



Digital Tax Administration and Micro, Small and Medium Enterprise Formalization: A Conceptual Synthesis of Electronic Registration, Filing, and Payment Technologies

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Abstract

Transitioning micro, small and medium enterprises (MSMEs) from the informal economy into the formal one is among the more stubborn governance problems facing developing countries. Tax authorities have long struggled to bring informal operators into the system through conventional means, but the spread of digital technology is opening up new routes to formalization. This paper builds a conceptual framework that traces, step by step, how electronic taxpayer registration, electronic filing, and electronic payment relate to one another and to MSME formalization. Drawing on the Technology Acceptance Model, institutional theory, and recent empirical work from sub-Saharan Africa, Asia, and Latin America, it argues that these three digital tax pillars work in sequence and reinforce one another, lowering compliance costs, improving transparency, and helping small enterprises build institutional legitimacy. Electronic registration opens the door to formal status; electronic filing changes how firms behave around compliance by cutting administrative burden; and electronic payment completes the compliance cycle by creating traceable financial records and pulling MSMEs into the formal financial system. The paper's contribution is to bring these separate strands of the tax administration literature together into a single formalization architecture, and to offer revenue authorities practical guidance for broadening their tax base through digital inclusion.

Keywords: Electronic Taxpayer Registration, Electronic Filing, Electronic Payment, MSME Formalization, Digital Tax Administration, Tax Compliance, Developing Countries.

Article Information:

Received: 22 June 2026

Revised: 25 September 2026

Accepted: 3 October 2026

Published: 2026

Vol. 16, No. 1, 2026

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Introduction

Background to the Study

Informality still defines much of the enterprise landscape across the developing world. MSMEs make up the vast majority of business establishments in low and middle-income countries, yet a large share operates outside formal regulatory structures a state of affairs that starves governments of fiscal resources and cuts firms off from credit, legal protection, and public services (International Labour Organization, 2025). Formalizing these enterprises, understood here as the process by which unregistered or partially regulated firms gain legal status, a tax identity, and the capacity to stay compliant over time, has become a central goal of both fiscal policy and private sector development strategy.

Governments have traditionally pursued formalization through regulatory simplification, tighter enforcement, and public information campaigns. The results have been mixed at best, especially where administrative capacity is thin and compliance costs still outweigh what a micro-enterprise can absorb (ICTD, 2025). Against this backdrop, the digitalization of tax administration looks like a genuinely different kind of lever. Over roughly the past two decades, revenue authorities across Africa, Asia, and Latin America have rolled out electronic taxpayer registration, online filing platforms, and digital payment channels, often one at a time, but together amounting

to a digital tax ecosystem capable of reshaping the cost-benefit calculation small firms make about going formal.

None of this is automatic, and it does not run in a straight line. Registering does not guarantee compliance; a filing system can fail if paying through it is still a hassle; and payment technology means little without registration and reporting behind it (ICTD, 2025). Making sense of how these three technological pillars fit together to produce formalization outcomes matters for researchers and practitioners alike, and that is the gap this paper tries to fill: a step-by-step conceptual model tracing the causal and complementary links running from electronic registration, through filing and payment, to formalization itself.

Problem Statement

Despite heavy investment in digital tax infrastructure, formalization rates among MSMEs in many developing countries remain low. In sub-Saharan Africa, informal employment accounts for more than 85 percent of total employment, and tax contributions from small enterprises are correspondingly thin (Arewa & Santoro, 2022). Individual studies have looked at e-filing (Gwaro et al., 2016), e-payment (Saadu & Danmalam, 2025), and digital registration (ICTD, 2024) on their own, but the literature still lacks an integrated account of how these three technologies function as an interdependent system driving formalization. Without that



integration, policymakers risk rolling out fragmented digital reforms that never quite close the loop between initial registration and durable, compliant behavior.

There is a second problem. Much of the existing research treats formalization as binary a firm is either registered or it is not rather than as a gradual process with several administrative touchpoints along the way (ICTD, 2020). That framing hides an important reality: firms may register but never file, or file but never pay, landing in a kind of partial formalization that generates neither revenue for the state nor full legal protection for the firm. This paper sets out to build a more nuanced, process-oriented framework that captures how digital tax technologies depend on one another sequentially, and what that means cumulatively for MSME formalization trajectories.

Research Objectives

The paper's central aim is to build a theoretically grounded, step-by-step conceptual model of how electronic taxpayer registration, electronic filing, and electronic payment jointly shape MSME formalization. More specifically, it sets out to:

1. Conceptualize electronic taxpayer registration as the foundational gateway to MSME formalization and examine how it lowers barriers to entering the formal tax system.
2. Analyze how electronic filing technology mediates the relationship between registration and sustained compliance by reshaping MSMEs' cost structures and administrative capabilities.
3. Evaluate how electronic payment technology closes the formalization loop through traceable transactions, reduced leakages, and integration with the formal financial system.
4. Bring these relationships together into an integrated conceptual framework that accounts for complementarities, sequencing effects, and contextual moderators.

Significance of the Study

This study speaks to several strands of literature at once. For tax administration scholars, it offers an integrated conceptual architecture that goes beyond single-technology studies to look at the systemic properties of digital tax ecosystems. For development economists, it provides a mechanism-based account of how digitalization can catalyze the shift out of informality, with implications for fiscal capacity building (Ali et al., 2021). And for policymakers, the framework's message is that isolated digital interventions e-filing rolled out without matching e-payment integration, for instance are unlikely to be enough on their own; sequencing and interoperability across systems matter just as much as adopting any single technology.

Conceptual Clarifications

Electronic Taxpayer Registration

Electronic taxpayer registration is the digitization of the process by which individuals and enterprises obtain a unique tax identification number (TIN) and get entered into a revenue authority's database. Implementations range from simple web portals and mobile apps to systems that pull data directly from national ID databases and business registries (ICTD, 2024). Uganda's revenue authority, for example, runs an "Instant TIN" interface that draws third-party data from the National Identification and Registration Authority, which has sharply cut the time and paperwork needed for initial enrolment (ICTD, 2024). South Africa's revenue service goes further still, allowing registration through e-Filing, USSD codes, and WhatsApp part of a broader shift toward multi-channel digital onboarding (South African Revenue Service, 2025).

What makes electronic registration matter for MSMEs is its capacity to remove the physical barriers distance from tax offices, bureaucratic middlemen, mountains of paperwork that

have historically kept informal operators from formalizing in the first place. When registration shrinks from a days-long ordeal to something that takes minutes, it changes the entry calculus for micro-enterprises running on thin margins with little administrative capacity to spare (International Labour Organization, 2025).

