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Digital Tax Administration and the Shadow Economy: A Fiscal Governance Framework for Emerging Economies

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Abstract: *Digital tax administration has become a central instrument for strengthening domestic revenue mobilization and reducing economic informality in emerging economies. This study develops a fiscal governance framework explaining how electronic filing, electronic invoicing, digital payments, data integration, and risk-based analytics can influence taxpayer compliance and the shadow economy. An integrative literature review synthesizes peer-reviewed studies published between 2022 and 2025, prioritizing Scopus-indexed and Indonesian journal evidence on tax digitalization, VAT e-invoicing, taxpayer behavior, financial inclusion, digital payments, and informal economic activity. The evidence indicates that digital systems can increase reported sales and tax liabilities, improve audit efficiency, reduce compliance costs, strengthen transaction traceability, and generate network spillovers across firms. However, digitalization does not automatically formalize economic activity. Limited digital literacy, weak institutional trust, fragmented data, cash dependence, exclusion risks, cybersecurity concerns, and inadequate enforcement can constrain its effectiveness. Evidence from Indonesia further suggests that e-filing, e-billing, e-invoicing, taxpayer education, and emerging core tax systems can support compliance, although outcomes depend on user readiness and administrative quality. The proposed framework integrates five dimensions: digital service accessibility, transaction visibility, data-driven enforcement, taxpayer trust, and inclusive formalization. It argues that tax administrations should combine technological modernization with simplified procedures, proportional enforcement, taxpayer assistance, interoperable data, and safeguards for privacy and fairness. Accordingly the evidence supports inclusive transparent risk based digitally enabled taxpayer centered accountable fiscal governance that combines administrative efficiency stronger compliance effective enforcement institutional trust data protection digital literacy and gradual formalization.*

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INTRODUCTION

The shadow economy remains a persistent fiscal-governance challenge because unregistered production, underreported transactions, informal employment, and cash-based exchange weaken the tax base and reduce the information available to public authorities. In emerging economies, the problem is closely connected with small-firm informality, limited administrative capacity, and uneven access to formal financial services. Younas et al. (2022) show that the shadow economy is associated with weaker

growth outcomes in developing economies, while financial inclusion can support economic performance. These findings suggest that formalization requires more than enforcement: governments must make participation in formal systems economically and administratively feasible.

Digital tax administration offers a potential mechanism for addressing this challenge by replacing fragmented paper processes with electronic filing, invoicing, billing, payment, and data-matching systems. Bellon et al. (2022) provide strong quasi-experimental evidence from Peru that VAT e-invoicing increased reported sales, purchases, and tax liabilities, particularly among smaller firms and sectors with higher initial noncompliance. The result is important for emerging economies because electronic transaction records can reduce information asymmetry and improve monitoring. Nevertheless, the study also shows that digital tools need complementary reforms to translate higher reported liabilities into sustained revenue gains.

Digitalization can also generate compliance spillovers through business networks. Bellon et al. (2023) find that mandatory VAT e-invoicing in Peru encouraged voluntary adoption among trading partners and affected reported taxable purchases across connected firms. This network effect implies that tax technology can extend beyond directly targeted taxpayers because digital records alter the information environment of suppliers and customers. For shadow-economy reduction, such spillovers are valuable because they can gradually increase transaction visibility. However, they may also create adjustment costs for firms with weak digital capabilities, making sequencing and taxpayer support important components of reform.

The effectiveness of digitalization depends strongly on enforcement design. Evidence from Rwanda shows that e-invoicing increased net VAT payments and improved the efficiency of tax audits, while the compliance effect was particularly linked to enhanced audit effectiveness (Mascagni et al., 2025). Digital records therefore create value when tax administrations possess the analytical and institutional capacity to use them. Simply collecting electronic data is insufficient. Authorities need risk models, trained auditors, interoperable databases, and clear procedures for converting digital signals into proportionate compliance actions. This combination is especially relevant where informal activity is widespread and enforcement resources are scarce.

