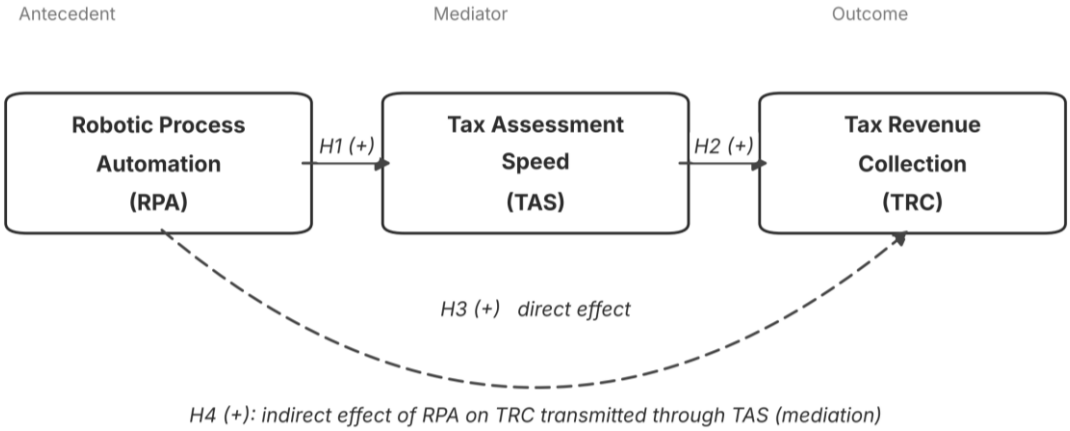


Figure 1: Conceptual Model of the Hypothesised Direct and Mediated Relationships

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Figure 1 illustrates the proposed conceptual framework, positioning RPA as the antecedent construct, TAS as the mediating administrative mechanism and TRC as the fiscal outcome. Solid arrows represent the hypothesised direct relationships (H1, H2), whereas the dashed arrow indicates the direct pathway from RPA to TRC (H3). The mediated relationship operating through TAS is represented by H4.

METHODOLOGY

Research Design

A quantitative research approach employing a deductive, cross-sectional survey design was adopted to investigate the proposed relationships. This methodological framework enables the empirical examination of directional associations between latent variables that cannot be measured directly and must instead be assessed through the informed perceptions of professionals engaged in administrative operations. The collected data were analysed using PLS-SEM in SmartPLS 4. Three methodological considerations informed this analytical choice. First, the proposed framework emphasises predictive relationships rather than the strict confirmation of an established theoretical model. Second, the inclusion of a mediating variable necessitates the estimation of indirect effects through non-parametric procedures. Third, the ordinal, bounded and multivariately non-normal characteristics of the data make covariance-based estimation less efficient for the present analysis (Hair et al., 2019).

Population, Sampling and Response

The study population consisted of professionals directly responsible for tax assessment activities and associated automation processes within public revenue authorities and financial audit directorates. Eligible participants included senior tax inspectors, public financial auditors, revenue system administrators and departmental directors. A purposive sampling strategy was implemented to ensure that respondents possessed sufficient practical knowledge of assessment procedures and automation technologies to provide informed evaluations of the constructs under investigation. Accordingly, participation was restricted to individuals currently engaged in tax assessment, auditing or revenue systems administration.

Table 1: Demographic and Professional Profile of Respondents (N = 284)

Characteristic	Category	f	%	Cumulative %
Role	Senior tax inspector	98	34.51	34.51
	Public financial auditor	82	28.87	63.38
	Revenue system administrator	56	19.72	83.10
	Departmental director or manager	48	16.90	100.00
Experience	Less than 5 years	34	11.97	11.97
	5 to 10 years	112	39.44	51.41
	11 to 15 years	91	32.04	83.45

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Characteristic	Category	f	%	Cumulative %
	More than 15 years	47	16.55	100.00
Education	Bachelor's degree	168	59.15	59.15
	Master's degree	84	29.58	88.73
	Doctorate	32	11.27	100.00

Note: f = Frequency. Percentages are calculated on the retained sample of 284 valid responses and may not sum to exactly 100.00 because of rounding. Cumulative percentages restart within each characteristic.

