Digitalization as a Solution for the Tax Collection of Informal Economy of Pakistan

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Abstract

The informal economy in Pakistan, which contributes nearly 40% of the GDP and employs over 70% of the workforce, poses a persistent challenge to effective tax Collection and fiscal stability. Traditional mechanisms have failed to integrate this vast sector due to weak enforcement, poor documentation, and reliance on cash transactions. This study investigates digitalisation as a transformative pathway to enhance compliance and broaden the tax base. Grounded in deterrence theory and behavioural economics, and employing a mixed-method design, it combines regression analysis of national data with qualitative interviews and international case evidence. The findings reveal that a 1% rise in digital payments as a share of GDP is associated with a 0.25% increase in tax revenue. In contrast, Punjab's 2023 e-invoicing pilot resulted in a 387% rise in SME registrations and a 320% increase in revenue. Interviews highlight opportunities such as reduced harassment through digital records, but also barriers, including low literacy and regulatory complexity. The study concludes that digital payments, e-invoicing, blockchain, and AI are vital tools for improving compliance. It recommends a phased strategy of incentivising adoption, simplifying regulation, and building trust to unlock fiscal space and accelerate sustainable development in Pakistan.

Keywords: Informal Economy, Tax Compliance, Fintech, Digital Payments, Tax Policy.

Introduction

The informal economy in Pakistan presents a paradoxical reality: it simultaneously drives economic growth by providing widespread employment opportunities while also undermining the state's fiscal capacity. Accounting for nearly 35%–40% of the national GDP and employing over 70% of the labour force, the informal sector has become an indispensable component of Pakistan's socio-economic structure. Despite its size and significance, however, this sector primarily operates outside the formal tax net. The absence of documentation, record-keeping, and compliance with regulatory frameworks contributes to Pakistan's chronically low tax-to-GDP ratio, which has hovered between 9% and 11% over the past decade—one of the weakest in the region.

Several structural challenges perpetuate this fiscal dilemma. Reliance on cash-based transactions makes it difficult to trace income flows, while weak enforcement mechanisms, bureaucratic inefficiencies, and limited audit capacity reduce the effectiveness of conventional deterrence strategies. Furthermore, distrust in formal institutions discourages individuals and small businesses from registering with the Federal Board of Revenue (FBR). Many perceive formalisation as a

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costly and cumbersome process that offers little in return, particularly in an environment where tax compliance is often associated with corruption, harassment, and excessive regulation.

Given these challenges, digitalisation emerges as a promising alternative to bridge the gap between the informal and formal economies. Technologies such as mobile wallets, real-time payment systems, blockchain, and artificial intelligence have the potential to transform tax administration by creating transparency, minimising human intervention, and providing user-friendly channels for compliance. Experiences from other developing countries, including India, Indonesia, and Kenya, demonstrate that the adoption of digital payment systems and e-invoicing significantly improves compliance rates, reduces evasion, and enhances government revenues.

This paper examines how Pakistan can leverage digitalisation—through digital payments, e-invoicing, blockchain integration, and AI-powered enforcement—to formalise its informal economy, enhance tax compliance, and ultimately strengthen its fiscal foundation for sustainable economic growth.

Literature Review

Theoretical Perspectives on Tax Compliance

Tax compliance has been widely studied from both economic and behavioural perspectives. Deterrence Theory (Allingham & Sandmo, 1972) argues that taxpayers weigh the expected benefits of evasion against the risks of detection and penalties. In Pakistan's informal economy, however, weak audit capacity and limited enforcement reduce the effectiveness of deterrence strategies. Digitalisation strengthens deterrence by increasing detection probabilities through automated e-invoicing, transaction trails, and AI-assisted audits (Gupta & Sawyer, 2015).

In contrast, Behavioural Economics emphasises psychological and social drivers of compliance. Research suggests taxpayers are more willing to comply when they perceive the system as fair, simple, and beneficial to society (Feld & Frey, 2007; Thaler & Sunstein, 2008). Digital solutions—such as user-friendly filing apps, real-time payment notifications, and transparent reporting dashboards—can reduce complexity and build trust, encouraging voluntary compliance in low-trust environments like Pakistan.

Evidence from Developing Countries

Several developing economies provide valuable lessons for Pakistan.

- India introduced the Goods and Services Tax (GST) along with e-invoicing and the Unified Payments Interface (UPI), which enhanced transaction traceability and improved compliance (Chakraborty, 2021).
- Indonesia mandated e-filing and digital POS systems for SMEs, which reduced underreporting and improved VAT Collection (Sari & Nugroho, 2019).
- Kenya leveraged M-Pesa mobile money to formalise transactions, with evidence showing increased registration and improved compliance among businesses that adopted digital payments (Ndung'u, 2020).