Digital payments constitute another formalization channel because they create transaction trails and reduce exclusive dependence on cash. Allen et al. (2022) show that fiscal incentives can increase digital-payment acceptance and usage, with financial inclusion and the size of the shadow economy influencing adoption. For tax governance, payment digitalization can complement e-invoicing by linking reported business activity with observable financial flows. Yet policies that discourage cash must consider access, transaction costs, privacy, and the risk of excluding microenterprises. Effective formalization should expand convenient digital options rather than merely penalize cash users.

Indonesian evidence confirms that taxpayer behavior remains central to digital reform. Malik et al. (2023) find that digital tax socialization strengthens the relationship between e-filing and individual taxpayer compliance. Panjaitan and Handayani (2023) likewise examine e-filing, e-billing, tax understanding, and compliance in Bandung. These studies indicate that technological availability does not guarantee effective use. Taxpayers must understand procedures, perceive systems as usable, and receive adequate assistance. Digital administration should therefore be designed as a service transformation as well as

a control transformation, especially for individuals and micro, small, and medium enterprises.

Recent Indonesian research connects digitalization more directly with the shadow economy. Ningsih et al. (2025) evaluate tax-administration digitalization as a strategy for reducing informal activity and emphasize benefits, efficiency, transparency, participation, and implementation challenges. Banda (2025) similarly reviews fiscal strategies for addressing the shadow economy and highlights payment digitalization alongside presumptive taxation and other policy instruments. Together, these studies suggest that technology is most effective when embedded in a broader policy package that lowers formalization costs while increasing the probability that hidden transactions become visible.

Despite rapid adoption of tax technology, the literature often studies e-filing, e-invoicing, digital payments, audits, and the shadow economy separately. This fragmentation limits understanding of how these instruments interact within fiscal governance. The present study addresses that gap by integrating five mechanisms: accessible digital services, transaction visibility, data-driven enforcement, institutional trust, and inclusive formalization. The central proposition is that digital tax administration reduces shadow activity when it simultaneously lowers compliance frictions, increases information quality, strengthens credible enforcement, and makes formal participation more attractive than remaining outside the tax system.

THEORETICAL FOUNDATION

The theoretical framework combines deterrence theory, the slippery-slope perspective on tax compliance, transaction-cost reasoning, and institutional approaches to informality. Deterrence theory emphasizes detection probability and sanctions, while trust-based approaches emphasize legitimacy, service quality, and voluntary cooperation. Transaction-cost reasoning explains why complicated registration, filing, payment, and recordkeeping can discourage formalization. Institutional theory highlights how governance quality, social norms, and administrative credibility shape decisions to operate formally or informally. Digital tax administration can influence all four mechanisms by changing compliance costs, information visibility, enforcement capability, and taxpayer experience.

Five capabilities structure the proposed fiscal-governance framework. Digital service accessibility concerns simple, reliable, and inclusive filing, billing, invoicing, and payment channels. Transaction visibility concerns standardized electronic records and data interoperability. Data-driven enforcement concerns risk scoring, audit selection, and anomaly detection. Institutional trust concerns transparency, privacy, fairness, service quality, and taxpayer education. Inclusive formalization concerns proportionate requirements, financial inclusion, simplified regimes, and transition support for small firms. The framework predicts that shadow-economy reduction is strongest when these capabilities develop jointly rather than when governments rely on technology or coercive enforcement alone.

REASERCH METHODS

This study employed an integrative literature review and conceptual synthesis to develop a fiscal-governance framework for digital tax administration and the shadow economy in emerging economies. Peer-reviewed studies published between 2022 and 2025 were prioritized, with emphasis on Scopus-indexed journals and relevant Indonesian journals addressing electronic invoicing, e-filing, e-billing, digital payments, taxpayer

compliance, tax audits, financial inclusion, informality, and tax-administration modernization. Search concepts included digital tax administration, shadow economy, informal economy, tax compliance, e-invoicing, e-filing, digital payments, tax audits, and emerging economies. The qualitative synthesis followed the stages of data reduction, categorization, interpretation, and conclusion development described by Sugiyono (2022).