Questionnaires were administered electronically and through printed copies across the participating administrative departments, with 350 instruments distributed in total. Following data screening, submissions containing incomplete information, uniform response patterns or other indications of insufficient respondent engagement were excluded. This procedure produced a final analytical sample of 284 valid responses, corresponding to an effective response rate of 81.1%. The achieved sample substantially exceeds the minimum sample-size threshold determined by the inverse square root rule, considering that no endogenous construct receives more than two incoming structural paths. Consequently, the sample provides sufficient statistical power to estimate the hypothesised relationships (Hair et al., 2019). Table 1 presents the demographic characteristics and professional distribution of the respondents.

The respondent characteristics presented in Table 1 indicate a strong representation of experienced personnel occupying senior operational positions. Senior tax inspectors constitute 34.51% of the sample, while public financial auditors account for another 28.87%. Collectively, these groups represent 63.38% of participants and are directly involved in conducting or reviewing tax assessment determinations. The sample also demonstrates considerable professional experience, with 88.03% having served for at least five years and 48.59% reporting more than ten years of experience. Furthermore, 40.85% possess postgraduate qualifications. This composition reinforces the credibility of respondents as knowledgeable informants, supporting the use of perceptual measures to evaluate administrative process constructs.

Construct Operationalisation and Instrument Development

The measurement framework comprises three reflectively specified constructs, each operationalised through four indicators assessed using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Measurement items were developed by adapting previously validated instruments and established operational criteria identified in the relevant literature. A reflective measurement approach was selected because the indicators represent observable expressions of their respective underlying constructs rather than separate dimensions that collectively constitute them. Consequently, excluding an individual indicator may reduce measurement coverage without fundamentally changing the construct's conceptual definition, providing the basis for reflective rather than formative specification.

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The five-point response format was preferred over scales offering more response categories because the questionnaire was administered in two languages to participants with differing levels of familiarity with survey-based research. Under these circumstances, a more restricted response scale was considered appropriate for minimising variation arising from differences in item interpretation. Before the main survey, subject specialists evaluated the instrument to establish content validity, followed by preliminary testing with a small group of practising tax inspectors to assess the clarity and appropriateness of the terminology. This process confirmed the suitability of the questionnaire, with no substantive modifications required. The complete measurement items and their corresponding literature sources are provided in Table 2.

Table 2: Construct Operationalisation, Reflective Indicators and Adapted Sources

Construct	Code	Measurement Item	Adapted from
Robotic Process Automation (RPA)	RPA1	Software robots extract data from taxpayer filings without manual re-keying.	Cooper et al. (2019)
	RPA2	Cross-system reconciliations run continuously without officer initiation.	Kokina and Blanchette (2019)
	RPA3	Rule-based routines validate claimed deductions and flag discrepancies automatically.	Huang and Vasarhelyi (2019)
	RPA4	Automated routines connect legacy tax systems with banking and customs data sources.	Syed et al. (2020)
Tax Assessment Speed (TAS)	TAS1	Automation has measurably reduced the processing cycle-time of returns.	Hofmann et al. (2020)
	TAS2	The lag between return submission and formal determination has been minimised.	Gotthardt (2020)
	TAS3	Backlogs of unassessed returns are cleared systematically rather than episodically.	Plattfaut and Borghoff (2022)
	TAS4	Determinations are issued within the statutory time limit.	Kochanova et al. (2020)
Tax Revenue Collection (TRC)	TRC1	Faster assessment has increased the overall tax revenue yield.	Okunogbe and Pouliquen (2022)
	TRC2	Automated reconciliation suppresses revenue leakage and narrows the tax gap.	Slemrod (2019)
	TRC3	Treasury inflows have become more predictable as billing has accelerated.	Uyar et al. (2021)
	TRC4	The tax base is better protected against deferral and understatement strategies.	Naritomi (2019)

Note: All items were measured on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). All constructs are specified reflectively.

Table 2 delineates the operational dimensions of the three constructs. RPA is measured through four capabilities identified in the automation literature as fundamental to interface-based robotics in tax assessment: automated information extraction,

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continuous reconciliation across systems, rule-governed verification and interoperability with legacy applications. TAS, by contrast, reflects improvements in procedural latency rather than the technological activities responsible for them. Its indicators encompass shorter assessment cycles, reduced valuation delays, faster resolution of accumulated cases and compliance with statutory assessment deadlines. This distinction establishes the mediator as conceptually and empirically separate from RPA. Meanwhile, TRC is operationalised through revenue yield, reduction of the tax gap, predictability of treasury inflows and preservation of the tax base.

