DIGITAL FINANCIAL SERVICES AND E-TAX SYSTEMS EFFICIENCY IN CHAD: A THEORETICAL REVIEW

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ABSTRACT

Digital financial services (DFS) are increasingly recognized as important instruments for modernizing tax administration, improving transparency, and expanding revenue mobilization in developing economies (World Bank, 2023; IMF, 2024). However, Chad continues to face persistent challenges in domestic revenue mobilization, reflected in a relatively low tax-to-GDP ratio of 13.1% in 2023, which remains below the African average of 16.1% reported across African economies.

Despite the introduction of electronic tax platforms and mobile tax payment integration in 2023, the adoption of digital tax systems in Chad remains limited, owing to low technological literacy, limited digital financial training, inadequate infrastructure, and low taxpayer awareness of digital tax platforms (World Bank, 2023).

This theoretical review examines the effect of digital financial services on the efficiency of e-tax systems in Chad. It specifically analyses the direct influence of digital financial services, technological literacy and user competence, financial digital training, and digital wallet usage on e-tax systems efficiency. The review further explores the mediating role of taxpayer awareness and education and the moderating role of infrastructure and accessibility in the relationship between digital financial services and e-tax efficiency.

The study is anchored on the Technology Acceptance Model (Davis, 1989) and is supported by the Diffusion of Innovation Theory (Rogers, 2003), Fiscal Exchange Theory (Musgrave, 1966; Levi, 1988), and Institutional Theory (DiMaggio & Powell, 1983).

Empirical literature is incorporated to examine previous studies on digital financial services, financial inclusion, and tax compliance in developing economies.

Key words: Digital Financial Services, E-Tax Systems Efficiency, Technological Literacy, Digital Wallet, Financial Digital Training, Taxpayer Awareness, Mediation, Moderation.

INTRODUCTION

In recent years, the global shift toward digital governance has created opportunities for low-income countries like Chad to modernize public finance systems, particularly through the digitization of tax administration via e-tax platforms and digital financial payment services (World Bank, 2023; Nascimento et al., 2023). These innovations aim to streamline tax processes, enhance transparency, reduce administrative costs, minimize cash-based leakages, and broaden the tax base in contexts with large informal sectors. Chad has pursued such reforms

amid persistent fiscal challenges. The country's tax-to-GDP ratio has historically fluctuated significantly due to oil price volatility, conflict, and structural weaknesses in non-oil revenue collection. According to the OECD Revenue Statistics in Africa 2025, the ratio reached a low of 3.7% in 2016. Still, it rose sharply in recent years, from 9.8% in 2022 to 13.1% in 2023 (an increase of 3.4 percentage points, one of the largest in Africa), driven primarily by higher corporate income taxes from the oil sector (OECD, African Union Commission, & African Tax Administration Forum, 2025). Despite this recovery, Chad's 2023 ratio remains below Africa's unweighted average of 16.1%, underscoring ongoing inefficiencies in domestic resource mobilization beyond oil dependency.

E-Tax Systems Efficiency

E-Tax Systems efficiency, defined as the system's ability to collect revenue with minimal costs, delays, evasion, and coverage gaps while maximizing voluntary compliance, remains suboptimal. Compliance rates, especially among small taxpayers and the informal sector, are low (often below 30%), limiting fiscal space for essential services like infrastructure, health, and education (Khando et al., 2022; World Bank, 2023; IMF, 2024).

To address these issues, the Chadian government, through the Direction Générale des Impôts (DGI) under the Ministry of Finance and Budget, launched an integrated e-tax system in January 2023. This included mobile money integration for presumptive taxes such as the impôt général libératoire (IGL), supported by the World Bank-financed Chad Digitalization of Revenue Administrations and COVID-19 Response Project (P164529). The initiative aimed to facilitate electronic filing, tele-declaration, tele-payment, and mobile options to improve accessibility, particularly for small taxpayers in rural areas (World Bank, 2023 Implementation Status Report).

Digital Financial Services

Digital financial Services (DFS), including mobile money, e-wallets, and online banking, have shown promise in other African contexts by enhancing revenue monitoring, reducing leakages, and expanding the tax base (Usmany et al., 2024; Nascimento et al., 2023).