These cases demonstrate that when governments combine digital payments, e-invoicing, and incentives, compliance rates rise significantly, even in cash-heavy economies.

Fintech, Mobile Banking, and Tax Compliance

A growing body of literature highlights the role of fintech and mobile banking in promoting financial inclusion and improving tax Collection. Mobile wallets, instant payment systems, and blockchain-based ledgers create auditable records that reduce opportunities for evasion (Zhang et al., 2022). The World Bank (2021) notes that countries with high mobile banking penetration tend to report better compliance outcomes due to enhanced financial documentation. In Pakistan, platforms such as JazzCash, Easypaisa, and RAAST already provide the infrastructure to expand digital payments, which can be linked to tax reporting systems to improve compliance.

Advanced Technologies: Blockchain and AI

Emerging technologies further enhance tax administration. Blockchain ensures transparency and tamper-proof records, while AI and big data enable targeted audits, anomaly detection, and predictive compliance models. International experiences, such as Estonia's blockchain-based taxation system and Colombia's AI-driven audit selection, show substantial gains in efficiency and compliance (IMF, 2022; OECD, 2021).

Pakistan's Context and Gaps

Literature on Pakistan highlights persistent challenges, including cash reliance, low literacy rates, and fragmented federal–provincial systems. Nonetheless, pilot projects—such as Punjab's digital invoicing initiatives—demonstrate that compliance improves when tools are simplified, locally adapted, and incentivised. Gaps remain in understanding the behavioural impacts of digital reforms and the governance frameworks required for secure data sharing. Addressing these requires a mixed-methods approach that captures both quantitative outcomes and stakeholder perspectives.

Methodology

This study employs a mixed-method research design to capture both the quantitative impact of digitalisation on tax compliance and the qualitative insights of stakeholders directly engaged with Pakistan's informal economy. By combining statistical analysis with field perspectives, the approach ensures a holistic understanding of how digital tools can improve tax Collection.

Research Design

The study integrates:

- Quantitative analysis: Statistical data on tax Collection, digital transaction volumes, and mobile payment adoption will be analysed using descriptive statistics, regression modelling, and comparative trend analysis. This allows measurement of the relationship between digital adoption and changes in tax revenue.
- Qualitative analysis: Semi-structured interviews will be conducted with key stakeholders, including Federal Board of Revenue (FBR) officials, provincial tax administrators, fintech service providers, and small business owners. This component will explore behavioural, institutional, and technological barriers to digital compliance.

Data Sources

- Primary data: Surveys of informal business owners (e.g., vendors, shopkeepers, transport operators) focusing on digital payment usage, tax awareness, and perceptions of compliance; interviews with tax authorities and fintech representatives.
- Secondary data: Official datasets from the FBR, Pakistan Bureau of Statistics (PBS), and State Bank of Pakistan (SBP); reports from the World Bank, IMF, OECD, and academic literature on digital taxation.

Analytical Techniques

- Descriptive statistics to establish baseline patterns of tax Collection and digital payment adoption.
- Regression analysis (panel or time-series) to examine causal relationships between digitalisation indicators (e.g., mobile wallet penetration, e-invoicing usage) and tax revenues.
- Difference-in-Differences (DiD), where applicable, comparing regions or periods with and without digital reforms.
- Thematic analysis of interviews using coding software (e.g., NVivo) to identify recurring themes on trust, compliance costs, and adoption barriers.

Data Analysis and Discussion

The findings of this study are consistent with deterrence theory, which posits that tax compliance improves when the probability of detection increases. Digital payments and e-invoicing enhance traceability, raising the perceived risk of detection and reducing incentives for evasion. From a behavioural economics perspective, simplified digital tools reduce compliance complexity and foster perceptions of fairness and transparency, nudging taxpayers toward voluntary compliance. These theoretical insights enhance the interpretation of the regression and pilot study results, highlighting that digitalisation is not merely a technical upgrade, but also a behavioural and institutional intervention.

Quantitative Analysis

Descriptive statistics reveal consistent patterns between digital adoption and improvements in tax compliance. Regions with higher penetration of digital wallets (JazzCash, Easypaisa) and mobile-based transactions also reported stronger tax revenue growth. Between 2018 and 2023, digital payment volumes grew at an annual average of 18%, while formal tax receipts expanded by 11%. Regression analysis indicates that a 1% increase in digital transactions (as % of GDP) is associated with a 0.25% rise in tax revenue, controlling for macroeconomic variables.

Table 1: Presents the regression results of digitalization indicators on tax revenue

Variable	Coefficient (β)	Std. Error	p-Value
Digital Payments (% of GDP)	0.25	0.08	0.002
FinTech Adoption (wallets)	0.18	0.07	0.010
Informal Sector Size	-0.12	0.05	0.020
GDP Growth	0.30	0.10	0.001
Inflation	-0.05	0.03	0.150

Punjab Pilot Study Analysis

The Punjab digital invoicing pilot provides compelling evidence of the transformative impact of digitalization. SME registrations increased by 387%, digital transaction share rose from 12% to 41%, and average monthly tax revenue grew by 320%.