Data Screening and Common Method Variance

The collection of explanatory and outcome measures from the same respondents during a single survey period necessitated safeguards against common method variance (CMV). Accordingly, both procedural controls and statistical diagnostics were incorporated into the research design. To minimise response-related bias, participants were assured of anonymity, questionnaire items contained no explicit references to the proposed hypotheses, and the sequence of construct-specific questions was varied to discourage respondents from inferring the underlying theoretical relationships. Statistical assessment employed the full collinearity criterion. As presented in Table 5, all inner variance inflation factor (VIF) values remained below the recommended threshold of 3.3, providing no indication of severe CMV-related distortion within the estimated structural model.

Analytical Procedure

The empirical analysis was conducted through a sequential two-stage evaluation procedure. The initial stage examined the adequacy of the reflective measurement model using established reliability and validity criteria. Indicator reliability was assessed against a minimum outer loading of .708, while internal consistency was evaluated through Cronbach's alpha and composite reliability, both requiring values above .70. Convergent validity was established using average variance extracted (AVE), with .50 adopted as the minimum acceptable threshold. Discriminant validity was examined through the heterotrait–monotrait ratio of correlations (HTMT), applying the conservative cut-off of .85, with additional verification provided by the Fornell–Larcker criterion (Hair et al., 2019). Consistent with current methodological recommendations, composite reliability and HTMT were considered jointly to provide a more comprehensive assessment than reliance on Cronbach's alpha and the Fornell–Larcker criterion alone (Cheung et al., 2024).

The second stage focused on evaluating the structural relationships among the latent constructs. This assessment incorporated inner VIF values to examine collinearity, coefficients of determination to quantify explanatory capacity, effect sizes to establish the relative contribution of predictors, and significance testing for both direct and

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mediated relationships. Statistical inference was performed using non-parametric bootstrapping with 5,000 resamples, from which bias-corrected and accelerated confidence intervals were obtained. The complete analytical sequence is illustrated in Figure 2.

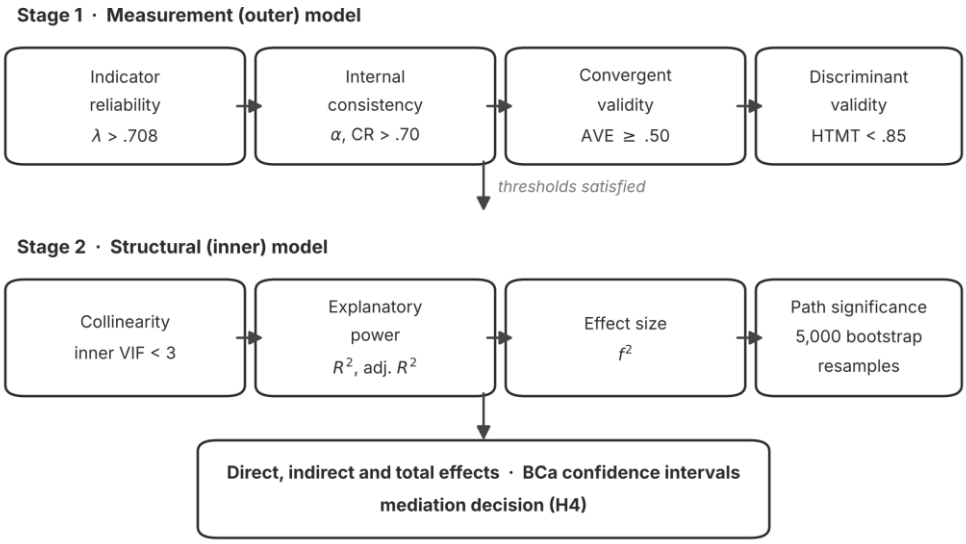


Figure 2: Two-Stage PLS-SEM Analytical Procedure
Note: Figure 2 sets out the evaluation sequence and the decision criterion applied at each step. Progression to the structural stage is conditional on satisfaction of all measurement-model thresholds.

