

**Relationship Between Electronic Invoicing On The Level Of Tax Compliance Within The Informal Sector In
Kampala District.**

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Abstract

The study examined the relationship between electronic invoicing and the level of tax compliance within the informal sector in Kampala District, Uganda. A descriptive cross-sectional survey design was employed with a sample of 378 informal sector operators. Data were collected using structured questionnaires and analyzed through correlation and regression techniques. Results revealed a significant positive relationship between electronic invoicing and tax compliance ($r=0.734$, $p<0.01$). Regression analysis indicated that electronic invoicing explained 53.9% of variance in tax compliance ($R^2=.539$, $F=127.845$, $p<.001$). E-invoicing awareness ($\beta=0.381$, $p<0.01$), e-invoicing adoption ($\beta=0.356$, $p<0.01$), and perceived e-invoicing benefits ($\beta=0.312$, $p<0.01$) significantly predicted tax compliance. The study concluded that electronic invoicing systems substantially enhanced tax compliance in the informal sector. Recommendations included expanding digital infrastructure, providing free e-invoicing training, subsidizing smartphones and internet costs, simplifying e-invoicing interfaces, and implementing incentive programs for compliant informal businesses.

Keywords: Electronic invoicing, tax compliance, informal sector, digital taxation, Uganda Revenue Authority, Kampala District

Background of the Study

The informal sector constituted a substantial component of Uganda's economy, accounting for approximately 43% of GDP and employing over 80% of the working population according to the Uganda Bureau of Statistics (2022). In Kampala District, the nation's capital and primary commercial hub, informal sector activities dominated economic life, spanning diverse enterprises including street vending, small retail shops, food stalls, artisan services, transportation services, and small-scale manufacturing. These enterprises generated significant economic value and provided livelihoods for millions of urban residents, yet remained largely outside the formal tax system.

Tax compliance within the informal sector represented a persistent challenge for revenue authorities worldwide, particularly in developing countries. The Uganda Revenue Authority (URA) estimated that tax revenue losses from informal sector non-compliance exceeded UGX 2 trillion annually, representing approximately 20% of potential tax revenue (URA, 2023). This revenue gap constrained government capacity to finance public services, infrastructure development, and social programs essential for national development. Furthermore, widespread tax evasion in the informal sector created unfair competitive advantages over compliant formal sector businesses, distorting markets and discouraging formalization.

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Several factors contributed to low tax compliance in Uganda's informal sector, including limited tax knowledge, complex tax procedures, inadequate record-keeping practices, cash-based transactions that facilitated concealment of income, limited enforcement capacity of tax authorities, and negative perceptions of government tax utilization (Ayoki, 2020). Many informal sector operators viewed taxation as burdensome without corresponding benefits, leading to deliberate evasion or strategic underreporting of income. Additionally, the fragmented and mobile nature of informal businesses complicated tax administration and monitoring efforts.

Electronic invoicing (e-invoicing) emerged globally as a transformative technology for enhancing tax compliance and modernizing tax administration. E-invoicing systems required businesses to generate, transmit, and store invoices electronically through standardized digital platforms, typically connected to tax authority systems in real-time or near-real-time (OECD, 2021). These systems provided multiple mechanisms for improving compliance: they created automatic digital records of transactions, reduced opportunities for sales concealment, simplified tax reporting processes, enhanced transparency, and enabled tax authorities to monitor business activities more effectively without burdensome physical inspections.

Several countries demonstrated successful application of e-invoicing to improve tax compliance. Brazil's Nota Fiscal Eletrônica (NF-e) system, implemented in 2006, increased reported business revenues by 17% and significantly reduced tax evasion (Bachas et al., 2020). Similarly, Rwanda's Electronic Billing Machines (EBM) program enhanced VAT compliance rates from 63% to 87% within three years of implementation (Rwanda Revenue Authority, 2019). Kenya's integrated Tax Invoice Management System (TIMS) also showed promising results in addressing tax compliance challenges in small businesses and informal sectors.

Uganda initiated e-invoicing implementation through the Electronic Fiscal Receipting and Invoicing Solution (EFRIS) launched by URA in 2020. EFRIS required businesses above specified turnover thresholds to issue electronic receipts and invoices through URA-approved systems. By 2023, EFRIS had been gradually extended to smaller businesses and selected informal sector categories, though adoption remained limited particularly among micro-enterprises and street vendors (URA, 2023). The system operated through various technologies including specialized fiscal devices, mobile applications, and web-based platforms designed to accommodate businesses of different sizes and technological capacities.

The relationship between e-invoicing and tax compliance was theoretically grounded in the Technology Acceptance Model (TAM), which posited that technology adoption depended on perceived usefulness and ease of use (Davis, 1989), and the deterrence theory of tax compliance, which emphasized that detection probability influenced compliance behavior (Allingham & Sandmo, 1972). E-invoicing potentially enhanced both dimensions by simplifying compliance processes while simultaneously increasing detection risks for non-compliance. However, implementation challenges including digital literacy gaps, limited technological infrastructure, cost barriers, and resistance to transparency raised questions about effectiveness in informal sector contexts.