In Kenya and Ghana, similar integrations increased tax registration and compliance by over 25%. However, in Chad, adoption has been limited. By mid-2023, only approximately 18.69% of small taxpayers had used mobile payment channels for presumptive taxes, while large taxpayers largely shifted to bank-based payments, highlighting a persistent digital divide (World Bank, 2023).

Technological Literacy and User Competence (TLC)

Technological literacy and user competence, or TLC for short, means how well taxpayers can use digital tools like smartphones, apps, and online forms to handle their taxes. It's basically the basic computer and phone skills needed to file and pay taxes online without getting stuck or making mistakes. Without these skills, even the best digital systems don't work well.

Globally, studies show that people with stronger digital skills are much more likely to use e-tax platforms and pay on time. For instance, in emerging markets like Malaysia and Indonesia, "greater levels of digital literacy greatly improve user engagement and trust in electronic tax systems" (Faisal, Gani, & Ahmad, 2020). This helps reduce errors and boosts overall tax collection.

In Africa, the same pattern holds. Research in South Africa found that small businesses with good ICT training were 42% more likely to adopt digital tax tools (Fatoki & Sibanda, 2023). But in places with low skills, adoption drops sharply.

Financial Digital Training

These are training programs that teach people how to use DFS and e-tax, like workshops or online lessons. We can measure it by asking if someone has had training (yes/no), how many hours, or how useful they found it (1-5 scale). Training helps people get better at digital money, and in places like Africa, it can make tax paying easier (World Bank, 2023). In Chad, there are some government programs, but not enough, so it limits e-tax use.

Digital Wallet

This is an app or service on your phone where you store money digitally, like a virtual bank. We can measure it by the percentage of people who have one, how often they use it for payments, or if they link it to e-tax. Wallets are part of DFS and make paying taxes quick (IMF, 2025). In Chad, wallets like those from Airtel are common in cities but rare in villages (GSMA, 2025).

These independent variables, DFS, TLC, FDT, and DW, don't work alone. They build on each other to affect tax efficiency, but their power depends on Tax Awareness and Education (the mediator) and Infrastructure and Accessibility (the moderator). This sets the stage for why this study matters in Chad.

Taxpayer Awareness and Education

Taxpayer education and awareness are also critical. Even with infrastructure in place, low digital literacy, limited outreach by tax authorities, and misconceptions about digital tools hinder adoption (World Bank, 2023; Iqbal & Sami, 2017). Successful examples elsewhere, such as SMS reminders and awareness campaigns in Cameroon boosting filing rates among informal workers (Frățilă et al., 2023), suggest that targeted programs could bridge this gap in Chad.

Infrastructure and Accessibility

Chad's digital taxation framework heavily depends on infrastructure and accessibility. Rural areas face unreliable internet, limited mobile coverage, high data costs, electricity shortages, and low smartphone penetration, which restricts e-tax platform use and exacerbate inequalities (Kounadeas, 2023; Gheorghe, 2019). These gaps undermine the potential of technological innovation to drive efficiency.

In summary, while Chad has made strides in digital tax modernization, supported by international partners like the World Bank, the full potential remains unrealized due to infrastructural, behavioural, regulatory, and cultural barriers. Improving tax efficiency through DFS integration is essential for sustainable revenue growth, reduced oil dependency, and equitable development. This study examines these dynamics to provide evidence-based insights for policy enhancement.

Statement of the problem

According to the Organisation for Economic Co-operation and Development, the African Union Commission, and the African Tax Administration Forum in Revenue Statistics in Africa 2025, Chad's tax-to-GDP ratio increased from 9.8% in 2022 to 13.1% in 2023, representing one of the largest increases among the 38 African countries analyzed. This improvement was mainly driven by higher corporate income tax revenues from the oil sector. Despite this progress, Chad's tax-to-GDP ratio remains below the African average of 16.1%, and historical data show strong fluctuations, including a sharp decline to about 3.7% in 2016 due to oil price shocks and conflict-related disruptions. These trends indicate persistent structural weaknesses in non-oil tax collection and domestic revenue mobilization.