RESULTS

The findings are presented in accordance with the established two-stage analytical framework. The reflective measurement model is assessed initially to verify its reliability and validity, after which the structural relationships are examined and interpreted, conditional upon satisfactory measurement performance.

Measurement Model: Reliability and Convergent Validity

Table 3 summarises the outer indicator loadings, internal consistency reliability estimates and convergent validity measures for all three reflectively specified constructs.

The measurement results demonstrate satisfactory indicator reliability, with all twelve outer loadings exceeding the recommended .708 threshold and falling between .835 and .881. Accordingly, each latent construct accounts for more than 50% of the variance in its respective indicators. Indicator communality ranges from .697 for TAS1 to .776 for TRC3, confirming that no item required removal. Internal consistency is similarly robust, as Cronbach's alpha values range from .869 to .891 and composite reliability

estimates from .911 to .924. These values exceed the minimum acceptable level of .70 without approaching the .95 threshold associated with potential indicator redundancy. Convergent validity is further supported by AVE values between .718 and .753, all surpassing the required .50 benchmark. As indicated in Table 3, TRC exhibits the strongest measurement precision (AVE = .753), whereas TAS records the lowest AVE (.718), although this difference is negligible.

Table 3: Indicator Reliability, Internal Consistency and Convergent Validity

Construct	Indicator	Loading	α	CR	AVE
Robotic Process Automation	RPA1	.842	.885	.920	.743
	RPA2	.867			
	RPA3	.871			
	RPA4	.868			
Tax Assessment Speed	TAS1	.835	.869	.911	.718
	TAS2	.854			
	TAS3	.860			
	TAS4	.840			
Tax Revenue Collection	TRC1	.849	.891	.924	.753
	TRC2	.873			
	TRC3	.881			
	TRC4	.868			

Note: α = Cronbach's Alpha; CR = Composite Reliability; AVE = Average Variance Extracted. Thresholds applied: loading > .708, α and CR > .70, AVE ≥ .50. All loadings are significant at $p < .001$.

Measurement Model: Discriminant Validity

Table 4 presents the discriminant validity results, with HTMT estimates positioned above the diagonal, correlations between constructs displayed below the diagonal, and the square roots of AVE reported along the diagonal.

Table 4: Discriminant Validity: Heterotrait–Monotrait Ratios and Fornell–Larcker Criterion

Construct	1. RPA	2. TAS	3. TRC
1. Robotic Process Automation	(.862)	.768	.741
2. Tax Assessment Speed	.684	(.847)	.812
3. Tax Revenue Collection	.659	.725	(.868)

Note: Values above the diagonal are heterotrait–monotrait (HTMT) ratios; values below the diagonal are inter-construct correlations; values in parentheses on the diagonal are the square root of the average variance extracted. Discriminant validity requires HTMT < .85 and a diagonal value exceeding all off-diagonal correlations in the same column and row; both conditions are satisfied.

Discriminant validity is supported by all HTMT values remaining below the stringent .85 threshold. The strongest association is observed between TAS and TRC (HTMT = .812), consistent with their theoretically anticipated relationship within the proposed structural framework. Nevertheless, this value remains within the acceptable limit.

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Further confirmation is provided by the Fornell–Larcker criterion, as the square roots of AVE for the respective constructs (.862, .847 and .868) are consistently greater than their correlations with all other latent variables. The agreement between these two assessment methods establishes satisfactory discriminant validity, confirming that the three constructs represent empirically distinguishable dimensions.

Structural Model: Collinearity, Explanatory Power and Effect Size

Following confirmation of measurement reliability and validity, the analysis proceeded to the structural model. Table 5 summarises the assessment of inner collinearity, explanatory power through coefficients of determination, and the effect sizes associated with the hypothesised relationships.

Table 5: Collinearity, Explanatory Power and Effect Size of the Structural Model

Relationship / Endogenous Construct	Inner VIF	R^2	Adjusted R^2	f^2	Interpretation
RPA → TAS	1.000	.468	.466	.879	Large
RPA → TRC	1.879	.573	.570	.142	Medium
TAS → TRC	1.879	—	—	.354	Large

Note: VIF = Variance Inflation Factor. R^2 values are reported against the endogenous construct of each path: TAS for the first row and TRC for the second. Effect sizes are interpreted against the conventional benchmarks of .02 (small), .15 (medium) and .35 (large). All inner VIF values are below 3, indicating no collinearity concern.