The analysis proceeded in three stages. First, each study was coded according to the primary mechanism through which digitalization could affect informality: compliance-cost reduction, transaction traceability, enforcement effectiveness, behavioral acceptance, or financial formalization. Second, findings were compared across country contexts and taxpayer groups to identify enabling conditions and implementation risks. Third, the recurring mechanisms were integrated into five governance dimensions: digital service accessibility, transaction visibility, data-driven enforcement, institutional trust, and inclusive formalization. No fabricated primary dataset was introduced; all substantive claims were derived from published evidence and used to construct propositions for future empirical testing.

Source quality was assessed through publication recency, peer-review status, relevance to the research question, journal credibility, and DOI traceability. High-impact Scopus sources were used to anchor causal evidence on e-invoicing, compliance spillovers, audit effectiveness, financial inclusion, and corporate digitalization, while Indonesian studies provided institutional and implementation context. Future research can operationalize digital administration through adoption, usability, interoperability, and data quality; shadow activity through informality proxies and tax gaps; enforcement through audit yield and detection rates; and trust through perceived fairness, transparency, and system reliability. Panel models, quasi-experiments, structural equation modeling, and administrative-data designs are appropriate validation strategies.

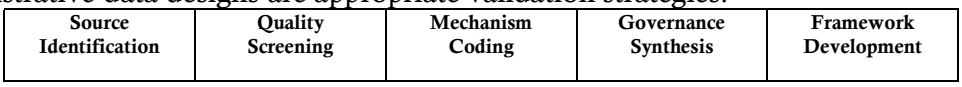


Figure 1. Integrative Review and Fiscal Governance Framework Development

RESULT AND DISCUSSION

First, VAT e-invoicing provides strong evidence that digital transaction records can increase declared economic activity. Bellon et al. (2022) find that Peru's reform increased reported sales, purchases, and VAT liabilities by more than five percent during the first year, with stronger effects among small firms and sectors characterized by lower prior compliance. This pattern is consistent with improved monitoring and deterrence. For emerging economies, the implication is that digital invoices can narrow opportunities for underreporting where business transactions enter formal supply chains. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy data-driven service-oriented fair adaptive coordinated practical governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Second, digital tax reform can diffuse through firm networks rather than affecting only mandated taxpayers. Bellon et al. (2023) document technology-adoption and tax-compliance spillovers from Peru's VAT e-invoicing reform. Firms were more likely to adopt voluntarily when their trading partners faced mandates, and connected transactions showed changes in reported taxable purchases. This finding is important for shadow-economy policy because business networks can transmit formalization incentives. Authorities can exploit network effects by sequencing mandates through highly connected

sectors and large buyers while supporting smaller suppliers. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy data-driven service-oriented fair adaptive governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Third, e-invoicing becomes more effective when digital information is connected to credible audits. Mascagni et al. (2025) use Rwandan tax data to show that e-invoicing increased net VAT payments and improved audit efficiency, with important effects operating through better audits. The result clarifies why digitalization alone may produce uneven outcomes: information must be converted into enforcement capacity. Emerging-economy tax administrations should therefore integrate invoice data with risk-based audit selection, case management, and feedback mechanisms. This approach can increase the perceived probability of detection without requiring universal intensive audits. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Fourth, financial inclusion interacts with the shadow economy and broader development outcomes. Younas et al. (2022) find that financial inclusion supports economic growth in developing economies, whereas a larger shadow economy is associated with weaker growth. Although financial inclusion is not identical to tax formalization, access to accounts and formal payment channels can reduce reliance on unrecorded cash transactions and create data useful for economic administration. Tax authorities should coordinate with financial-sector policies rather than treat taxation as an isolated digital project. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy data-driven service-oriented fair adaptive coordinated practical governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Fifth, incentives can accelerate digital-payment adoption and thereby increase transaction visibility. Allen et al. (2022) use machine-learning methods across countries and find that merchant and consumer fiscal incentives can increase point-of-sale adoption and digital-payment usage. They also identify financial inclusion and shadow-economy conditions as relevant predictors. This evidence supports carefully designed incentives during transitions away from cash. Temporary tax credits, fee reductions, or merchant support can lower adoption barriers, particularly for microenterprises. However, payment digitalization should not be equated automatically with tax compliance. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy data-driven service-oriented fair adaptive coordinated governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Sixth, Indonesian evidence highlights the behavioral dimension of digital tax administration. Malik et al. (2023) find that digital tax socialization moderates the relationship between e-filing and individual taxpayer compliance. The finding indicates that taxpayer knowledge and communication influence whether electronic systems translate into compliant behavior. For shadow-economy reduction, outreach should be targeted toward groups with limited familiarity with formal taxation, including new entrepreneurs and microenterprises. Assistance should explain registration, filing,