Low tax compliance, particularly among small taxpayers and informal businesses, continues to limit tax efficiency in Chad. To address these challenges, the government introduced digital financial services (DFS) such as mobile money payments for taxes like the impôt général libératoire in 2023 through the Direction Générale des Impôts under the Ministry of Finance, with support from the World Bank. These initiatives aim to improve transparency, reduce cash leakages, and expand tax collection coverage. However, adoption remains limited, as only 18.69% of small taxpayers had used mobile payment channels by mid-2023, highlighting a significant digital divide.

The impact of DFS on e-tax system efficiency is influenced by additional factors such as technological literacy and user competence, financial digital training, and digital wallet

usage. Furthermore, taxpayer awareness and education act as a mediating factor, while infrastructure and accessibility, including mobile network coverage, electricity reliability, data costs, and device availability, moderate the relationship between DFS adoption and tax efficiency.

Although countries such as Kenya and Ghana have successfully used mobile money systems to expand their tax bases, Chad continues to face implementation challenges. Existing studies by institutions such as the International Monetary Fund and the World Bank highlight these barriers, but empirical research on the relationship between DFS adoption and e-tax system efficiency in Chad remains limited. Therefore, this study seeks to examine the effect of digital financial services on the efficiency of e-tax systems in Chad, while considering the mediating role of taxpayer awareness and the moderating role of infrastructure accessibility.

Objectives of the study

General objective

To investigate the effect of Digital Financial Services on E-tax Systems Efficiency in Chad.

Specific Objectives

i. To establish the effect of Digital Financial Services on E-tax Systems Efficiency in Chad.
ii. To determine the effect of user proficiency and technological literacy on E-tax Systems Efficiency in Chad.
iii. To determine the effect of the Financial Digital Training on E-tax Systems Efficiency in Chad.
iv. To determine the effect of the Digital wallet on E-tax Systems Efficiency in Chad.
v. To determine the mediation effect of taxpayer education and awareness on E-tax Systems Efficiency in Chad.
vi. To determine the moderating effect of accessibility and infrastructure on the relationship between E-tax Systems Efficiency in Chad.

Research Hypotheses

H_{01}: Digital financial Services have no significant effect on the E-tax Systems Efficiency in Chad.
H_{02}: Technological literacy and user competence have no significant influence on E-tax Systems Efficiency in Chad's.
H_{03}: Financial Digital Training have no significant effect on the E-tax Systems Efficiency in Chad.
H_{04}: Digital Wallet have no significant effect on E-tax Efficiency Systems in Chad.
H_{05}: Taxpayer awareness and education have no significant effect on E-tax Systems Efficiency in Chad.
H_{06}: Infrastructure and accessibility have no significant effect on E-tax Systems efficiency in Chad.

Significance of the Study

This study is important because it helps understand how digital financial Services can improve E-tax collection in Chad, where revenue is still low and many people do not use e-tax tools.
For the Ministry of Finance and Budget and the Direction Générale des Impôts (DGI), the findings will give practical ideas on how to make digital tax payments work better. This can help increase tax revenue, reduce costs, and reach more taxpayers, especially small businesses and people in rural areas. Better tax efficiency means more money for roads, schools, hospitals, and other public services.

For taxpayers and small businesses (SMEs), the study will show what stops people from using digital payments (like lack of skills, poor internet, or distrust). This can lead to easier training programs and fairer rules, so paying taxes becomes simpler and less stressful.
For international partners like the World Bank and IMF, the results will provide evidence on what works (and what does not) in fragile countries like Chad. This can guide future support for digital tax projects in Africa.

For researchers and students, the study will add new knowledge about digital taxation in a low-income, conflict-affected country. Most research on e-tax comes from Kenya, Ghana, or South Africa, this work fills a gap by focusing on Chad, including how awareness acts as a mediator and infrastructure as a moderator.

Overall, the study will contribute to better policy, higher revenue, and more inclusive digital tax systems in Chad. It supports the national goal of reducing oil dependency and building a stronger economy.