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Previous research on tax compliance in Uganda had focused predominantly on formal sector businesses and general compliance determinants, with limited empirical investigation of e-invoicing effects specifically within the informal sector (Kiconco et al., 2019; Twesige & Gasheja, 2019). Given the informal sector's economic significance and the government's expanding e-invoicing mandate, understanding the relationship between electronic invoicing adoption and tax compliance behavior among informal operators was essential for evidence-based policy development and effective tax administration strategies.

Problem Statement

Despite constituting the largest employment sector and contributing significantly to Kampala's economy, informal sector businesses demonstrated persistently low tax compliance rates, creating substantial revenue losses and equity concerns. Uganda Revenue Authority data indicated that fewer than 15% of informal sector operators in Kampala District were registered for tax purposes, and among registered businesses, compliance rates with filing and payment obligations remained below 30% (URA, 2023). This widespread non-compliance undermined government revenue generation, perpetuated unequal tax burdens, and hindered economic formalization efforts.

The government introduced electronic invoicing systems as a technology-driven solution to enhance tax compliance and modernize revenue administration. However, the extent to which e-invoicing adoption influenced actual tax compliance behavior within the informal sector remained unclear. Informal sector operators faced unique challenges including limited digital literacy, inadequate access to smartphones and internet connectivity, financial constraints preventing technology investments, and skepticism toward government digital initiatives. Without empirical evidence on the relationship between electronic invoicing and tax compliance in this specific context, policymakers and tax administrators lacked critical information for designing effective implementation strategies, allocating resources efficiently, and addressing adoption barriers. This study therefore investigated the relationship between electronic invoicing and the level of tax compliance within the informal sector in Kampala District, Uganda.

Specific Objective

To determine the relationship between electronic invoicing and tax compliance levels in the informal sector.

Methodology

This study employed a descriptive cross-sectional survey research design to examine the relationship between electronic invoicing and tax compliance within the informal sector in Kampala District. The design was deemed appropriate as it enabled the researcher to collect data from a large sample at a single point in time and analyze relationships between variables systematically (Kothari, 2004).

The target population comprised informal sector operators in Kampala District's five administrative divisions: Central, Kawempe, Makindye, Nakawa, and Rubaga. According to Kampala Capital City Authority (KCCA) business registration records updated in January 2024, approximately 156,000 informal sector businesses operated within the district. For purposes of this study, informal sector businesses were operationally defined as unregistered or minimally

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registered enterprises with fewer than 5 employees, annual turnover below UGX 150 million, and operating without formal business premises or with temporary structures.

Using Yamane's (1967) formula for sample size determination with a 95% confidence level and 5% margin of error, a sample size of 378 informal sector operators was calculated and selected for the study. A multi-stage sampling technique was employed to ensure representativeness across divisions and business types. First, the five administrative divisions were treated as strata, with proportional allocation yielding: Central Division (n=98), Kawempe (n=87), Makindye (n=71), Nakawa (n=69), and Rubaga (n=53). Second, within each division, major informal business concentration areas (markets, commercial streets, taxi parks, industrial areas) were identified and randomly selected. Third, systematic random sampling was used to select individual businesses from sampling frames developed through enumeration of businesses in selected areas, with every 15th business selected after a random start.

Data were collected using structured questionnaires administered through face-to-face interviews conducted by trained research assistants. The questionnaire comprised four main sections: Section A captured demographic and business characteristics including gender, age, education level, business type, years of operation, and monthly turnover; Section B assessed electronic invoicing dimensions including awareness of e-invoicing systems, adoption status, usage frequency, perceived ease of use, and perceived benefits, measured on five-point Likert scales; Section C measured tax compliance through multiple indicators including business registration status, Tax Identification Number (TIN) acquisition, filing of tax returns, accuracy of income reporting, timeliness of tax payments, and maintenance of business records; and Section D explored challenges and facilitators of e-invoicing adoption.

Electronic invoicing was operationalized through three key dimensions based on existing literature and the Technology Acceptance Model (Davis, 1989; Venkatesh & Davis, 2000). E-invoicing awareness encompassed knowledge of EFRIS and other e-invoicing systems, understanding of e-invoicing requirements, and awareness of penalties for non-compliance. E-invoicing adoption included actual registration with EFRIS, possession of e-invoicing devices or applications, and active use of e-invoicing for business transactions. Perceived e-invoicing benefits captured respondents' perceptions regarding simplified record-keeping, easier tax reporting, reduced compliance costs, improved business credibility, and better financial management resulting from e-invoicing use.

Tax compliance was measured using a multidimensional approach consistent with OECD guidelines and previous tax compliance research (OECD, 2021; Kirchler, 2007). Indicators included: registration compliance (possession of business licenses and TIN), filing compliance (regular submission of tax returns), payment compliance (timely payment of assessed taxes), reporting compliance (accuracy and completeness of income disclosure), and administrative compliance (maintenance of required business records and cooperation with tax authorities). Respondents rated their compliance behaviors on five-point Likert scales, with responses validated through cross-checking against URA taxpayer databases where respondents consented.