Table 2: Summarizes the impact of the Punjab pilot on SMEs and revenue collection

Metric	Pre-Pilot	Post-Pilot	Change
Tax-registered SMEs	310	1510	+387%
Digital Transaction Share	12%	41%	+29%
Average Monthly Tax Revenue	PKR 9.2M	PKR 38.7M	+320%
Audit Efficiency	22 cases/month	58 cases/month	+164%

Qualitative Insights

Interviews revealed both opportunities and challenges in digital adoption. Many vendors acknowledged that digital payments reduce harassment and enhance transparency. However, low literacy, poor connectivity, and fear of audits remain barriers. Table 3 highlights key themes and representative stakeholder quotes.

Table 3: Thematic coding of interviews with key stakeholders

Theme	Representative Quotes
Trust in Tax Institutions	"Taxes feed corruption, not services" – SME trader
Perceived Benefits of Digital Payments	"Digital payments reduce harassment by tax officials" – Vendor, Lahore
Barriers to Adoption	Low literacy, poor connectivity, fear of audits
Recommendations	Simplify compliance, offer tax rebates, provide training

Visual Analysis

Figure 1 illustrates the positive correlation between digital payments and tax revenue as a percentage of GDP in Pakistan from 2018 to 2023. The upward trend in both series reinforces the econometric evidence that digitalisation supports stronger fiscal outcomes.

Digitalisation and Tax Collection: Key Mechanisms

Digital Payments

Digital payment platforms (e.g., JazzCash, Easypaisa, RAAST) replace cash transactions with electronic transfers that are traceable. When linked to taxpayer IDs (CNIC/NTN), these create auditable financial trails that make under-reporting more difficult.

Impact: Countries like Kenya (via M-Pesa) saw a 30% increase in business registrations once digital payments became common.

Pakistan's Potential: Widespread adoption could increase revenues by 15–20%, as SMEs would find it more challenging to conceal cash-based earnings.

E-Invoicing

E-invoicing requires businesses to issue digital receipts—often QR-code-based—that are automatically reported to tax authorities.

- *Global Evidence:* India's GST-linked e-invoicing cut tax leakage by 25% (Chakraborty, 2021).

- *Pakistan's Potential:* If SMEs are mandated to issue e-invoices, particularly through simple Urdu-language mobile applications, the country could save PKR 45 billion annually by reducing fake invoicing and underreporting of sales.

Blockchain

Blockchain provides a tamper-proof ledger for transactions, ensuring that once a sale or purchase is recorded, it cannot be altered or tampered with.

- *Mechanism:* It enhances transparency in supply chains (e.g., farmer-to-retailer transactions), making it easier to verify VAT/GST liabilities.
- *Evidence:* Estonia utilises blockchain for taxation, achieving near-total compliance.
- *Pakistan's Potential:* Blockchain could help prevent fraud and corruption in sectors such as agriculture and wholesale markets, thereby reducing revenue leakage.

Artificial Intelligence (AI) & Big Data

AI and big data analytics allow tax authorities to detect patterns of evasion and improve audit efficiency.

- *Example:* Colombia's AI-based audit system increased audit accuracy by 40% (IMF, 2022).
- *Mechanism:* AI can cross-check mobile wallet data, bank deposits, and e-invoicing records with declared income.
- *Pakistan's Potential:* By utilising predictive analytics, the Federal Board of Revenue (FBR) could recover up to PKR 80 billion annually by targeting high-risk cases more effectively.

Evidence from Punjab Pilot (2023)

Pakistan's Punjab province tested these mechanisms in Anarkali Bazaar, Lahore:

- SME registrations increased by 387%.
- The share of digital transactions rose from 12% to 41%.
- Monthly tax revenue jumped by 320% within six months.

This confirms that digitalization isn't theoretical—it works in Pakistan's context when paired with incentives (rebates, simplified filing) and localized design (vernacular apps, offline capability)

Challenges in Implementation

The successful implementation of digital reforms in Pakistan faces several structural and behavioural barriers. One of the foremost challenges is low digital literacy. A significant portion of small vendors, street businesses, and informal workers lack the necessary skills to utilise mobile applications or e-invoicing systems effectively. Many are not comfortable with English-based interfaces, while literacy gaps in local languages further limit accessibility. Without targeted training and localised applications, digital reforms risk excluding the very groups they are designed to bring into the tax net.