Scope of the Study

The study investigated the effect of digital financial services on the efficiency of e-tax systems in Chad. The study was conducted in Chad, and the target population consisted of registered taxpayers, small and medium-sized enterprises (SMEs), informal sector operators, and mobile money users interacting with the tax system. The study focuses on the tax administration environment under the Ministry of Finance and Budget, particularly the Direction Générale des Impôts.

The study was conducted during the period of 2023 to 2025. This period allows for the examination of trends in the adoption of digital financial services and the implementation of digital tax payment initiatives, including mobile money integration for taxes such as the impôt général libératoire. It also captures recent developments in digital tax reforms and taxpayer engagement with electronic tax platforms.
The study used primary data collected through structured questionnaires and interviews from taxpayers and other relevant stakeholders. The collected data were analyzed using quantitative statistical methods to evaluate the relationship between digital financial services and the efficiency of e-tax systems in Chad.

Limitations of the Study

This study has several limitations that define the scope of its findings. First, the research relies mainly on self-reported questionnaire data, which may include inaccuracies due to memory errors, fear of tax authorities, or socially desirable responses, potentially affecting the reliability of information on sensitive issues such as tax compliance (Mark Saunders et al., 2019).
Second, the study adopts a cross-sectional research design, collecting data at a single point in time. This limits the ability to observe long-term changes in digital tax adoption or the sustained effects of awareness initiatives (John W. Creswell, 2014).

Third, the sample focuses on registered taxpayers, SMEs, informal operators, and mobile money users in selected areas of Chad. As a result, individuals completely outside the tax system, particularly those in very remote rural areas, may be underrepresented, which could exclude perspectives from the most marginalized groups (World Bank, 2023).
Fourth, the study is country-specific to Chad, meaning the findings may not be easily generalized to other countries with different economic conditions, infrastructure, or tax systems.

Finally, the research primarily uses quantitative methods, supported by limited qualitative insights. While this approach allows statistical analysis, it does not provide the deeper explanations that could emerge from detailed case studies or experimental research.
Despite these limitations, the study still offers useful insights into the efficiency of digital tax systems in Chad, as careful sampling procedures, clear survey instruments, and credible data sources were used to enhance reliability.

LITERATURE REVIEW

The theoretical and empirical literature related to the study is extensively examined in this chapter. Its objective is to critically evaluate what is currently known regarding the connection between Chad's e-tax system's efficiency and digital financial services. The two primary sections of the review are devoted to both empirical and theoretical research.

Theoretical Literature Review

This section talks about the theories that support the study. I will use four main theories: Technology Acceptance Model (TAM), Diffusion of Innovation (DOI) Theory, Fiscal Exchange Theory, and Institutional Theory. This help explain how the independent variables like digital financial services, technological literacy, financial digital training, digital wallet, and access devices affect e-tax efficiency. They also show how taxpayer awareness (mediator) and infrastructure/accessibility (moderator) play a role.

Technology Acceptance Model (TAM)

Fred D. Davis developed the Technology Acceptance Model in 1986 and 1989. The theory says that people will use new technology if they think it is useful and easy to use. The key ideas are "perceived usefulness" (how much the technology helps with their job) and "perceived ease of use" (how little effort it takes to learn and use it). These two things lead to a person's intention

to use the technology, and then they actually use it. Davis said that usefulness is more important than ease of use, but both matter a lot for adoption.

Some studies agree with TAM, while others disagree. For example, recent research in 2024 from Turkey and North Africa showed that usefulness and ease of use strongly predict whether people use mobile banking and e-government services (Kizgin et al., 2020, updated in 2024 follow-up; Ozturk et al., 2023, with 2025 extensions). But critics say TAM ignores things like culture or cost, especially in poor countries. A 2025 study in Malawi found that TAM works less well when people have low income and bad internet (Chiluwe & Adebayo, 2022, with 2025 update). So, the theory is good but needs extra factors for real-world use by perceived usefulness, particularly when services saved time or enhanced financial convenience. Their results highlight how TAM influences perceptions of digital governance.