The inner VIF estimates of 1.000 and 1.879 remain substantially below the conservative cut-off of 3, indicating that multicollinearity does not materially compromise the estimated structural relationships. Consistent with the assessment in Section 3.4, these findings also provide no indication of severe common method bias. The model explains 46.8% of the variance in TAS and 57.3% in TRC, with corresponding adjusted R^2 values of .466 and .570. The minimal differences between the original and adjusted R^2 estimates suggest that the model's explanatory capacity is not artificially inflated by structural complexity. Both constructs consequently demonstrate moderate to substantial levels of explained variance within the context of behavioural and administrative research. The effect-size estimates presented in Table 5 further clarify the relative importance of the structural relationships. RPA demonstrates a large effect on TAS ($f^2 = .879$), while TAS similarly exhibits a large effect on TRC ($f^2 = .354$). In comparison, the direct effect of RPA on TRC is medium ($f^2 = .142$). This contrast between the substantial effects associated with the mediated pathway and the comparatively smaller direct effect provides preliminary evidence that improvements in TAS constitute the principal mechanism through which RPA contributes to fiscal performance.

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Structural Model: Path Coefficients and Mediation

Table 6 presents the estimated direct, indirect and total effects, together with their bootstrapped standard errors, t-statistics and bias-corrected and accelerated confidence intervals.

Table 6: Direct, Indirect and Total Effects with Bootstrapped Significance Tests

Effect	Path	β	SE	t	p	95% BCa CI	Decision
Direct (H1)	RPA → TAS	.684	.041	16.683	< .001	[.598, .759]	Supported
Direct (H2)	TAS → TRC	.528	.054	9.778	< .001	[.419, .628]	Supported
Direct (H3)	RPA → TRC	.298	.059	5.051	< .001	[.181, .411]	Supported
Indirect (H4)	RPA → TAS → TRC	.361	.044	8.205	< .001	[.276, .449]	Supported
Total	RPA → TRC	.659	–	–	–	–	–

Note: β = Standardised Path Coefficient; SE = Bootstrapped Standard Error; BCa = Bias-Corrected and Accelerated. Estimates are based on 5,000 bootstrap resamples.

The structural estimates reveal positive and statistically significant relationships across all three direct pathways ($p < .001$). RPA adoption demonstrates a strong positive association with TAS ($\beta = .684$, $t = 16.683$), confirming H1 and fulfilling RO1. Similarly, TAS significantly predicts TRC ($\beta = .528$, $t = 9.778$), providing empirical support for H2 and satisfying RO2. Although comparatively smaller in magnitude, the direct relationship between RPA and TRC remains statistically significant ($\beta = .298$, $t = 5.051$), thereby supporting H3 and achieving RO3. None of the corresponding confidence intervals includes zero.

The mediation analysis further identifies a significant positive indirect effect ($\beta = .361$, $t = 8.205$, 95% BCa CI [.276, .449]), confirming H4 and fulfilling RO4. The simultaneous significance and positive direction of both the direct and indirect pathways indicate complementary partial mediation, rather than complete mediation or competitive suppression. The total effect of RPA on TRC amounts to $\beta = .659$ (.298 + .361), of which 54.8% is attributable to the indirect pathway, as determined by the ratio of the mediated effect to the total effect. Thus, improvements in TAS account for much of the overall relationship between RPA adoption and fiscal performance, while the remaining 45.2% is transmitted through mechanisms independent of assessment speed. Figure 3 illustrates the estimated structural model.