Electronic Filing Technology

Electronic filing, or e-filing, covers the digital platforms through which taxpayers submit periodic returns, declarations, and supporting documents to revenue authorities. These have moved well beyond simple document-upload portals; modern systems pre-populate returns, check for errors automatically, validate against third-party data in real time, and connect with electronic invoicing systems (Hesami et al., 2024). Tanzania's upgraded VAT e-filing system, introduced in 2022, automatically cross-checks electronic fiscal device receipts against tax invoices, taking a good deal of manual data entry off taxpayers' hands (Ernst & Young, 2022).

For MSMEs, e-filing addresses what Evans and Tran-Nam (2020) describe as a core constraint: small enterprises bear a disproportionate compliance-cost burden relative to their turnover. By simplifying return preparation, cutting down on calculation errors, and doing away with physical submission altogether, e-filing lowers both the money and the time compliance demand. There is also a subtler effect: because digital filing gives the taxpayer and authority access to the same records, it can shift the psychological tenor of compliance away from adversarialism and toward something closer to trust (Night & Bananuka, 2020).

Electronic Payment Technology

Electronic payment technology covers the digital channels taxpayers use to remit what they owe internet banking transfers, mobile money, point-of-sale terminals, and dedicated tax payment apps (Arewa & Santoro, 2022). Mobile money's spread across sub-Saharan Africa has been especially consequential here, opening up person-to-government (P2G) payments that sidestep traditional banking infrastructure and cut down on the risks of handling cash (Mascagni et al., 2024). Nigeria's Federal Inland Revenue Service takes payment via credit cards, debit cards, and mobile platforms, while Rwanda's revenue authority has woven mobile money deeply into its collection architecture (Saadu & Danmalam, 2025).

E-payment's significance for formalization runs deeper than convenience. Digital payments leave traceable records that do double duty: they give revenue authorities an audit trail that curbs underreporting, and they give MSMEs a documented financial history that opens doors to formal credit (Arewa & Santoro, 2022). That financial footprint is arguably the critical bridge connecting tax compliance to the broader project of economic formalization.

MSME Formalization

This paper treats MSME formalization as a multi-dimensional process rather than a single event. Following recent tax administration research, formalization is taken to encompass legal registration with the relevant authorities, acquisition of a tax identification and entry into revenue databases, sustained compliance with filing obligations, and regular remittance of tax liabilities (ICTD, 2020; International Labour Organization, 2025). A firm can achieve partial formalization by registering without filing, or filing without paying full formalization requires all four dimensions to hold together.

A terminological distinction is worth making explicit here. Tax identity and legal status are related but not interchangeable: acquiring a taxpayer identification number establishes a firm's standing with the revenue authority, but it does not by itself confer the broader business registration, licensing, or corporate



legal status that some jurisdictions require for full legal recognition. Many MSMEs obtain a tax identification number without ever completing general business registration, and the reverse also occurs. Treating the two as synonymous risks overstating how far electronic registration alone carries a firm toward formalization; the framework that follows treats tax identity as one necessary but not sufficient component of the four-dimensional formalization construct.

This process-based view matters because different technologies act on different stages of formalization. Electronic registration mainly affects entry; e-filing shapes ongoing compliance behavior; e-payment governs finalization and the traceability of compliant status. Properly sequenced and integrated, these technologies are hypothesized to produce more durable formalization than any one of them could achieve alone.

Theoretical Framework

Technology Acceptance Model

The Technology Acceptance Model (TAM), developed by Davis (1989), supplies the paper's main theoretical lens for understanding why MSMEs adopt or don't adopt digital tax technologies. TAM holds that two beliefs drive adoption: perceived usefulness, or how much a user thinks a system will improve their performance, and perceived ease of use, or how effortless they expect using it to be. These beliefs shape attitudes, which in turn shape intentions and, eventually, actual behavior.

TAM has been applied repeatedly to explain how taxpayers come to accept e-filing systems (Night & Bananuka, 2020; Kimea et al., 2019). Night and Bananuka (2020), for instance, showed that attitude toward electronic tax systems has a significant bearing on tax compliance among small enterprises, with system adoption mediating that relationship. For an MSME, perceived usefulness might show up as time saved, fewer errors, or penalties avoided, while perceived ease of use hinges on interface design, digital literacy, and whether technical support is actually available (Che-Azmi & Kamarulzaman, 2014).

TAM is especially useful for understanding the path from registration to formalization because it explains why some MSMEs take up digital tax tools readily while others resist them even when the benefits seem obvious. Resistance can stem from low digital literacy, distrust of government systems, or a sense that the tool is more complicated than it's worth (Lai & Choong, 2010). In other words, formalization outcomes hinge not just on whether the technology exists, but on how MSMEs weigh its costs and benefits in their own minds.

Institutional Theory

Institutional theory rounds out TAM by placing individual adoption decisions within a wider normative and regulatory context. From this angle, MSME formalization is not purely a rational cost-benefit exercise but a bid for legitimacy within a formal institutional framework (Hodgson, 1998). Digital tax technologies act as institutional signals they communicate state capacity, set predictable rules of engagement, and generate isomorphic pressure toward compliance.

Manalu et al. (2021) found that isomorphic pressures coercive, mimetic, and normative significantly shape SME tax compliance alongside e-tax system adoption. When a revenue authority builds a system that is professional and reliable, it signals institutional competence in a way that can build taxpayer trust and encourage voluntary compliance (Fossung & Warah, 2022). The reverse holds too: systems plagued by downtime, data loss, or security breaches can erode legitimacy and push informal operators further away from formalizing (Salawu et al., 2024).

Open Innovation and Digital Financial Integration

The open innovation perspective, borrowed from Chesbrough (2003) and applied to tax administration by Saadu and Danmalam (2025), holds that effective e-payment systems depend on collaboration among revenue authorities, financial institutions, and technology providers. Rather than treating tax payment as a closed, two-party transaction between taxpayer and state, this view frames it as an ecosystem service that relies on external partnerships and interoperable platforms.

This helps explain why e-payment technologies can act as particularly strong formalization catalysts: they more or less require MSMEs to build a relationship with a formal financial service provider, whether a bank or a mobile money operator. Those relationships then generate the financial documentation and credit history that make further formal-sector integration possible. Seen this way, the payment stage is not just a compliance act it is a gateway into broader financial formalization (Arewa & Santoro, 2022).