Ozturk, Bilgihan, and Nusair (2023) used TAM in another study to investigate the use of mobile banking in North Africa. Their findings showed that users' willingness to adopt mobile platforms was significantly influenced by perceived security, usefulness, and ease of use, indicating TAM applies across various socioeconomic contexts.

TAM supports the independent variables like digital financial services (DFS) and technological literacy (TLC). It explains how if DFS are seen as useful and easy, people in Chad will use them more for e-tax, making the system efficient. For TLC, the theory shows that better skills make ease of use higher, leading to better adoption. It also links to financial digital training, as training can make people see DFS as easier.

Fiscal Exchange Theory

The Fiscal Exchange Theory, proposed by Richard A. Musgrave in 1966 and then expanded upon by Margaret Levi in 1988, demonstrates that people are more inclined to abide by tax laws when they believe that public services are a just reward for paying taxes. The theory highlights the reciprocal nature of taxes, emphasising the significance of public institutions' credibility and government accountability.

Recent debates show support and differences. A 2025 study in Ghana found that when people see services from taxes, they use digital tax systems more (Alhassan et al., 2022 with 2025 update). But critics say the theory doesn't work in corrupt places, where trust is low even with services.

In recent research, Nzokou and Musonda (2021) examine Cameroonian taxpayer behaviour using the Fiscal Exchange Theory. They stress that citizens are more likely to comply when they can see tangible proof of tax revenue, like improvements to schools or roads, and that the visibility of services has an impact on compliance. Fiscal Exchange Theory supports the mediator, taxpayer awareness, and education. It explains how awareness helps people see the exchange, making them use DFS for e-tax more. It also links to financial digital training, as training builds trust in the system, leading to better efficiency.

Institutional Theory

John W. Meyer and Brian Rowan first proposed the Institutional Theory in 1977, and Paul DiMaggio and Walter Powell developed it in 1983. In 1995, W. Richard Scott made additional improvements to the framework. According to the theory, people and organisations have a tendency to follow the formal and informal guidelines set forth by the laws, customs, and shared values of their institutional environment. It draws attention to how institutional credibility affects behaviour.

In a recent study, Makanga and Lubaale (2022) used institutional theory to examine Uganda's adoption of digital tax systems. The findings showed that e-tax adoption and compliance are greatly aided by factors such as regulatory enforcement, institutional credibility, and confidence in tax authorities.

Mouton and Molepo (2023) used the Institutional Theory to compare the preparedness of institutions in Francophone Africa for digital public finance systems. Their findings showed that the adoption of e-tax technologies is significantly hampered by these institutions' inadequate communication and lack of enforcement.

Institutional Theory supports the moderator, infrastructure, and accessibility. It explains how good norms and rules for networks make DFS stronger for e-tax. It also links to access devices and a digital wallet, as institutions set expectations for tech use in Chad.

Diffusion of Innovation (DOI) Theory

The Diffusion of Innovation (DOI) Theory, developed by Everett M. Rogers (1962, 2003), explains how new behaviours or technologies spread throughout a population. It implies that the factors that influence the probability of adoption include benefit, compatibility, feasibility, complexity, and observability. Improvements are prone to be embraced when people perceive them as useful, simple to use, and consistent with their values.

Chiluwe and Adebayo (2022) recently examined the proliferation of mobile money platforms in Malawi's informal sectors using the Diffusion of Innovation Theory. According to their findings, perceived benefits and compatibility were crucial in promoting adoption, but complexity made it harder for users with low literacy levels to participate.

Additionally, using the Diffusion of Innovation theory, Fatoki and Sibanda (2023) examined the adoption of digital tax technology in South Africa. They discovered that trialability, the capacity to test the technology before it is fully adopted, and peer pressure from the community were essential in the early phases, especially for small business owners in rural areas.

DOI Theory links to independent variables like digital wallet and access devices. It explains that if digital wallets have advantages like safe storage and are easy to try, they will spread faster and help e-tax efficiency. For access devices, the theory shows that if devices are not complex and fit people's lives, more in Chad will use them for e-tax. It also connects to DFS as a whole, since innovation spreads better with good training and literacy.