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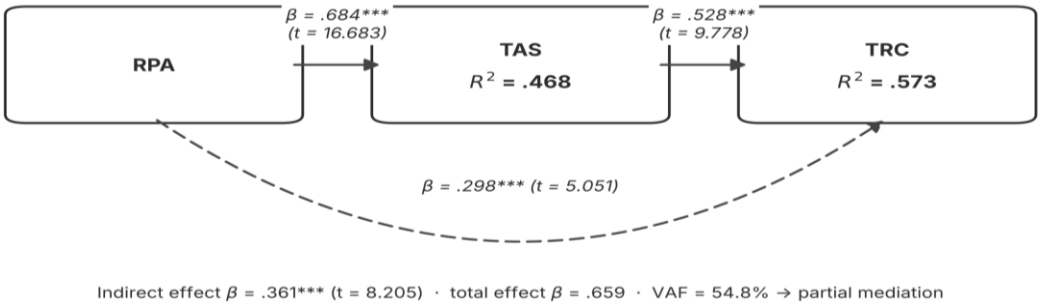


Figure 3: Estimated Structural Model with Standardised Path Coefficients
Note: Figure 3 reports standardised path coefficients with t-statistics in parentheses and coefficients of determination within the endogenous constructs. *** p < .001. VAF = variance accounted for, calculated as the indirect effect divided by the total effect.

Two additional observations emerge from the estimated relationships. First, the magnitude of the indirect effect (.361) surpasses that of the direct effect (.298), establishing the mediated pathway as the more influential transmission mechanism despite the statistical significance of both relationships. Second, the indirect effect exhibits a narrower confidence interval [.276, .449] than the direct effect [.181, .411], suggesting greater estimation precision for the mediated pathway. Consequently, this pathway provides a comparatively stronger empirical foundation for decisions concerning resource allocation.

Summary of Hypothesis Testing

Table 7 synthesises the hypothesis-testing outcomes, indicating the empirical decision for each proposed relationship alongside its associated research objective.

Table 7: Summary of Hypothesis Testing Against Research Objectives

Hypothesis	Objective	Statistical Evidence	Decision
H1: RPA → Tax Assessment Speed	RO1	β = .684, t = 16.683, f^2 = .879	Supported
H2: Tax Assessment Speed → Tax Revenue Collection	RO2	β = .528, t = 9.778, f^2 = .354	Supported
H3: RPA → Tax Revenue Collection	RO3	β = .298, t = 5.051, f^2 = .142	Supported
H4: Mediation of RPA → TRC by Assessment Speed	RO4	β = .361, t = 8.205, CI [.276, .449], VAF = 54.8%	Supported (Partial Mediation)

Note: VAF = Variance Accounted For. Research objectives are as stated in Section 1.4. All effects are significant at p < .001.

As summarised in Table 7, empirical support is obtained for all four hypotheses, with each corresponding research objective identified in Section 1.4 addressed through a reported statistical estimate. The overall configuration of findings is coherent: RPA demonstrates a particularly strong influence on TAS, TAS substantially predicts TRC,

and the direct relationship between RPA and TRC remains significant but comparatively weaker. This pattern establishes procedural latency as the principal mechanism linking automation to fiscal outcomes. The coefficients presented in Tables 5 and 6 address RO1–RO4, while RO5 is considered in Section 6.2.

DISCUSSION

Automation and Assessment Latency (H1)

The substantial influence of RPA on TAS ($\beta = .684$, $f^2 = .879$) reinforces the process-based proposition that delays in manual tax assessment arise predominantly from workflow interruptions and waiting periods rather than the analytical requirements of individual cases. By enabling verification activities to operate continuously and concurrently, software robots fundamentally alter the sequential processing arrangements responsible for administrative queues, rather than simply increasing the speed of existing manual operations. This interpretation corresponds with practical evidence identifying shorter processing cycles and fewer errors as the most consistently documented advantages of RPA in accounting activities involving extensive reconciliation (Cooper et al., 2019; Kokina & Blanchette, 2019). It also supports task–technology fit reasoning, given that tax assessment involves the repetitive, structured and rules-driven operations for which RPA is particularly suitable (Syed et al., 2020).

Assessment Speed and Revenue Collection (H2)

The positive relationship between TAS and TRC ($\beta = .528$, $f^2 = .354$) provides empirical support for the deterrence-based explanation developed in Section 2.3. The fiscal significance of timely assessment operates through two complementary mechanisms. Earlier determinations increase the likelihood that identified liabilities can be recovered before collection becomes impracticable, while prompt administrative intervention strengthens taxpayers' perceptions that non-compliance will attract an immediate response, thereby influencing subsequent reporting decisions (Slemrod, 2019). Evidence that audit interventions generate effects extending across multiple periods further supports this interpretation, suggesting that improvements in administrative timeliness accumulate over successive filing cycles rather than producing exclusively immediate gains (Advani et al., 2023). The observed relationship also provides quantitative support for cross-jurisdictional administrative evidence connecting timely assessments and arrears management with stronger revenue collection outcomes (OECD, 2023).