Integrating TAM and Institutional Theory: A Behavioral Transition Mechanism

The theoretical frameworks reviewed above are typically invoked stage by stage TAM to explain e-filing adoption, institutional theory to explain compliance legitimacy rather than used to explain why passing through one digital stage changes the probability that a firm advances to the next. Closing that gap requires specifying the internal state that each stage alters, not just the external behavior it produces.

At the registration stage, the relevant internal state is the entrepreneur's assessment of state coercive capacity and exposure risk, not merely the technical ease of the enrolment interface. Formalization theory in the institutionalist tradition treats visibility to the state as a cost as well as a benefit: an unregistered firm is invisible to enforcement, and that invisibility is itself a form of protection for an operator with thin margins (Hodgson, 1998). Electronic registration lowers the transactional cost of entry, but TAM's perceived usefulness construct only turns positive once the entrepreneur believes that visibility will be rewarded rather than punished. This is why a low-friction interface does not guarantee follow-through: reducing the cost of Step 1 does nothing to change the entrepreneur's belief about what Step 2 will expose them to. The dormant-register pattern documented by ICTD (2025) is consistent with this reading firms complete an act that costs little and carries a legitimacy benefit (a TIN can be presented to a bank or supplier) while withholding the behavior, filing, that carries ongoing exposure. Registration completion and filing initiation are therefore governed by different cost-benefit calculations, and a framework that treats them as points on a single continuous incentive gradient will mispredict the transition.

The transition from filing to payment turns on a related but distinct mechanism: procedural fairness. TAM's perceived ease of use construct explains whether a firm can file; it does not explain whether a firm that can file chooses to remit the full amount owed rather than filing a return that under-reports liability, a strategic response consistent with patterns noted in the compliance studies reviewed above (Kimea et al., 2019; Salawu et al., 2024). What appears to move firms from filing to full remittance is less the technical usability of the payment channel than a belief that the amount assessed is fair and that the revenue authority will use the resulting financial visibility for revenue collection rather than for arbitrary or predatory enforcement. This is an institutional-legitimacy judgment layered on top of a technology-acceptance judgment, and the two operate on different timescales: perceived ease of use can shift within a single system upgrade, while institutional trust accumulates or erodes across repeated interactions.

This layering also resolves the circularity that arises when trust is treated simultaneously as a precondition for technology

adoption and as a consequence of it. The two are not the same construct measured twice; they are sequential. A baseline level of institutional trust, formed prior to any interaction with a specific digital system and shaped by an MSME owner's general experience of the state, functions as a moderator that raises or lowers the initial willingness to engage with electronic registration and filing. Once engagement begins, each transparent, correctly processed transaction, a return that is not queried without cause, a payment that is credited and reflected accurately, generates a second, distinct quantity: accumulated institutional legitimacy, which reinforces continued compliance and raises the ceiling on how far a firm will progress through the registration-filing-payment sequence. Baseline trust is an input moderator; accumulated legitimacy is an output of sustained digital interaction that feeds forward into subsequent stages rather than backward into the same one. Distinguishing the two removes the feedback loop from the causal chain: technology does not build the same trust that enabled its own adoption; it builds a different, cumulative form of legitimacy that lowers resistance to the stages that follow.

Read together, these three transition mechanisms exposure-risk recalculation at the registration-to-filing boundary, procedural fairness judgment at the filing-to-payment boundary, and the trust/legitimacy sequence running underneath both, give the sequential model a behavioral engine rather than an administrative one. They also explain why the sequence is not strictly linear in practice: an MSME can rationally complete Step 1 while indefinitely delaying Step 2 if its exposure-risk assessment does not improve, or complete Step 2 in a strategically partial form (filing without full disclosure) if its procedural-fairness judgment remains negative even while its ease-of-use judgment turns positive. Section 3.2 formalizes these dynamics as testable propositions, and Section 3.4 addresses how they vary across MSME size and orientation.

Empirical Literature Review

Electronic Taxpayer Registration and Formalization Entry

The evidence on what digital registration does for formalization is still emerging, but it looks promising. ICTD's (2024) study of Uganda's Instant TIN system found that data sharing between the revenue authority and the national identification bureau meaningfully improved registration data quality and sped up enrollment. But the same study noted that registration on its own does not guarantee follow through a pattern ICTD (2025) also found across several African contexts, where digital ID integration widened tax registers without necessarily waking up dormant taxpayers.

The International Labour Organization (2025) pulled together global evidence on simplified registration regimes and concluded that streamlined digital onboarding Benin's GUFÉ platform, Colombia's VUE system, and India's Udyam framework are the examples it cites can meaningfully lower entry barriers for micro-enterprises. These regimes map out initial requirements, attach tangible benefits such as property registration or bank account opening, and embed everything in automated, low-friction procedures. Even so, the ILO cautioned that simplified registration needs to be paired with perceived benefits and continued engagement, or it risks becoming a hollow formalization gesture.

Research on business registration reform in Latin America adds a further wrinkle. Field experiments in Brazil and Mexico suggest that simplifying registration procedures boosts new firm creation but does relatively little to formalize existing informal enterprises unless it comes paired with enforcement or substantial subsidies (IZA World of Labor, 2014). Electronic registration, in other words, works best as one piece of a broader formalization strategy, not as a standalone fix.

Electronic Filing and MSME Compliance Behavior

The empirical base on e-filing and SME compliance is comparatively deep. Gwaro et al. (2016) studied online tax filing among SMEs in Nakuru, Kenya, and found a positive relationship between e-filing adoption and compliance behavior, which they attributed to lighter administrative burden, better record-keeping, and fewer face-to-face interactions with tax officials' interactions that had previously carried a reputation for harassment and corruption.

In Cameroon, Fossung and Warah (2022) looked at tax digitalization and compliance and identified behavioral intentions as a key mediating factor. Their findings suggest e-filing shapes compliance not just through technical efficiency but by changing how taxpayers relate psychologically to the revenue authority: when MSMEs see digital filing as transparent and fair, their intrinsic motivation to comply rises a pattern consistent with the broader tax morale literature (Andreoni et al., 1998).

Kimea et al. (2019) used TAM to study taxpayers' intentions to use e-filing in Tanzania, controlling for self-selection endogeneity, and found that performance expectancy, social influence, and risk perceptions all shape adoption intentions significantly. Risk perception worries about data security and system reliability stood out as a notable barrier, which suggests e-filing's formalization potential rests heavily on system quality and trust.