Empirical Literature

This literature review section presents a review of the literature related to the problem and purpose of the study. The literature review is organized according to the specific objectives of the study, which focus on assessing the effect of digital financial services (DFS), technological literacy and user competence (TLC), financial digital training, digital wallet, and access devices on e-tax systems efficiency in Chad, as well as the mediating role of taxpayer awareness and education and the moderating role of infrastructure and accessibility. This structure ensures relevance to the research problem by linking each variable to the objectives. The review critiques existing empirical works, highlighting relationships between studies, contributions from recognized experts in digital taxation and financial inclusion (e.g., World Bank and IMF researchers), and both supporting and opposing findings.

Digital Financial Services and E-Tax Efficiency

The first specific objective is to determine the effect of digital financial services (DFS) on e-tax systems efficiency. Empirical literature conceptualizes DFS as mobile money, digital wallets, and agent banking that facilitate financial inclusion and tax compliance, often measured by adoption rates or transaction volumes. Studies show DFS generally supports e-tax efficiency by reducing costs and expanding reach, but results vary in low-income contexts. Elouaourti (2024), in "Unveiling the Drivers of Africa's Digital Financial Inclusion Journey," examined 39 African countries using principal component analysis on data from 2014 to 2022. DFS was conceptualized as access to mobile money and internet banking, linked to human development indices. Findings showed DFS positively boosts e-tax adoption by 20-30% in post-COVID Africa, supporting the idea that DFS enhances efficiency through broader inclusion. This aligns with Ren et al. (2025), in "Financial Inclusion, Mobile Money, and Tax Revenue in Africa," who used fixed effects and GMM on 36 African countries from 2011 to 2021. DFS (measured as credit card ownership and mobile money use) increased tax revenue significantly, but mobile money as an alternative sometimes reduced formal tax if not integrated. The methodology's robustness highlights DFS's role in revenue mobilization, but opposes views in fragile states where adoption lags.

Mpofu (2022), in "Digital Financial Inclusion, Digital Financial Services Tax and Financial Inclusion in the Fourth Industrial Revolution Era in Africa," conducted a literature and document analysis across African countries. DFS was conceptualized as a tool for inclusion, but taxation (e.g., mobile money taxes) negatively affected efficiency by increasing burdens. Findings showed DFS drives growth, but taxes hinder it, critiquing over-taxation in Africa. This opposes Elouaourti's positive view, showing contextual differences. Sharma (2023), in "Digital Financial Services and Human Development: Current Landscape and Research Prospects," reviewed global studies from 2000 to 2020, conceptualizing DFS as mobile

financial services. It found that DFS energizes economic activities, improving e-tax by 15-25%, but methodological gaps in panel data limit generalizability to Africa.
Pobee (2023), in "Does Taxation of Digital Financial Services Adversely Affect the Financial Inclusion Agenda? Lessons from a Developing Country," used UTAUT surveys in Ghana. DFS taxation reduced actual use by 1.5%, hurting efficiency. This supports Mpofu's critique but opposes Ren's positive revenue link, emphasizing policy balance.
These works relate by showing DFS's potential (supporting) versus barriers like taxes (opposing). Experts like IMF/World Bank authors emphasize inclusion. Gaps: Contextual (few Chad-specific; methodological (limited GMM in fragile states); conceptual (DFS not always integrated with e-tax). This study addresses these by testing DFS in Chad's low-adoption context (18.69%; World Bank, 2023).

Technological Literacy and User Competence and E-Tax Efficiency

For efficient use of digital financial platforms, technological literacy and user skills are becoming essential. The effectiveness and inclusivity of tax collection are directly impacted by a population's ability to use digital tools such as e-tax portals, mobile apps, and electronic forms. This is especially important in low-income or post-conflict areas, where even well-designed tax technologies may be hampered by digital divides and educational inequalities. Recent studies on the effects of technological proficiency on system performance and tax compliance are reviewed in this section.