The Residual Direct Effect (H3)

The persistence of a statistically significant direct relationship between RPA and TRC ($\beta = .298$) suggests that automation generates fiscal benefits beyond those attributable to faster assessment. A plausible explanation lies in the greater comprehensiveness of

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automated verification. Unlike manual procedures, which typically rely on selective examination, software robots can systematically reconcile declarations across the entire filing population with information maintained in third-party registries. Such verification can identify understated liabilities that would otherwise remain undetected and consequently never enter the assessment queue. This mechanism is therefore conceptually distinct from the speed at which existing cases are processed. The interpretation accords with findings that independently corroborated third-party information increases declared tax liabilities (Naritomi, 2019), alongside evidence that analytically informed targeting improves the effectiveness of tax enforcement resources (Baghdasaryan et al., 2022; Savić et al., 2022).

Partial Mediation and Its Policy Reading (H4)

The decomposition of the total effect constitutes the central empirical contribution of this investigation. With TAS accounting for 54.8% of the overall relationship and the remaining 45.2% operating through the direct pathway, the fiscal consequences of RPA cannot be adequately explained through either administrative efficiency or improved detection alone. This distinction carries important implications for evaluating automation investments. Assessments restricted to staffing reductions or processing-time improvements risk undervaluing the fiscal contribution of RPA because nearly half of its estimated effect is associated with broader verification coverage. Equally, initiatives that expand verification capacity without addressing procedural delays fail to realise the larger component of the potential benefit. The identified mediation structure is also consistent with evidence from electronic taxation research demonstrating that fiscal improvements depend on the operational application of digital systems rather than their availability alone (Mascagni et al., 2021; Night & Bananuka, 2020). These findings additionally require tax administrations to distinguish between the performance indicators associated with each pathway. The mediated mechanism can be monitored through the number of days separating return submission from assessment determination, whereas the direct mechanism can be assessed through the proportion of filed returns subjected to automated matching against third-party records. Reliance exclusively on assessment timeliness would therefore obscure the contribution of expanded verification and potentially encourage insufficient investment in coverage.

Theoretical Implications

The findings contribute to the theoretical literature in three respects. First, they extend technology acceptance and task–technology fit perspectives beyond individual adoption behaviour by demonstrating how technological implementation translates into organisational process capability. Within this framework, the fiscal contribution of public-sector technology emerges through identifiable procedural improvements rather than adoption considered in isolation. Second, the study provides quantitative evidence concerning organisational outcomes, addressing the limited availability of variance-

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based empirical findings within an RPA literature historically dominated by case-oriented investigations in accounting information systems (Plattfaut & Borghoff, 2022). Third, the persistence of a meaningful direct effect establishes an important qualification to efficiency-centred explanations of administrative digitalisation. Although procedural acceleration represents the predominant transmission mechanism, it does not account for the entirety of automation-related fiscal improvements. Theoretical approaches that attribute technological benefits exclusively to efficiency gains are therefore insufficient. These contributions must nevertheless be interpreted within the governance conditions outlined in Section 2.6, since faster administrative determinations produce sustainable fiscal benefits only when they remain legally enforceable and subject to appropriate administrative challenge (Busuioc, 2021).

CONCLUSION, RECOMMENDATIONS AND IMPLICATIONS

Conclusion

This investigation examined whether RPA strengthens TRC and identified the mechanisms through which any such relationship operates. Drawing on survey evidence from 284 taxation and auditing professionals and employing PLS-SEM, the analysis establishes a substantial positive relationship between RPA adoption and TAS (β = .684), a significant association between TAS and TRC (β = .528), and an additional direct contribution of RPA to TRC (β = .298). The mediation results indicate that TAS transmits 54.8% of the total estimated effect (β = .659), confirming complementary partial mediation. The structural model accounts for 46.8% of the variance in TAS and 57.3% in TRC. Collectively, these findings position procedural latency as a consequential fiscal variable rather than a peripheral administrative consideration. The time separating tax return submission from formal determination represents a measurable factor associated with revenue performance and can be addressed through automation without requiring wholesale replacement of existing information systems.