payment, and available simplified regimes in practical language. Digital systems that are technically available but poorly understood may reproduce exclusion rather than formalization. This evidence supports a balanced inclusive transparent risk-based digitally-enabled governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Seventh, e-filing and e-billing reforms demonstrate the importance of usability and tax understanding. Panjaitan and Handayani (2023) examine taxpayers in Bandung and show how electronic administration interacts with taxpayer understanding in shaping compliance. The broader lesson is that reducing administrative friction can improve the attractiveness of formal participation. Emerging economies should minimize duplicate data entry, simplify authentication, provide mobile-compatible services, and integrate filing with payment information. At the same time, taxpayers need clear explanations of obligations and error-correction procedures. Digital reform therefore requires institutional capacity and careful implementation. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Eighth, the combined use of e-filing, e-billing, and e-invoicing can create a more complete compliance environment. Eddy et al. (2023) report that digital taxation instruments influence taxpayer compliance in their Indonesian study. From a governance perspective, integration matters because separate platforms can generate inconsistent records and increase compliance costs. A unified architecture can connect registration, returns, invoices, payments, and taxpayer accounts, allowing both taxpayers and administrators to reconcile obligations more easily. Integration also improves risk analysis by reducing fragmented information. Digital reform therefore requires institutional capacity and careful implementation. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Ninth, digitalization may affect informal activity through transparency and participation as well as enforcement. Ningsih et al. (2025) analyze Indonesian tax-administration digitalization in relation to the shadow economy and identify benefits alongside implementation challenges. Their findings support a balanced e-government perspective in which efficiency, transparency, and participation matter. For MSMEs, formalization is more likely when digital systems provide visible benefits such as easier compliance, faster services, and clearer records. Tax administrations should therefore communicate the reciprocal value of formal status, including access to financing, procurement, or business services where appropriate. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Tenth, fiscal strategies for the shadow economy should combine digitalization with appropriately designed tax instruments. Banda (2025) reviews strategies including payment digitalization and presumptive taxation, emphasizing the need to adapt policy to informal-sector characteristics. This is particularly important for microenterprises whose accounting capacity may be insufficient for complex income measurement. Simplified turnover-based

regimes can provide an entry path into taxation, while digital payments and basic recordkeeping gradually improve information quality. Authorities should avoid designing digital systems exclusively around large-firm compliance models. Digital reform therefore requires institutional capacity and careful implementation. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Eleventh, digital tax administration can reduce compliance costs when modernization addresses the entire taxpayer journey. Nugraha (2025) examines Indonesia's Coretax-related digitalization and compliance-cost efficiency for medium taxpayers. The study highlights the potential of integrated administration to reduce structural burdens associated with fragmented processes. Lower compliance costs matter for shadow-economy reduction because businesses compare the benefits and burdens of formal participation. Yet modernization can initially create learning costs, migration problems, and system uncertainty. Governments should therefore phase implementation, provide parallel assistance during transitions, monitor user problems, and publish service-performance indicators. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Twelfth, digital systems do not always generate statistically significant compliance improvements by themselves. Yanto and Girindratama (2025) find that e-filing and e-billing were not significant determinants of taxpayer compliance in their Surabaya sample, suggesting that knowledge, enforcement, attitudes, or other factors may dominate. This finding is valuable because it challenges technological determinism. Tax administrations should diagnose why taxpayers remain noncompliant instead of assuming that online services solve behavioral or economic constraints. Digital tools should be combined with credible enforcement, taxpayer education, service quality, simplified rules, and trust-building. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy data-driven governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Thirteenth, recent corporate evidence suggests that digital technology can improve tax compliance through multiple internal mechanisms. Research published in Finance Research Letters in 2025 finds that digital technology application enhances corporate tax compliance by reducing information asymmetry, improving productivity, and strengthening internal governance. These mechanisms broaden the fiscal-governance perspective beyond direct tax-administration systems. As firms digitize accounting, payments, and operational controls, the quality and traceability of information available for taxation may improve. Governments can support this process through interoperable standards and machine-readable reporting while avoiding redundant requirements. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate accessible trustworthy data-driven governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Fourteenth, digital taxation in developing regions must address the distinctive challenges of taxing digitally mediated economic activity. Mpofu and Moloi (2022)