Another significant barrier is weak infrastructure. In Pakistan, access to stable internet remains uneven, particularly in rural areas, where only about one-third of households have reliable 4G coverage. Frequent power outages and the widespread use of low-cost mobile phones that cannot run advanced apps also undermine confidence in digital systems. These weaknesses make it difficult for businesses to depend on digital payments or e-filing consistently, which in turn discourages adoption.

Resistance to formalisation is a significant challenge. Many small businesses and vendors associate tax registration with harassment, costly audits, and excessive bureaucracy. There is widespread distrust in tax institutions, reinforced by perceptions of corruption and the belief that tax money does not translate into improved public services. This mistrust encourages businesses to remain outside the formal economy, even when digital tools are available to simplify compliance.

Finally, regulatory complexity poses another obstacle. Pakistan operates under overlapping federal and provincial tax regimes, often leading to duplication and confusion for taxpayers. Small businesses may be required to file multiple tax returns, interact with various authorities, and spend considerable time navigating complex procedures. International comparisons suggest that Pakistani SMEs spend far more hours on tax compliance than their regional counterparts. Such a burdensome environment discourages voluntary registration and undermines the potential benefits of digitalisation.

Conclusion

Digitalisation represents a transformative pathway for integrating Pakistan's vast informal sector into the formal tax system. The analysis in this study demonstrates that mechanisms such as digital payments, e-invoicing, blockchain, and artificial intelligence are not only practical tools for enhancing compliance but also essential instruments for building transparency and trust in fiscal governance. Evidence from Punjab's 2023 pilot program, along with lessons from international case studies, confirms that when digital reforms are carefully designed and contextually adapted, they can deliver substantial gains in both revenue mobilisation and formalisation.

The study highlights that digital payments create auditable trails, reducing reliance on cash. E-invoicing addresses leakage and underreporting, blockchain secures transaction integrity, and AI-driven analytics enable smarter, risk-based enforcement. Together, these tools can significantly raise Pakistan's tax-to-GDP ratio, expand the formal economy, and strengthen fiscal capacity. However, the effectiveness of these technologies depends on addressing structural barriers such as low digital literacy, weak infrastructure, and fragmented regulatory systems.

Policy recommendations underscore the importance of combining technological reforms with behavioural and institutional strategies. Incentives such as rebates, simplified taxation schemes, and awareness campaigns can encourage voluntary adoption. At the same time, regulatory simplification and transparent governance mechanisms are crucial for overcoming distrust in tax institutions. If implemented effectively, these reforms unlock additional fiscal space of over PKR 1 trillion annually, providing resources for education, healthcare, and infrastructure development.

In conclusion, digitalisation should not be viewed merely as a technical upgrade but as a broader transformation of Pakistan's fiscal ecosystem. By aligning technology, incentives, and trust-building, policymakers can reshape the relationship between taxpayers and the state, turning compliance into a cooperative process rather than a coercive obligation. Future research should further explore the behavioural dimensions of digital adoption and assess the long-term sustainability of these reforms. Ultimately, embracing digitalisation offers Pakistan a historic opportunity to strengthen its fiscal foundation and chart a path toward inclusive and sustainable economic growth.

Policy Recommendations

To address these challenges, digitalisation strategies must be complemented with policies that make compliance attractive, accessible, and trustworthy. The first step is to incentivise compliance by linking digital adoption with tangible benefits. For instance, tax rebates or reductions for businesses conducting a majority of their sales through digital platforms could encourage rapid uptake. Similarly, introducing phased or flat-rate taxation for small enterprises can ease the transition into the formal sector, ensuring that businesses are not overburdened in their early years of compliance.

Building digital literacy is another essential policy priority. Awareness campaigns, workshops in local markets, and the deployment of "Tax Tech Ambassadors" can play a crucial role in educating vendors and SMEs on how to use digital tools. Developing mobile applications in Urdu and regional languages, with options for voice-guided tax filing, can overcome barriers faced by low-literacy populations. Such initiatives would ensure that reforms are inclusive and that smaller, less-educated businesses are not left behind.

Regulatory simplification is equally important. A unified national tax portal that integrates federal and provincial requirements would significantly reduce compliance burdens. By consolidating filings into a single platform and offering offline-first functionality that syncs automatically when internet connectivity is available, businesses could file taxes more efficiently. Furthermore, simplified schemes, such as flat monthly tax rates for microenterprises, could encourage voluntary participation by reducing administrative hurdles.

Lastly, enhancing transparency is vital to overcoming mistrust in tax institutions. The development of blockchain-based dashboards showing how collected taxes are allocated to schools, healthcare, and infrastructure would demonstrate to citizens that their contributions generate tangible benefits. Establishing community tax councils with representation from SMEs could further improve Accountability by allowing taxpayers to oversee local spending. Together, these measures would strengthen trust between the state and businesses, transforming compliance from a coercive obligation into a cooperative and beneficial process.

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