The findings also challenge the assumption that efficiency improvements alone adequately capture the value of public-sector digitalisation. The continued significance of the direct pathway demonstrates that administrative efficiency and enforcement coverage operate as complementary rather than interchangeable sources of fiscal improvement. Automation confined to accelerating existing verification procedures would realise approximately half of the estimated overall benefit, while expanded verification without corresponding reductions in assessment delays would account for the remaining portion. Achieving the complete estimated effect therefore requires implementation strategies that simultaneously improve processing timeliness and extend verification coverage.

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Recommendations

Table 8 converts the empirical findings into actionable recommendations for tax administration. Each proposed intervention is prioritised according to the magnitude of its supporting statistical estimate, providing a basis for sequencing implementation where institutional capacity and resources are constrained.

Table 8: Recommendations Mapped to Empirical Findings

Empirical Finding	Recommended Action	Responsible Level
RPA → TAS is the largest effect in the model ($f^2 = .879$)	Establish a robotics centre of excellence and robotise the reconciliation routines that dominate the critical path of assessment before undertaking core system replacement.	Revenue authority executive
Assessment speed carries 54.8% of the total fiscal effect	Adopt elapsed days from filing to determination as a monitored key performance indicator, reported alongside collection figures rather than separately.	Operations and performance units
A direct effect of $\beta = .298$ persists net of speed	Mandate machine-readable, service-level-bound data exchange with banking, customs and property registries so that verification extends to the whole filing population, not a sample.	Ministry of finance and partner agencies
Automated determinations must be legally enforceable	Legislate statutory recognition of automated assessments and electronic signatures, together with a documented right of challenge and an auditable decision trail.	Legislature and legal directorate
Professionals do not uniformly defer to machine output	Reskill inspectors towards forensic and complex-case work and train them in interpreting and challenging automated exception reports.	Human resources and training

Note: Each recommendation is derived from the corresponding estimate reported in Tables 5 and 6 and discussed in Section 5.

Implications

The findings generate implications for theory, administrative practice and public policy. From a theoretical perspective, they establish the importance of incorporating explicit process-level mediators when examining the organisational consequences of administrative technologies, rather than relying exclusively on direct-effect specifications. By estimating the proportion of the overall relationship transmitted through TAS, the study also provides a quantitative basis for distinguishing the mechanisms underlying technological contributions to fiscal performance. In practical terms, the observed differences in effect sizes offer revenue administrators an empirically supported approach to implementation prioritisation. Reconciliation activities situated along the critical processing path should receive initial attention, as their automation can simultaneously reduce assessment delays and expand verification coverage. At the policy level, effective implementation requires three complementary legislative measures to accompany technological deployment: formal legal recognition

of automated tax determinations and electronic signatures; enforceable arrangements for inter-agency information exchange governed by clearly specified service standards; and an established procedural right to contest automated assessments. These safeguards should be introduced concurrently with automation rather than retrospectively, because administrative legitimacy underpins the legal enforceability upon which the anticipated fiscal benefits depend (Busuioc, 2021; Kuziemski & Misuraca, 2020).

LIMITATIONS AND FUTURE RESEARCH

The interpretation and generalisability of the findings are subject to three principal limitations, each indicating a direction for subsequent investigation. First, the cross-sectional research design permits the identification of structural associations but cannot establish temporal causality. Future longitudinal panel studies incorporating assessment processing times and realised revenue collections before and after RPA implementation would provide a stronger foundation for causal inference. Second, the constructs were assessed through the perceptions of professionals working within tax administration, introducing potential concerns regarding subjective measurement and common method variance. Replication using independently recorded administrative indicators, particularly actual intervals between filing and determination and verified revenue collection figures, would improve external validity while eliminating common method concerns arising from shared perceptual measurement. Third, the evidence originates from a single national administrative setting, limiting the transferability of the estimated relationships to jurisdictions characterised by substantially different legacy information systems or enforcement capabilities. Comparative investigations involving tax authorities at varying stages of digital maturity would therefore help identify the contextual conditions under which the mediated relationship remains applicable.

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