Manalu et al. (2021) examined Indonesian SMEs and found that attitude toward e-tax systems, system adoption, and trust in tax authorities all shape compliance together. Trust emerged as a particularly important moderator: even a well-designed, user-friendly e-filing system may fail to move the needle on compliance if taxpayers doubt the revenue authority's intentions or competence underscoring, once again, the institutional dimension of technology adoption.

Salawu et al. (2024) looked at e-filing adoption among SMEs in Lagos State and found moderate uptake around 58 percent alongside real obstacles: inadequate training, server downtime, network instability. Their conclusion was that while e-filing does help compliance, realizing that potential requires sustained investment in infrastructure, user education, and technical support, factors that technology-centric policy design tends to overlook.

Electronic Payment, Revenue Collection, and Financial Traceability

The literature on electronic tax payment points consistently to strong positive effects on revenue and compliance, mediated by transparency and reduced leakage. Saadu and Danmalam (2025) studied e-payment's effect on Federal Inland Revenue Service collections in Nigeria and found a statistically significant positive relationship, arguing that electronic payment channels block the revenue leakage tied to cash handling, cut down on corruption opportunities, and improve the reliability of collection data.

Mukuwa and Phiri (2020) looked at e-services and tax compliance among Zambian SMEs and reported meaningful revenue growth and improved compliance after digital services were rolled out. Their analysis found that SMEs saw lower compliance costs and greater certainty about payment receipt once they moved to electronic channels.

Mobile money's role in tax collection has drawn particular attention. A large study spanning 97 emerging and developing countries found that mobile money adoption is linked to significant increases in non-resource tax revenue, with person-to-government payments, bill payments, and merchant transactions carrying the strongest effects (Mascagni et al., 2024). The study pointed to three mechanisms behind this: greater transparency and accountability that curb corruption, formalization of informal firms that widens the tax base, and higher VAT collection driven by remittance-fueled consumption. Of the three digital pillars, e-payment may be the most direct

formalization catalyst, since it inherently produces the financial records that separate formal operation from informal.

Arewa and Santoro (2022) reviewed digital tax payment systems across low- and middle-income countries and found that the successful ones tend to use multi-channel architectures built to accommodate different levels of digital literacy and infrastructure access. Payment system design, they argue, has to account for how varied MSMEs actually are from micro-enterprises with nothing but a basic mobile phone to small firms running sophisticated accounting software.

Integrated Digital Tax Administration and MSME Formalization

Studies of individual technologies are plentiful; studies that look at registration, filing, and payment as an integrated system are not. Kagasi (2025) tested a model of tax compliance as a function of electronic registration, filing, and payment technology among Nairobi SMEs, finding that all three predicted compliances significantly, with electronic payment technology accounting for the largest share of variance at 32.5 percent. That empirical architecture lines up closely with the conceptual framework developed here, and offers some preliminary validation for the integrated approach.

He and Yi (2023) studied tax administration digitalization and corporate performance in China and found that digital transformation improves compliance and eases tax-related administrative burdens. Their sample skews toward larger firms, but the broader pattern — economy-wide compliance gains from digital tax ecosystems that spill over to smaller firms through competitive and institutional pressure is suggestive.

Hesami et al. (2024) carried out a systematic review of digital tax transformation, focused on e-invoicing and prefilled returns, and concluded that digitalization's compliance benefits are largest when systems are integrated across the whole tax lifecycle — from the moment a transaction is captured through reporting to payment rather than scattered across separate, unconnected platforms. That insight about integration sits at the heart of the framework developed in this paper.

Mascagni, Mengistu, and Woldeyes (2021) offered experimental evidence from Ethiopia showing that ICT-based compliance interventions can substantially improve filing and payment behavior among firms that previously were not compliant, though the effect depends on a firm's baseline compliance capacity suggesting digital tools work best for firms already sitting near the margin of formalization.

Conceptual Framework Development

The Sequential Logic of Digital Formalization

Building on the theory and evidence reviewed above, this paper proposes that electronic taxpayer registration, electronic filing, and electronic payment operate as sequential, complementary mechanisms in the MSME formalization process. The logic runs as follows.

Step 1: Electronic Taxpayer Registration as the Gateway

Formalization cannot begin without entry into the tax system, and electronic registration is what lowers the structural, temporal, and psychological barriers that have historically kept informal MSMEs from acquiring legal status. Once registration is digitized and tied into national ID systems, business registries, and social security databases, it stops being a discretionary, high-cost administrative act and becomes something closer to a near-automatic step in setting up a business (ICTD, 2024).

This gateway function works through three channels. It cuts costs by removing the travel, intermediary fees, and repeat office visits that fall disproportionately on micro-enterprises (International Labour Organization, 2025). It compresses time, turning what used to take days or weeks into minutes and

reducing the opportunity cost for entrepreneurs operating on subsistence margins. And it confers legitimacy: a digital tax identification number gives a business a recognizable legal identity that eases transactions with banks, suppliers, and government contractors.

Registration by itself, though, is weak formalization. ICTD (2025) observes that many African revenue authorities have grown their taxpayer registers substantially through digital ID integration without seeing matching revenue growth, simply because registered firms stay inactive or non-compliant. The gateway needs to be followed by something that sustains and activates that formal status.

This is not simply a matter of insufficient follow-up; Section 2.2.4 develops the underlying mechanism in more detail. Registration completion and filing initiation rest on different cost-benefit calculations: a low-cost entry transaction that yields a visible legitimacy benefit (a TIN) is not evidence that the entrepreneur's assessment of ongoing state exposure has shifted, and it is that exposure assessment, not the ease of the registration interface, that governs the move to Step 2.

Step 2: Electronic Filing Technology as the Compliance Engine

Once a firm is registered, it faces the ongoing burden of periodic filing historically a major reason informal operators avoid compliance altogether or comply only partially. Electronic filing technology functions as the compliance engine, turning filing from a complex, error-prone, sometimes adversarial process into something streamlined, transparent, and self-directed.

This works through four channels. It reduces administrative burden, since pre-populated returns, automatic calculations, and electronic record retrieval remove the manual paperwork that costs small firms disproportionately more than large ones (Evans & Tran-Nam, 2020). It minimizes errors, because real-time validation and automatic checking cut the risk of incorrect filings that trigger penalties, audits, and disputes. It regularizes timing, since reminder functions and clear deadlines improve the punctuality of filing and head off the kind of arrears that often push firms back into informality. And it enhances transparency, because digital filing gives taxpayer and authority a shared, visible record, which narrows the information gap and limits room for arbitrary enforcement (Night & Bananuka, 2020).