analyze digital-services taxation in Africa and emphasize administrative, equity, certainty, and efficiency considerations. Their discussion is relevant to shadow-economy governance because digital business models can be economically visible to consumers while remaining difficult for conventional tax systems to locate or assess. Emerging economies need rules that clarify nexus, registration, reporting, and platform responsibilities without discouraging innovation. International coordination and platform data can improve visibility, but policy should distinguish between sophisticated cross-border digital firms and vulnerable domestic microenterprises. This evidence supports a governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Fifteenth, a coherent framework must connect technology, enforcement, trust, and inclusion rather than treating them as substitutes. Evidence across Peru, Rwanda, Indonesia, and cross-country studies shows that electronic invoices, digital payments, filing systems, and integrated administration can strengthen information and compliance, but their effects vary with institutional capacity and taxpayer conditions. The proposed fiscal-governance framework therefore places accessible services at the entry point, transaction visibility and analytics at the information layer, risk-based enforcement at the control layer, institutional trust at the legitimacy layer, and inclusive formalization at the development layer. This evidence supports a balanced inclusive transparent risk-based digitally-enabled taxpayer-centered accountable proportionate governance strategy for digital tax administration that strengthens compliance protects taxpayers and promotes sustainable formalization across emerging economies.

Table 1. Fiscal Governance Framework for Digital Tax Administration and Formalization

Dimension	Core mechanism	Governance requirement	Expected outcome
Digital service accessibility	Lower filing and payment costs	Usability, support, inclusion	Higher voluntary participation
Transaction visibility	E-invoices and digital payments	Interoperability and data quality	Reduced underreporting
Data-driven enforcement	Risk scoring and audit targeting	Proportionality and review	Higher detection efficiency
Institutional trust	Fairness, transparency, privacy	Accountability and taxpayer education	Sustainable compliance
Inclusive formalization	Simplified regimes and transition support	Appropriate thresholds and incentives	Smaller shadow economy

CONCLUSION

This study concludes that digital tax administration can reduce the shadow economy when technological modernization changes both the cost of compliance and the information available for enforcement. Electronic invoicing, filing, billing, payments, and integrated data can strengthen transaction visibility, improve audit targeting, reduce administrative friction, and create compliance spillovers across business networks. However, technology alone is insufficient. Weak digital literacy, fragmented systems, limited trust, cash dependence, and inadequate enforcement can prevent digital tools from producing durable formalization. Effective reform therefore requires an institutional strategy that links service quality with credible control.

The proposed framework integrates five mutually reinforcing dimensions: digital service accessibility, transaction visibility, data-driven enforcement, institutional trust, and inclusive formalization. Emerging economies should simplify registration and filing, promote interoperable digital payments, use electronic records for risk-based audits, protect taxpayer data, and provide assistance for small firms during transition. Presumptive or simplified regimes can complement digitalization where accounting capacity is limited. Performance should be evaluated through compliance costs, filing accuracy, audit yield,

tax-gap indicators, formal registration, and taxpayer trust rather than through system adoption statistics alone.

Future research should test the framework using linked administrative, payment, survey, and firm-level data across emerging economies. Quasi-experimental designs can identify the causal effects of e-invoicing mandates, digital-payment incentives, and integrated tax platforms on reported sales, tax liabilities, firm survival, and formalization. Longitudinal studies should examine whether initial compliance gains persist and whether digital exclusion creates unintended movement into deeper informality. Research should also evaluate algorithmic fairness, cybersecurity, privacy, platform taxation, and the distributional effects of enforcement. Such evidence can help governments design digital tax systems that strengthen revenue mobilization while supporting inclusive and legitimate economic formalization.

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