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The research instrument underwent rigorous validation processes to ensure reliability and validity. Content validity was established through expert review by five academics and practitioners specializing in taxation, digital systems, and informal sector economics. Experts evaluated each item for relevance, clarity, and comprehensiveness, with modifications incorporated based on their feedback. The final instrument achieved a content validity index (CVI) of 0.88, exceeding the recommended threshold of 0.70 (Amin, 2005). Face validity was assessed through cognitive interviews with 10 informal sector operators who evaluated question clarity and appropriateness, leading to simplification of technical terminology and adjustment of response scales.

Reliability testing was conducted through a pilot study involving 38 informal sector businesses (approximately 10% of the main sample) in Wakiso District, which bordered Kampala and contained similar informal sector characteristics. Pilot data were analyzed using Cronbach's alpha coefficient to assess internal consistency reliability. Results yielded alpha values of 0.89 for electronic invoicing measures and 0.86 for tax compliance measures, both substantially exceeding the acceptable threshold of 0.70, confirming instrument reliability.

Data collection occurred over eight weeks from October to December 2025. Eight research assistants, trained intensively on research ethics, questionnaire administration, and informal sector engagement, conducted face-to-face interviews at respondents' business locations. Interviews were conducted in English or Luganda depending on respondent preference, with questionnaires translated and back-translated to ensure linguistic equivalence. Of 378 targeted respondents, 366 completed interviews, representing a response rate of 96.8%. After data cleaning and completeness checks, 361 questionnaires were retained for final analysis.

Data analysis was performed using Statistical Package for Social Sciences (SPSS) version 27.0. Descriptive statistics including frequencies, percentages, means, and standard deviations were computed to summarize respondent characteristics and describe variable distributions. Pearson correlation analysis was conducted to determine the strength, direction, and significance of relationships between electronic invoicing dimensions and tax compliance. Multiple linear regression analysis was performed to assess the magnitude and significance of electronic invoicing effects on tax compliance while controlling for demographic and business characteristics. Regression diagnostics including tests for normality (Kolmogorov-Smirnov test, Q-Q plots), multicollinearity (Variance Inflation Factors), homoscedasticity (Breusch-Pagan test), and outliers (standardized residuals) were conducted to ensure assumptions were met and results were valid.

Ethical considerations were strictly observed throughout the research process. Ethical clearance was obtained from the institutional review board prior to data collection. Written informed consent was secured from all participants after explaining the study's purpose, voluntary nature of participation, confidentiality measures, right to withdraw, and absence of negative consequences for refusal or withdrawal. Given the sensitivity of tax compliance topics and potential concerns about information sharing with authorities, respondents were explicitly assured that data would be anonymized, reported only in aggregate form, and never shared with Uganda Revenue Authority or other government

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agencies. No personal identifying information was collected except voluntary provision of phone numbers for possible follow-up clarifications. Questionnaires were assigned numerical codes, and completed instruments were stored securely with restricted access. Additionally, interviews were conducted privately to protect confidentiality and avoid social desirability bias from observers.

Results

Demographic and Business Characteristics of Respondents

Table 1: Demographic Characteristics of Respondents (N=361)

Characteristic	Category	Frequency	Percentage
Gender	Male	198	54.8
	Female	163	45.2
Age	18-25 years	67	18.6
	26-35 years	152	42.1
	36-45 years	98	27.1
	Above 45 years	44	12.2
Education Level	Primary or below	78	21.6
	Secondary (O-level)	149	41.3
	Secondary (A-level)	87	24.1
	Tertiary	47	13.0
Division	Central	94	26.0
	Kawempe	84	23.3
	Makindye	68	18.8
	Nakawa	67	18.6
	Rubaga	48	13.3

Source: Primary Data, 2025

The demographic analysis revealed a relatively balanced gender distribution with males constituting 54.8% and females 45.2% of respondents, reflecting substantial female participation in Kampala's informal sector economy. This gender distribution aligned with broader patterns in urban informal economies where women actively engaged in trading, food vending, and service provision activities. Age distribution showed concentration in the 26-35 years category (42.1%), followed by 36-45 years (27.1%), indicating that informal sector entrepreneurship was dominated by young and middle-aged adults in their economically productive years. Youth aged 18-25 years represented 18.6%

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of the sample, suggesting emerging entry into informal business activities among younger populations facing limited formal employment opportunities.

Educational attainment data indicated varied literacy levels with important implications for e-invoicing adoption. Secondary O-level education was most common (41.3%), followed by A-level (24.1%), while 21.6% had only primary education or less. Tertiary education holders constituted 13.0% of respondents. This educational profile suggested moderate literacy levels overall, though the substantial proportion with only primary education (21.6%) raised concerns about digital literacy capacities and abilities to navigate electronic invoicing systems without support. The geographic distribution across Kampala's five divisions showed relatively proportional representation, with Central Division having the largest representation (26.0%) consistent with its higher concentration of commercial activities.