TAM would predict that these benefits raise perceived usefulness and ease of use, which then reinforces positive attitudes toward compliance and increases the odds of sustained formal behavior (Davis, 1989). But TAM also implies the reverse is true: an e-filing system that is poorly designed, unreliable, or under-supported will erode perceived ease of use and can push MSMEs back toward informal non-compliance (Lai & Choong, 2010; Salawu et al., 2024).

Step 3: Electronic Payment Technology as the Formalization Finalizer

Filing without payment is hollow compliance. Electronic payment technology is what closes the loop between declaring a liability and actually remitting it, while at the same time generating the traceable financial records that separate formal economic activity from informal.

This finalizer function works through five channels. It eliminates leakage, since digital payments bypass cash handling and manual receipting and reduce the room for embezzlement, corruption, and revenue diversion (Saadu & Danmalam, 2025). It creates traceability, because every electronic payment leaves a digital footprint that serves as auditable evidence of compliance and strengthens the credibility of an MSME's financial statements. It drives financial integration, since e-payment channels typically require an MSME to hold an account with a formal financial institution, pulling it into the regulated financial

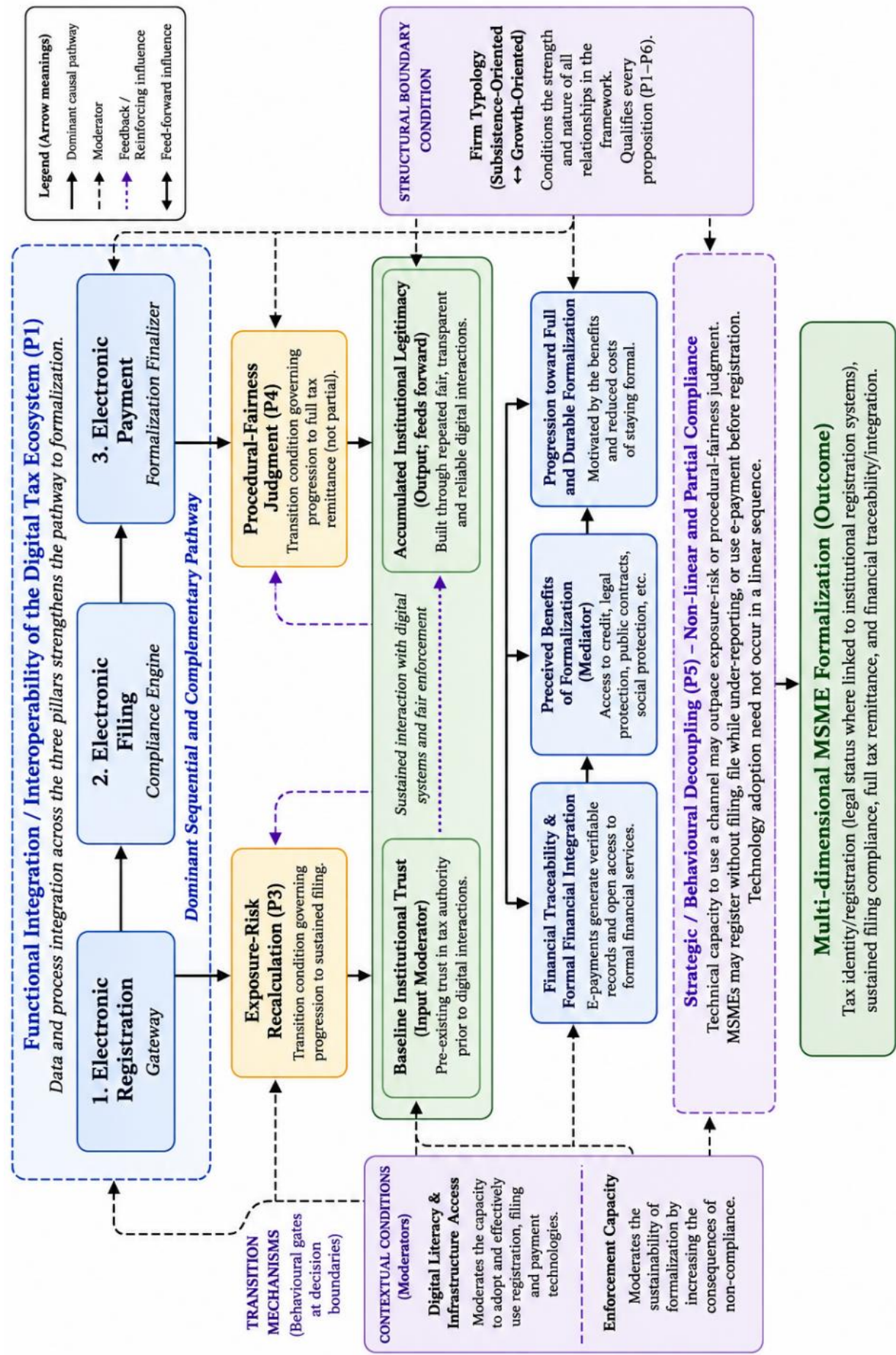


Figure 1. Conceptual framework linking digital tax technologies, behavioral transition mechanisms, moderators and boundary conditions, and MSME formalization outcomes

sector and opening a path to credit (Arewa & Santoro, 2022). It adds convenience and certainty, as mobile money and internet banking allow payment from anywhere with immediate confirmation, removing the delay and uncertainty of physical remittance. And it feeds back into transparency: when MSMEs see their payments recorded and credited properly, their trust in the revenue authority grows, which reinforces voluntary compliance (Fossung & Warah, 2022).

The mobile money literature offers particularly strong support for this finalizer mechanism. Mascagni et al. (2024) found that mobile money adoption significantly raises tax revenue precisely by formalizing informal firms because digital transactions generate the financial records that make staying informal less viable and formal compliance more attractive. The payment stage, in this sense, is the point where formalization stops being an administrative status and becomes a behavioral reality.

It is worth being explicit that this sequence describes the dominant behavioral pathway, not a deterministic one. MSMEs can and do behave non-linearly within it: an operator may adopt e-payment for informal levies or supplier transactions well before registering with the tax authority, or may file electronically while under-reporting turnover to minimize assessed liability. The framework accommodates these patterns rather than assuming them away. Strategic or partial compliance of this kind is, on the account developed in Section 2.2.4, precisely what should be expected when a firm's exposure-risk or procedural-fairness judgment lags behind its technical capacity to use a given channel; the technology and the underlying behavioral judgment can decouple at any stage. Proposition 5 in Section 3.2 states this decoupling condition explicitly.