Table 2: Business Characteristics of Respondents (N=361)

Characteristic	Category	Frequency	Percentage
Business Type	Retail/trading	147	40.7
	Food vending	82	22.7
	Artisan services	56	15.5
	Transportation	38	10.5
	Manufacturing	22	6.1
	Other services	16	4.4
Business Duration	Less than 1 year	48	13.3
	1-3 years	134	37.1
	4-6 years	109	30.2
	Above 6 years	70	19.4
Monthly Turnover	Below UGX 500,000	96	26.6
	UGX 500,000-1M	128	35.5
	UGX 1M-3M	98	27.1
	Above UGX 3M	39	10.8
Number of Employees	Owner only	178	49.3
	1-2 employees	142	39.3
	3-4 employees	41	11.4
Business Premises	Open-air/street	134	37.1
	Market stall	118	32.7
	Container/kiosk	76	21.1

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Characteristic	Category	Frequency	Percentage
	Small shop	33	9.1

Source: Primary Data, 2025

Business characteristics analysis revealed that retail trading dominated (40.7%), followed by food vending (22.7%) and artisan services (15.5%), reflecting typical informal sector activity patterns in African urban centers. Transportation services, primarily motorcycle taxis (boda-bodas) and small taxi operations, represented 10.5% of the sample. Most businesses were relatively young, with 37.1% operating for 1-3 years and only 19.4% exceeding 6 years, indicating high turnover rates and business mortality common in informal sectors. This youth profile suggested that many operators lacked established business routines and might be more receptive to adopting new systems like e-invoicing, though they simultaneously faced greater vulnerability and resource constraints.

Monthly turnover data indicated that most businesses operated at modest scales, with 35.5% earning UGX 500,000-1 million monthly and 26.6% below UGX 500,000. Only 10.8% exceeded UGX 3 million monthly turnover. These low revenue levels underscored the micro-enterprise nature of most informal businesses and raised questions about their capacity to invest in digital technologies. Nearly half of businesses (49.3%) operated as one-person enterprises without employees, while 39.3% had 1-2 employees, confirming the micro-scale character of the informal sector. Business premises types showed that 37.1% operated from open-air or street locations, 32.7% from market stalls, and 21.1% from containers or kiosks, with only 9.1% occupying conventional shop premises. This distribution highlighted the mobility and informality of business operations, with implications for enforcement and monitoring by tax authorities.

Electronic Invoicing Awareness, Adoption, and Perceptions

Table 3: Descriptive Statistics for Electronic Invoicing Dimensions (N=361)

Electronic Invoicing Indicator	Mean	SD	Interpretation
E-Invoicing Awareness			
I have heard about electronic invoicing systems	3.42	1.28	Moderate
I know about EFRIS (URA's e-invoicing system)	3.18	1.34	Moderate
I understand how e-invoicing works	2.87	1.39	Moderate
I know the requirements for e-invoicing registration	2.76	1.42	Moderate
I am aware of penalties for not using e-invoicing	3.04	1.36	Moderate
Overall E-Invoicing Awareness	3.05	1.12	Moderate
E-Invoicing Adoption			
My business is registered with EFRIS	2.34	1.47	Low
I have e-invoicing device/app on my phone	2.18	1.42	Low

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Electronic Invoicing Indicator	Mean	SD	Interpretation
I issue electronic receipts to customers	2.42	1.49	Low
I use e-invoicing system regularly	2.29	1.45	Low
I submit sales data through e-invoicing system	2.15	1.41	Low
Overall E-Invoicing Adoption	2.28	1.29	Low
Perceived E-Invoicing Benefits			
E-invoicing helps keep better business records	3.67	1.18	High
E-invoicing makes tax reporting easier	3.54	1.21	High
E-invoicing reduces time spent on tax matters	3.41	1.24	Moderate
E-invoicing improves my business reputation	3.38	1.26	Moderate
E-invoicing helps me track sales accurately	3.72	1.15	High
E-invoicing helps me manage my business better	3.59	1.19	High
Overall Perceived E-Invoicing Benefits	3.55	1.02	High
Overall Electronic Invoicing	2.96	0.98	Moderate

Note: Mean scores interpretation: 1.00-2.00 = Low; 2.01-3.00 = Moderate; 3.01-4.00 = High; 4.01-5.00 = Very High

Source: Primary Data, 2025

The descriptive analysis of electronic invoicing revealed important patterns across the three dimensions examined. Overall e-invoicing awareness was moderate (M=3.05, SD=1.12), indicating that informal sector operators had basic familiarity with electronic invoicing concepts though understanding remained incomplete. Specifically, general awareness of electronic invoicing systems scored highest (M=3.42, SD=1.28), while understanding of how e-invoicing works (M=2.87, SD=1.39) and knowledge of registration requirements (M=2.76, SD=1.42) scored lower. This pattern suggested that while sensitization campaigns had achieved basic awareness, deeper understanding necessary for confident adoption remained limited. The high standard deviations across awareness items indicated substantial variation, with some operators quite knowledgeable while others remained largely uninformed.

E-invoicing adoption levels were notably low (M=2.28, SD=1.29), revealing a significant awareness-adoption gap. Only a minority of informal businesses had actually registered with EFRIS (M=2.34, SD=1.47) or possessed e-invoicing devices or applications (M=2.18, SD=1.42). Regular use of e-invoicing systems scored lowest (M=2.29, SD=1.45), and actual submission of sales data through e-invoicing platforms was minimal (M=2.15, SD=1.41). These findings confirmed that despite moderate awareness, actual implementation of e-invoicing remained limited in the informal sector, consistent with URA's own estimates. The gap between awareness and adoption suggested that knowledge alone was insufficient; significant barriers prevented translation of awareness into actual use.

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Interestingly, perceived e-invoicing benefits scored high overall (M=3.55, SD=1.02), indicating generally positive attitudes toward electronic invoicing among informal sector operators. Respondents particularly recognized that e-invoicing helped track sales accurately (M=3.72, SD=1.15) and keep better business records (M=3.67, SD=1.18). Benefits related to business management (M=3.59, SD=1.19) and easier tax reporting (M=3.54, SD=1.21) were also strongly perceived. This positive perception of benefits despite low adoption suggested that barriers to implementation were primarily practical (cost, access, skills) rather than attitudinal. The relatively lower standard deviations for perceived benefits compared to awareness items indicated greater consensus on e-invoicing advantages.

Tax Compliance Levels

Table 4: Descriptive Statistics for Tax Compliance Indicators (N=361)

Tax Compliance Indicator	Mean	SD	Interpretation
Registration Compliance			
My business is officially registered	2.87	1.38	Moderate
I have a Tax Identification Number (TIN)	2.64	1.43	Moderate
I have necessary business licenses	2.76	1.40	Moderate
Overall Registration Compliance	2.76	1.25	Moderate
Filing Compliance			
I file tax returns regularly	2.42	1.45	Low
I submit required tax documents on time	2.51	1.44	Moderate
I understand tax filing procedures	2.68	1.41	Moderate
Overall Filing Compliance	2.54	1.31	Moderate
Payment Compliance			
I pay my taxes on time	2.58	1.46	Moderate
I pay the correct amount of tax owed	2.71	1.43	Moderate
I have no outstanding tax arrears	2.83	1.42	Moderate
Overall Payment Compliance	2.71	1.32	Moderate
Reporting Compliance			
I report all my business income accurately	2.94	1.37	Moderate
I keep records of all business transactions	3.08	1.34	Moderate
I declare my actual sales to tax authorities	2.79	1.40	Moderate
I provide accurate information on tax forms	2.91	1.38	Moderate





Tax Compliance Indicator	Mean	SD	Interpretation
Overall Reporting Compliance	2.93	1.27	Moderate
Overall Tax Compliance	2.74	1.19	Moderate

Source: Primary Data, 2025

The tax compliance analysis revealed moderate overall compliance levels (M=2.74, SD=1.19) among informal sector operators in Kampala District, though substantial room for improvement existed across all dimensions. Reporting compliance showed the highest mean score (M=2.93, SD=1.27), with respondents indicating moderate levels of keeping transaction records (M=3.08, SD=1.34) and reporting income accurately (M=2.94, SD=1.37). However, even these highest-scoring items remained only moderately implemented, and the relatively high standard deviations indicated significant heterogeneity in compliance behavior across the sample.

Registration compliance averaged M=2.76, SD=1.25, with official business registration (M=2.87, SD=1.38) slightly more common than TIN acquisition (M=2.64, SD=1.43) or possession of necessary licenses (M=2.76, SD=1.40). The lower compliance with TIN registration was particularly concerning as TIN constituted the foundational requirement for formal tax system participation. Many informal operators appeared to have some form of business registration, possibly with KCCA or trading authorities, without necessarily registering with URA for tax purposes.

Payment compliance (M=2.71, SD=1.32) and filing compliance (M=2.54, SD=1.31) showed lower scores, indicating that even among businesses with some level of registration, consistent fulfillment of ongoing tax obligations remained weak. Regular tax return filing scored lowest (M=2.42, SD=1.45), approaching the "low" interpretation threshold, suggesting that many registered businesses failed to maintain active compliance with periodic reporting requirements. Payment timeliness (M=2.58, SD=1.46) and accuracy (M=2.71, SD=1.43) were similarly moderate, indicating gaps between registration and actual revenue contribution.

The overall moderate compliance levels, combined with high standard deviations across most items, revealed a polarized informal sector with some operators demonstrating reasonable compliance efforts while many others remained largely outside the tax system. This heterogeneity suggested that different intervention strategies might be needed for different informal sector segments, and that one-size-fits-all approaches to compliance improvement were unlikely to succeed.

Correlation Analysis

Table 5: Pearson Correlation Analysis Between Electronic Invoicing and Tax Compliance (N=361)

Variables	1	2	3	4	5
1. E-Invoicing Awareness	1				
2. E-Invoicing Adoption	.687**	1			
3. Perceived E-Invoicing Benefits	.624**	.653**	1		

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Variables	1	2	3	4	5
4. Overall Electronic Invoicing	.892**	.915**	.858**	1	
5. Tax Compliance	.682**	.697**	.618**	.734**	1

*Note: *Correlation is significant at the 0.01 level (2-tailed)

Source: Primary Data, 2025

The correlation analysis demonstrated significant positive relationships between all electronic invoicing dimensions and tax compliance at the 99% confidence level. Overall electronic invoicing showed a strong positive correlation with tax compliance ($r=0.734$, $p<0.01$), providing robust evidence that informal sector operators with higher e-invoicing engagement demonstrated significantly better tax compliance behaviors. This strong correlation supported the theoretical proposition that digital invoicing systems enhanced compliance by reducing information asymmetries, increasing detection probabilities, and simplifying compliance processes (Bachas et al., 2020; OECD, 2021).