Formal Theoretical Propositions

The behavioral mechanisms developed in Section 2.2.4, together with the sequential and complementary logic set out above, can be restated as a set of testable propositions. These are offered as a basis for future empirical operationalization rather than as findings of this conceptual synthesis.

Proposition 1 (Complementarity): The positive effect of electronic taxpayer registration on durable MSME formalization is positively moderated by the functional integration of e-filing platforms; registration without integrated filing infrastructure will produce registry growth without a corresponding rise in filing compliance.

Proposition 2 (Financial Traceability Mechanism): Electronic payment technology exerts a stronger direct effect on full formalization than electronic registration, because it functions as a bridge to formal financial services (credit access) rather than merely as a remittance channel.

Proposition 3 (Exposure-Risk Recalculation): The effect of electronic registration on subsequent e-filing uptake is mediated by the entrepreneur's perceived change in state coercive exposure, not by the technical ease of the registration interface; where perceived exposure risk remains unchanged or increases, registration will not predict filing uptake even when interface usability is high.

Proposition 4 (Procedural Fairness): The effect of e-filing adoption on full, rather than partial or under-reported, tax remittance is mediated by the firm's judgment of procedural fairness in assessment, independent of the system's perceived ease of use.

Proposition 5 (Strategic Decoupling): MSMEs will adopt digital tax technologies in a non-linear or partial sequence (for example, e-payment prior to registration, or e-filing paired with

under-reporting) when technical capacity to use a channel outpaces the firm's underlying exposure-risk or procedural-fairness judgment for that channel.

Proposition 6 (Trust-Legitimacy Sequencing): Institutional trust functions as an input moderator prior to a firm's first digital tax interaction, and as a reinforcing outcome, accumulated legitimacy, of sustained digital interaction thereafter; the two effects are sequential rather than concurrent and should be modeled as distinct constructs in empirical tests.

Complementarities and Systems Effects

These three technologies are not simply sequential; they are complementary. A revenue authority that rolls out e-filing without e-payment leaves MSMEs to complete the compliance loop through cumbersome physical channels, which undercuts whatever administrative gains digital filing produced. The reverse also holds: e-payment without a solid registration and filing infrastructure behind it risks channeling informal payments through digital platforms without generating matching compliance records a scenario that might improve revenue traceability but stops well short of full formalization (ICTD, 2025).

From a systems perspective, formalization outcomes end up depending on the weakest link in the digital chain. Seamless registration paired with burdensome filing tends to produce firms that register and then drift into non-compliance. Streamlined filing paired with unreliable payment tends to produce firms that file but fail to remit, racking up arrears and penalties that push them back toward informality. Only when all three stages are digitally integrated when data flows automatically from registration to filing to payment and back again does the full formalization potential of digital tax administration come through (Hesami et al., 2024).

MSME Heterogeneity and Boundary Conditions

The framework developed above has so far treated MSMEs as a single analytical category moving through a common pipeline. That simplification does useful work for exposition, but it understates how differently subsistence-oriented microenterprises and growth-oriented small and medium enterprises are likely to respond to the same digital tax technology (Kasasbeh, 2021).

Subsistence-oriented microenterprises typically operate at thin margins with limited prospects of accessing formal credit, public contracts, or supplier financing in the near term, so the financial-traceability benefit central to Proposition 2 carries little weight in their cost-benefit calculation; for these firms, exposure-risk and procedural-fairness judgments (Propositions 3 and 4) are likely to dominate, and the strategic decoupling described in Proposition 5, adopting e-payment for convenience while avoiding full e-filing disclosure, should be most pronounced in this segment. Growth-oriented SMEs, by contrast, have more to gain from the credit-access channel identified in Proposition 2, since full formalization opens contracts, credit lines, and supplier relationships that are unavailable to informal operators; these firms should progress through the full registration-filing-payment sequence more reliably and with a shorter lag between stages.

Treated as a structural boundary condition rather than a residual control variable, firm typology qualifies every proposition in Section 3.2: Propositions 1 through 6 should be read as holding most strongly for growth-oriented firms and least reliably for subsistence operators, for whom the perceived benefits of formalization (International Labour Organization, 2025) may never outweigh the perceived exposure risk regardless of how well-designed the digital infrastructure is. Future empirical work applying this framework should therefore

stratify by firm size and orientation rather than pooling MSMEs into a single compliance model.

Moderating and Mediating Variables

The framework also accounts for several factors that shape, strengthen, or dampen the relationship between digital tax technologies and formalization.

Digital literacy and infrastructure access are primary moderators. MSMEs operating where internet connectivity is patchy, electricity unreliable, or smartphone penetration low will struggle to use digital tax tools no matter how useful those tools are in principle (Salawu et al., 2024; Arewa & Santoro, 2022). Entrepreneurs with limited digital skills, similarly, may find e-filing and e-payment intimidating or overly complex, which dampens both adoption and compliance (Kimea et al., 2019).

Trust in tax authorities moderates, and over time is also reshaped by, the relationship between technology and compliance; the framework treats these as two distinct effects rather than a single circular one (see Section 2.2.4). A baseline level of trust, formed before any interaction with a specific digital system, functions as an input moderator: both Manalu et al. (2021) and Fossung and Warah (2022) found that this prior trust shapes whether technology adoption translates into compliant behavior, and where a revenue authority is seen as corrupt, arbitrary, or incompetent, MSMEs may resist digital tools even when those tools are technically superior to the manual alternative. Separately, sustained, transparent digital interaction generates accumulated institutional legitimacy as an output that feeds forward into later stages of the formalization sequence rather than looping back to re-explain the adoption decision that produced it.

Enforcement capacity moderates how sustainable formalization turns out to be. The IZA *World of Labor* (2014) review makes the point that simplified registration and digital tools may draw more firms into formality at the entry stage, but without credible enforcement behind them, many of those firms will register and never go on to file or pay. Digital systems do strengthen enforcement capacity by generating data useful for risk-based auditing, but only if that potential is actively put to use through compliance risk management (ICTD, 2025).

Perceived benefits of formalization play a mediating role too. The International Labour Organization (2025) notes that MSMEs are more likely to stay formal when they see tangible benefits — access to credit, legal protection, public contracts, social protection rather than experiencing formalization as pure cost. Digital tax technologies bundled with broader business development services are therefore likely to outperform standalone tax tools.