Among the individual dimensions, e-invoicing adoption exhibited the strongest correlation with tax compliance ($r=0.697$, $p<0.01$), indicating that actual use of e-invoicing systems, rather than mere awareness or positive perceptions, most strongly associated with compliance behavior. This finding aligned with deterrence theory expectations that actual monitoring mechanisms rather than abstract knowledge influenced compliance decisions (Allingham & Sandmo, 1972). E-invoicing awareness also showed strong correlation with tax compliance ($r=0.682$, $p<0.01$), suggesting that knowledge of e-invoicing systems, including awareness of requirements and penalties, contributed to compliance even before full adoption occurred. Perceived e-invoicing benefits demonstrated a substantial though slightly lower correlation with tax compliance ($r=0.618$, $p<0.01$), indicating that recognizing advantages of e-invoicing related positively to compliance, possibly through enhanced motivation or reduced psychological costs of compliance.

The inter-correlations among electronic invoicing dimensions were high and significant, ranging from 0.624 to 0.687, indicating that these constructs were conceptually related and mutually reinforcing. Informal operators who were aware of e-invoicing tended to have adopted it and perceived its benefits positively, suggesting coherent patterns of e-invoicing engagement. However, the correlations were not so high as to indicate redundancy, confirming that awareness, adoption, and perceived benefits represented distinct though related aspects of e-invoicing engagement.

These correlation patterns provided strong preliminary evidence supporting the hypothesized relationship between electronic invoicing and tax compliance in the informal sector context. The consistently significant correlations across all dimensions suggested that e-invoicing initiatives could indeed enhance compliance, though the moderate adoption levels observed indicated that realizing this potential required addressing implementation barriers.

Table 6: Correlation between Electronic Invoicing and Specific Tax Compliance Dimensions (N=361)





E-Invoicing Dimensions	Registration Compliance	Filing Compliance	Payment Compliance	Reporting Compliance
E-Invoicing Awareness	.638**	.592**	.614**	.671**
E-Invoicing Adoption	.672**	.641**	.658**	.693**
Perceived Benefits	.581**	.548**	.572**	.627**

*Note: *Correlation is significant at the 0.01 level (2-tailed)

Source: Primary Data, 2025

Additional analysis examining relationships between e-invoicing dimensions and specific tax compliance components revealed that electronic invoicing correlated significantly with all compliance dimensions, though with varying strengths. E-invoicing adoption showed strongest correlations with reporting compliance ($r=0.693$, $p<0.01$) and registration compliance ($r=0.672$, $p<0.01$), suggesting that adopters were more likely to register formally and maintain accurate business records. Correlations with filing compliance ($r=0.641$, $p<0.01$) and payment compliance ($r=0.658$, $p<0.01$) were also substantial. Similar patterns emerged for e-invoicing awareness, which correlated most strongly with reporting compliance ($r=0.671$, $p<0.01$). These findings suggested that e-invoicing systems influenced multiple compliance dimensions simultaneously rather than affecting only specific aspects of tax behavior.

Table 7: Comparison of Tax Compliance Levels by E-Invoicing Adoption Status (N=361)

Adoption Status	n	Mean Tax Compliance	SD	F	Sig.
Non-adopters (no EFRIS registration)	247	2.38	1.08	94.27	.000
Partial adopters (registered but irregular use)	78	3.24	0.89		
Full adopters (registered with regular use)	36	4.07	0.76		

Source: Primary Data, 2025

A one-way ANOVA was conducted to compare tax compliance levels across informal businesses with different e-invoicing adoption statuses. Results revealed highly significant differences in mean tax compliance across the three groups ($F=94.27$, $p<.001$). Full adopters who had registered with EFRIS and used the system regularly demonstrated substantially higher tax compliance ($M=4.07$, $SD=0.76$) compared to partial adopters with irregular use ($M=3.24$, $SD=0.89$) and non-adopters without EFRIS registration ($M=2.38$, $SD=1.08$). Post-hoc Tukey HSD tests confirmed that all pairwise differences were statistically significant ($p<.001$), demonstrating a clear graduated relationship between adoption levels and compliance outcomes.

These findings provided additional evidence that progressive engagement with e-invoicing systems corresponded with enhanced tax compliance, supporting the policy emphasis on expanding e-invoicing coverage. The substantial compliance difference between non-adopters and partial adopters suggested that even incomplete or irregular e-





invoicing use yielded compliance improvements, while the further gain from partial to full adoption indicated that consistent use maximized compliance benefits.

Table 10: Challenges to E-Invoicing Adoption Reported by Informal Sector Operators (N=361)

Challenge	Frequency	Percentage
Lack of smartphone/suitable device	267	74.0
High cost of internet data	243	67.3
Limited digital literacy/skills	218	60.4
Unreliable electricity for charging devices	189	52.4
Poor network coverage in operating areas	176	48.8
Complexity of e-invoicing system	164	45.4
Fear of increased tax burden	157	43.5
Lack of training on system use	152	42.1
Low customer demand for electronic receipts	138	38.2
Distrust of government digital systems	124	34.3

Source: Primary Data, 2025

Descriptive analysis of reported challenges to e-invoicing adoption revealed multiple significant barriers. Lack of suitable devices was most prevalent (74.0%), with many informal operators using basic phones incapable of running e-invoicing applications. High internet data costs represented another major barrier (67.3%), particularly burdensome given low profit margins in informal businesses. Limited digital literacy affected 60.4% of respondents, indicating that many operators lacked confidence or skills to navigate digital systems independently. Infrastructure challenges including unreliable electricity (52.4%) and poor network coverage (48.8%) constrained adoption, particularly for operators in peripheral urban areas or using street locations without reliable power access.