Discussion

Synthesis of Relationships

The framework developed here suggests that MSME formalization through digital tax administration is best understood as a staged process, with distinct technologies addressing distinct barriers along the way. Electronic registration deals with the entry barrier; electronic filing deals with the ongoing burden of compliance; electronic payment deals with finalization and traceability. Each stage matters, but none is sufficient on its own together, they form a coherent digital formalization architecture.

This staged view also resolves something that looks like a puzzle in the empirical literature: why digital tax reforms sometimes expand the tax register without growing revenue, or grow revenue without doing much for enterprise development. The answer is partial implementation. Digitize registration without matching filing and payment integration, and the register grows while compliance stays dormant. Digitize filing without payment, and declaration behavior improves while remittance still lags. It is only full lifecycle digitalization that

produces the cumulative formalization outcomes policymakers are actually after.

Beyond its practical synthesis, the framework makes a specific theoretical move relative to TAM and institutional theory as conventionally applied in this domain. Standard applications treat TAM as governing the adoption decision for a single system and institutional theory as governing the legitimacy of a single relationship between taxpayer and state. The account developed in Section 2.2.4 instead nests these constructs at successive decision points within one compliance trajectory: exposure-risk recalculation governing the registration-to-filing transition, procedural-fairness judgment governing the filing-to-payment transition, and a trust-to-legitimacy sequence running beneath both. This reframes formalization not as a single technology-acceptance event but as a chain of acceptance decisions, each conditioned by the institutional residue of the one before it. That reframing is the paper's principal theoretical contribution, and Section 3.2's propositions make it directly testable.

Implications for Tax Administration Policy

The framework carries several practical implications for revenue authorities in developing countries. Sequencing matters: registration digitization should be followed promptly by filing and payment digitization, so that dormant registrants do not pile up. Integration matters: data architecture needs to let information flow seamlessly across registration, filing, and payment systems, rather than sitting in the kind of silos ICTD (2025) identifies as a major barrier to effective digitalization. Adoption support matters: perceived ease of use depends not just on interface design but on training, helpdesk support, and taxpayer education that address digital literacy gaps among MSME operators (Salawu et al., 2024; Mwesiga & Twamzihirwa, 2024).

Trust-building matters just as much: technology cannot substitute for institutional legitimacy. Revenue authorities need to pair digitalization with transparent service delivery, responsive dispute resolution, and a credible commitment to using digital data fairly rather than as a tool for predatory enforcement (Manalu et al., 2021). And ecosystem thinking matters: integrating e-payment with mobile money operators and banks should be treated not merely as a collection convenience but as a deliberate strategy for pulling MSMEs into the formal financial system (Arewa & Santoro, 2022).

Limitations and Future Research Directions

The framework has several limitations worth flagging. It draws mainly on evidence from sub-Saharan Africa and selected Asian and Latin American contexts, so how well it travels to other developing regions is still an open question. It also treats MSMEs as a fairly homogeneous category, when in practice microenterprises, small firms, and medium-sized enterprises face quite different barriers and adopt technology in different ways (Kasasbeh, 2021). And it leans heavily on supply-side technology provision while saying comparatively little about demand-side factors such as entrepreneurial orientation, sector characteristics, or competitive pressure, all of which likely shape formalization decisions too (Musah et al., 2026).

Future work should put this framework, and the six propositions advanced in Section 3.2 specifically, to an empirical test. Priority should go to research designs capable of separating the exposure-risk mechanism (Proposition 3) from the procedural-fairness mechanism (Proposition 4), since both can produce the same observed outcome, filing without full remittance, through different causal routes; longitudinal studies that track individual MSMEs across the registration, filing, and payment stages, ideally paired with survey measures of perceived exposure and perceived fairness at each transition, would allow the two to be distinguished. Experimental or quasi-



experimental designs that exploit staggered digital reforms across jurisdictions remain valuable for testing the complementarity claim in Proposition 1, and studies stratified by firm typology are needed to test whether Proposition 6's heterogeneity claim holds. Qualitative work on how MSME owners actually interpret and experience these technologies would help validate the cognitive constructs the propositions assume rather than infer them solely from behavioral proxies.

Conclusion

Formalizing MSMEs is a critical frontier for fiscal development and inclusive growth in emerging economies. This paper has developed a step-by-step conceptual framework showing that electronic taxpayer registration, electronic filing, and electronic payment function as sequential, complementary mechanisms in the digital formalization process registration as the gateway, filing as the compliance engine, payment as the finalizer. Integrated into a coherent digital tax ecosystem and backed by adequate infrastructure, trust-building, and enforcement capacity, these technologies can substantially lower the barriers that have long kept small enterprises confined to informal status.

That said, the framework is not an argument for technological determinism. Digitalization on its own cannot fix weak institutions, low digital literacy, or a lack of trust between taxpayers and revenue authorities. Digital tax technologies reach their full formalization potential only as part of broader administrative reform one that addresses data quality, systems integration, compliance risk management, and taxpayer service together. For scholars and practitioners working to expand the formal economic base, the task is clear: build digital tax architectures that are not just technologically advanced, but institutionally coherent and genuinely accessible.