System-related challenges included perceived complexity (45.4%) and inadequate training (42.1%), suggesting that user experience design and support services required improvement. Attitudinal barriers such as fear of increased tax burdens (43.5%) and distrust of government systems (34.3%) indicated that psychological resistance complemented practical barriers. The low customer demand for electronic receipts (38.2%) suggested limited market pressure for adoption, reducing incentives for voluntary compliance beyond regulatory requirements. These challenge patterns underscored that successful e-invoicing expansion in the informal sector required multifaceted interventions addressing technological access, skills development, infrastructure improvement, and trust-building simultaneously.

Conclusions

This study established a significant positive relationship between electronic invoicing and tax compliance within the informal sector in Kampala District. The findings conclusively demonstrated that e-invoicing awareness, adoption,

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and perceived benefits substantially enhanced tax compliance behavior among informal sector operators. The regression analysis revealed that electronic invoicing dimensions explained 53.9% of tax compliance variance, confirming e-invoicing as a major determinant of compliance in this context and validating policy emphasis on digital tax administration modernization.

The research concluded that e-invoicing awareness constituted the strongest predictor of tax compliance, even exceeding adoption effects. This finding underscored that knowledge-building and sensitization initiatives generated compliance benefits independently of full system implementation, possibly by clarifying compliance expectations, increasing perceived detection risks, and reducing uncertainty about tax obligations. The substantial effect of awareness suggested that comprehensive public education campaigns emphasizing e-invoicing systems, requirements, benefits, and penalties could yield immediate compliance improvements while supporting long-term adoption.

The study further concluded that actual e-invoicing adoption significantly enhanced tax compliance beyond awareness effects, confirming that requiring digital transaction recording and reporting mechanically improved compliance by reducing concealment opportunities and simplifying reporting processes. The compliance differential between full adopters, partial adopters, and non-adopters demonstrated a dose-response relationship where greater e-invoicing engagement yielded proportionally higher compliance, supporting policies to expand coverage and encourage consistent system use.

Perceived e-invoicing benefits emerged as an independent compliance predictor, indicating that recognizing business management advantages of e-invoicing enhanced compliance behavior. This finding suggested that framing e-invoicing as a business development tool rather than purely a tax enforcement mechanism could enhance voluntary acceptance and sustained usage. Operators who viewed e-invoicing as beneficial for record-keeping, financial management, and business credibility demonstrated higher compliance, validating approaches that emphasize mutual benefits rather than mere regulatory compulsion.

However, the study also concluded that despite moderate awareness and positive benefit perceptions, actual e-invoicing adoption remained low in Kampala's informal sector, revealing significant implementation gaps. Multiple barriers including lack of suitable devices, high internet costs, limited digital literacy, infrastructure deficiencies, system complexity, and attitudinal resistance constrained adoption. The substantial awareness-adoption gap indicated that knowledge alone was insufficient; comprehensive support addressing practical barriers was essential for translating awareness into actual implementation.

The moderate overall tax compliance levels observed, combined with the strong relationship with e-invoicing, indicated substantial unrealized potential for revenue mobilization through expanded digital invoicing systems. The findings contributed empirical evidence from Uganda's informal sector to the broader literature on digital tax administration in developing economies, validating theoretical propositions while highlighting context-specific implementation challenges.

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Recommendations

URA should implement aggressive nationwide e-invoicing sensitization campaigns specifically targeting informal sector operators, utilizing multiple channels including radio broadcasts in local languages, community meetings in markets and trading centers, SMS messaging, and peer educator programs. Campaigns should emphasize both compliance requirements and practical business benefits to address awareness gaps and enhance perceived value. URA should develop simplified e-invoicing interfaces specifically designed for informal sector users with limited digital literacy, featuring intuitive navigation, minimal text, visual instructions, local language options, and voice guidance capabilities. A tiered e-invoicing approach should be implemented, offering basic functionality for micro-enterprises while requiring more comprehensive features only from larger businesses, reducing complexity barriers for smallest operators.

URA should establish mobile support teams providing on-site e-invoicing registration assistance and training in markets, taxi parks, and commercial streets where informal businesses concentrate. These teams should offer hands-on device setup, application installation, initial transaction demonstrations, and troubleshooting support, reducing technical barriers to adoption. A toll-free helpline with multilingual support should be maintained for ongoing technical assistance. Additionally, URA should develop incentive programs rewarding consistent e-invoicing compliance, such as fast-track service access, recognition certificates, preferential consideration for government contracts, or small tax credits, creating positive reinforcement complementing enforcement approaches.

The authority should collaborate with telecommunications companies to negotiate subsidized internet data packages specifically for e-invoicing purposes, reducing ongoing cost barriers that particularly affected low-margin informal businesses. Bundled data-device packages could be developed, spreading costs over time. URA should also explore partnerships with mobile money platforms to integrate e-invoicing with existing digital payment systems already familiar to informal operators, leveraging established technological adoption and trust.

The Ministry of Finance should allocate dedicated budgetary resources for informal sector e-invoicing facilitation, recognizing that compliance improvement required investment beyond mere mandate issuance. Resources should support device subsidies, training programs, infrastructure development, and technical assistance services. A phased implementation approach should be adopted, beginning with relatively larger and more formalized informal businesses before extending to smallest micro-enterprises, allowing iterative learning and system refinement.

The Ministry of ICT and National Guidance should prioritize digital literacy programs emphasizing practical skills for business technology use, not merely general computer training. Programs should be delivered through accessible community venues using informal operators' actual business scenarios. Government should invest in last-mile internet

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infrastructure expansion, particularly in informal business concentration areas, addressing connectivity barriers that constrained adoption regardless of willingness.

KCCA and local governments should integrate e-invoicing compliance into business licensing renewal processes, creating natural compliance checkpoints while avoiding additional bureaucratic burden. Local authorities should provide physical spaces in markets and commercial areas where informal operators could access devices, internet, and assistance for e-invoicing activities, establishing "digital tax corners" reducing individual infrastructure requirements. Tax policy should be reformed to address informal sector concerns about tax burden escalation following e-invoicing adoption. Clear threshold exemptions should be communicated, transparent rate structures published, and commitments made that formalization would not trigger punitive taxation. Building trust that honesty would be rewarded rather than exploited was essential for voluntary compliance.

Private companies developing e-invoicing solutions should design products specifically for informal sector needs, prioritizing simplicity, low data consumption, offline functionality with later synchronization, and compatibility with basic smartphones. User testing with actual informal operators should inform design iterations. Companies should explore business models offering free basic e-invoicing applications with revenue from value-added services, reducing upfront cost barriers.

Telecommunications companies should develop affordable smartphone models optimized for business applications including e-invoicing, priced accessibly for informal operators. Device financing schemes with micropayment options could enhance affordability. Internet service providers should offer specialized data packages for business applications with prioritized bandwidth for e-invoicing systems, ensuring reliability even during network congestion.

Mobile money and fintech companies should integrate e-invoicing functionality into their platforms, allowing operators already using mobile money to seamlessly generate electronic receipts as part of transaction processes they already perform. This integration could dramatically reduce adoption friction by embedding e-invoicing into familiar workflows.

Trader associations, market vendor groups, boda-boda associations, and other informal sector organizations should conduct peer education programs where early adopters share experiences and provide practical guidance to peers. Peer learning often proved more effective than top-down training for informal operators. Associations should negotiate collective agreements with device suppliers, internet providers, and e-invoicing vendors for group discounts, leveraging collective bargaining power.

Informal sector organizations should advocate for member interests in e-invoicing policy development, ensuring implementation approaches respected informal sector realities and constraints. They should facilitate dialogue between members and tax authorities, building trust and mutual understanding. Associations could establish shared

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resource facilities providing members access to devices, internet, and trained assistants for e-invoicing activities, mutualizing costs.

International organizations and NGOs supporting private sector development should provide technical and financial assistance for e-invoicing implementation programs targeting informal sectors. Support should include funding for device subsidies, training programs, infrastructure development, and monitoring and evaluation systems tracking implementation progress. Partners should facilitate South-South learning, connecting Ugandan stakeholders with counterparts in Rwanda, Kenya, and other countries with informal sector e-invoicing experience.

Development partners should support research on e-invoicing impacts, generating evidence to guide policy refinement and demonstrate benefits to skeptical stakeholders. Longitudinal studies tracking adopters' business performance could provide compelling narratives about e-invoicing value beyond mere compliance.

Scholars should conduct longitudinal studies tracking informal businesses over extended periods following e-invoicing adoption, examining causal pathways through which e-invoicing influences compliance and broader business outcomes. Experimental or quasi-experimental designs with treatment and control groups would strengthen causal inference beyond cross-sectional associations. Qualitative research should explore informal operators' lived experiences with e-invoicing adoption, uncovering nuanced barriers and facilitators not captured in quantitative surveys.

Future research should investigate moderating factors affecting the e-invoicing-compliance relationship, such as business size, sector, operator education, peer adoption rates, and enforcement intensity, identifying conditions maximizing e-invoicing effectiveness. Comparative studies across different Ugandan cities and rural areas would reveal geographic variations in implementation challenges and success factors. Research should examine long-term effects of e-invoicing on business formalization trajectories, investigating whether digital compliance served as a gateway to broader formal economy participation.

Studies should assess cost-effectiveness of different e-invoicing implementation strategies, comparing device subsidies, training programs, infrastructure investments, and enforcement approaches to guide optimal resource allocation. Research should also investigate unintended consequences of e-invoicing mandates, such as business displacement into shadow economy segments, employment effects, or pricing impacts, ensuring comprehensive policy evaluation. Finally, studies examining the revenue yield from informal sector e-invoicing relative to implementation costs would provide crucial evidence for policy prioritization and resource justification.

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