References

- Ali, M., Shifa, A. B., Shimeles, A., & Woldeyes, F. (2021). Building fiscal capacity in developing countries: Evidence on the role of information technology. *National Tax Journal*, 74(3), 563–588. <https://doi.org/10.17310/ntj.2021.3.02>
- Andreoni, J., Erard, B., & Feinstein, J. (1998). Tax compliance. *Journal of Economic Literature*, 36(2), 818–860.
- Arewa, M., & Santoro, F. (2022). An introduction to digital tax payment systems in low-and middle-income countries (ICTD Working Paper No. 152). Institute of Development Studies. <https://doi.org/10.19088/ICTD.2022.019>
- Awasthi, R., Lee, H. C., Poulin, P., Choi, J. G., Kim, W. C., Lee, O. J., Sung, M. J., & Chang, S. Y. (2019). *The benefits of electronic tax administration in developing economies: A Korean case study and discussion of key challenges* (Research Paper). World Bank and KDI School of Public Policy and Management.
- Bird, R. M. (2015). Improving tax administration in developing countries. *Journal of Tax Administration*, 1(1), 1–28.
- Che-Azmi, A. A., & Kamarulzaman, Y. (2014). Adoption of tax e-filing: A conceptual paper. *African Journal of Business Management*, 10(1), 599–603.
- Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business School Press.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319–340. <https://doi.org/10.2307/249008>
- Ernst & Young. (2022, February 11). Tanzania Revenue Authority upgrades VAT electronic filing system. EY Tax News Update. <https://taxnews.ey.com/news/2022-0246-tanzania-revenue-authority-upgrades-vat-electronic-filing-system>
- Evans, C., & Tran-Nam, B. (2020). Tax compliance costs and digitalisation: Implications for SMEs. *Australian Tax Forum*, 35(2), 145–168.
- Fossung, M. F., & Warah, C. N. (2022). An assessment of tax digitalisation and tax compliance relationship in Cameroon: The mediating role of behavioural intentions. *Journal of Finance and Accounting*, 10(1), 30–43. <https://doi.org/10.11648/j.f.a.20221001.14>
- Gwaro, O. T., Maina, K., & Kwasira, J. (2016). Influence of online tax filing on tax compliance among small and medium enterprises in Nakuru town, Kenya. *IOSR Journal of Business and Management*, 18(10), 82–92. <https://doi.org/10.9790/487X-1810028292>
- He, Y., & Yi, Y. (2023). Digitalization of tax administration and corporate performance: Evidence from China. *International Review of Financial Analysis*, 90, 102859. <https://doi.org/10.1016/j.irfa.2023.102859>
- Hesami, S., Jenkins, H., & Jenkins, G. P. (2024). Digital transformation of tax administration and compliance: A systematic literature review on e-invoicing and prefilled returns. *Digital Government: Research and Practice*, 5(3), Article 3643687. <https://doi.org/10.1145/3643687>
- Hodgson, G. M. (1998). The approach of institutional economics. *Journal of Economic Literature*, 36(1), 166–192.
- ICTD. (2020, April 21). *Unpacking formalisation: The need for a new research agenda on taxation and the informal economy*. <https://www.ictd.ac/blog/unpacking-formalisation-need-new-research-agenda-taxation-informal-economy/>
- ICTD. (2024, June 10). *Enhancing taxpayer registration with inter-institutional data sharing: Evidence from Uganda* (African Tax Administration Paper No. 35). <https://www.ictd.ac/publication/enhancing-taxpayer-registration-with-inter-institutional-data-sharing-evidence-from-uganda/>
- ICTD. (2025, October 8). *Why digitalisation alone won't fix Africa's tax systems: 6 steps for real impact*. <https://www.ictd.ac/blog/why-digitalisation-alone-wont-fix-africas-tax-systems-6-steps-for-real-impact/>
- International Labour Organization. (2025, February 27). *Simple registration and tax incentives are key measures to drive formalization*. ILO News. <https://www.ilo.org/resource/article/simple-registration-and-tax-incentives-are-key-measures-drive-formalization>
- IZA World of Labor. (2014). Formalization of jobs and firms in emerging market economies through registration reform. <https://wol.iza.org/articles/formalization-of-jobs-and-firms-in-emerging-market-economies-through-registration-reform/long>
- Kagasi, M. M. (2025). *Technology adoption and tax compliance among small and medium enterprises in Nairobi central business district* [Unpublished master's thesis]. United States International University-Africa.
- Kasasbeh, H. (2021). Perceived benefits of digital tax reform among developing-country SMEs. *International Journal of Public Administration*, 44(12), 1054–1066. <https://doi.org/10.1080/01900692.2020.1746434>
- Kimea, A., Chimilila, C., & Sichone, J. (2019). Analysis of taxpayers' intention to use tax e-filing system in Tanzania: Controlling for self-selection based endogeneity. *African Journal of Economic Review*, 7(2), 192–212.
- Lai, M. L., & Choong, K. F. (2010). Motivators, barriers and concerns in adoption of electronic filing system: Survey evidence from Malaysian professional accountants. *American Journal of Applied Sciences*, 7(4), 562–567. <https://doi.org/10.3844/ajassp.2010.562.567>
- Manalu, P., Kusumastati, W., & Safiq, M. (2021). The effect of attitude towards e-tax systems, adoption of e-tax systems, isomorphic forces, and trust in tax authority to tax compliance (case study on SMEs listed in KPP Pratama Medan Petisah). *Journal Inovasi Penelitian*, 2(2), 699–710.
- Mascagni, G., Mengistu, A. T., & Woldeyes, F. B. (2021). Can ICTs increase tax compliance? Evidence on taxpayer responses to technological innovation in Ethiopia. *Journal of Economic Behavior & Organization*, 189, 172–193. <https://doi.org/10.1016/j.jebo.2021.05.017>
- Mascagni, G., Santoro, F., & Mukama, D. (2024). From cash to digital: How mobile money is transforming tax collection in developing countries. *International Tax and Public Finance*. <https://doi.org/10.1007/s10797-026-09952-w>
- Mukuwa, V., & Phiri, J. (2020). The effects of e-services on revenue collection and tax compliance among SMEs in developing countries: A case study of Zambia. *Open Journal of Social Sciences*, 8(1), 98–108. <https://doi.org/10.4236/jss.2020.81008>
- Musah, A., Adenutsi, D. E., & Okyere, B. (2026). The moderating role of entrepreneurial orientation in the relationship between digital transformation, corporate tax reputation, and tax compliance among SMEs. *Sustainable Futures*, 11, 101641. <https://doi.org/10.1016/j.sfsr.2025.101641>



- Mwesiga, F., & Twamzihirwa, D. (2024). The effect of taxpayer education on SMEs' tax compliance: The case of Dar es Salaam City. *International Journal of Research and Innovation in Social Science*, 8(7), 3288–3295. <https://doi.org/10.47772/ijriss.2024.807250>
- Night, S., & Bananuka, J. (2020). The mediating role of adoption of an electronic tax system in the relationship between attitude towards the electronic tax system and tax compliance. *Journal of Economics, Finance and Administrative Science*, 25(49), 73–88. <https://doi.org/10.1108/JEFAS-07-2018-0066>
- Nkwe, N. (2013). Tax payers' attitude and compliance behavior among small medium enterprises (SMEs) in Botswana. *Business and Management Horizons*, 1(1), 113–137. <https://doi.org/10.5296/bmh.v1i1.3486>
- Saadu, Y., & Danmalam, M. I. (2025). Electronic payment: A determinant of tax revenue generation in Nigeria. *Journal of Public Administration and Government*, 7(1), 15–27.
- Salawu, M. K., Adigun, O. A., & Ogundipe, L. O. (2024). Adoption and challenges of electronic tax filing system among small and medium-sized enterprises in Lagos State, Nigeria. *Journal of Taxation and Economic Development*, 23(1), 141–155.
- South African Revenue Service. (2025, April 10). Register as a taxpayer. <https://www.sars.gov.za/individuals/how-do-i-register-for-tax/register-as-a-taxpayer/>