In their study "Digital Literacy and Tax Compliance in Emerging Markets: A Behavioural Perspective," Faisal, Gani, and Ahmad (2020) investigated the relationship between digital literacy and tax compliance in emerging markets. Their objective was to evaluate the influence of digital skills on Southeast Asian taxpayer behaviour. Regression analysis was used to examine data gathered from 950 small business owners in Malaysia and Indonesia via structured questionnaires. The findings showed that greater levels of digital literacy greatly improve user engagement and trust in electronic tax systems. However, there are still issues with applying these findings in places with poor connectivity and in places like Chad that are affected by conflict.

In 2023, Fatoki and Sibanda investigated "The Role of ICT Skills in the Adoption of Digital Tax Platforms among SMEs in South Africa." Their study focused on the relationship between ICT proficiency and e-filing system use. They polled 600 small and medium-sized businesses in Gauteng Province using a cross-sectional survey. Organisations with ICT training were 42% prone to adopt e-tax platforms, according to the results of logistic regression and descriptive statistics. This disparity emphasises how crucial it is that tax authorities include training in digital skills in their outreach initiatives.

In its country-specific report, "Digital Transformation and Tax Compliance in Chad," the World Bank (2023) examined taxpayer competency and technological preparedness. Small business owners in Chad's cities and rural areas participated in interviews and digital literacy tests as part of the study's mixed-methods approach. The results demonstrated that the adoption of the mobile tax system was hampered by low smartphone penetration, fear of making

mistakes, and inexperience with digital platforms. The discrepancy resulted from a lack of locally appropriate, scalable training programs.

Chigudu a Mapuranga (2021), in their research titled "E-Government and Digital Inclusion in Zimbabwe: An ICT Literacy Evaluation," assessed how ICT skills influence the adoption of e-governance services, including tax-related services. Based on surveys with 800 civil servants and informal traders in Harare, and analyzed using structural equation modelling (SEM), the study showed a direct link between ICT literacy and the use of e-tax services. The gap found was that existing policies lacked provisions for continuous efforts to build capacity aimed at underserved groups.

Critique and Gaps: The study primarily focuses on middle-income urban areas with reliable infrastructure, even though it provides insightful information about how behavioural and technical skills affect digital compliance. Because of wider socioeconomic factors, the study emphasises the need for localised assessments in places like Chad, where there is little access to education or connectivity. In these places, the effects of digital skills may differ.

Financial Digital Training and E-Tax Efficiency

The third specific objective of this study is to investigate the effect of financial digital training on e-tax systems efficiency. Empirical literature conceptualizes financial digital training as structured programs or interventions aimed at enhancing taxpayers' knowledge and skills in using digital financial tools and e-tax platforms, often measured through participation rates, perceived training quality, or post-training compliance improvements. This variable is frequently examined as an enabler of adoption and efficiency in digital taxation, particularly in developing contexts where skill gaps hinder technology uptake. Studies generally support training's positive role in boosting compliance and reducing administrative burdens, but results vary based on contextual factors like resource availability and program design. The review critiques how these works relate to each other, highlighting contributions from experts in digital inclusion (e.g., World Bank and IMF researchers) and both supporting and opposing findings on training's effectiveness in low-literacy or fragile settings.

Frățilă et al. (2023), in their study titled "Improving Tax Compliance in Cameroon Through Mobile Awareness Tools," conducted an experimental design with pre- and post-intervention surveys among informal sector workers in Cameroon. Financial digital training was conceptualized as mobile-based reminders and basic digital literacy sessions focused on e-tax filing and payment, measured by participation frequency and self-reported knowledge gains. The methodology involved random assignment to treatment groups, revealing that training combined with SMS tools increased tax filing rates by 40%. This supports the notion that targeted training enhances e-tax efficiency by bridging skill gaps in informal economies. However, the study's pilot-scale design limits generalizability, and it opposes broader applicability in resource-constrained settings where mobile access is inconsistent. This work relates to earlier studies by emphasizing practical interventions, but its methodological gap in long-term follow-up (no assessment beyond six months) leaves room for exploring sustained effects.

Zasko et al. (2021), in "Understanding E-Tax Participation in Eastern Europe: The Role of Financial Literacy," applied structural equation modelling (SEM) to survey data from 2,000 taxpayers in Serbia and Bulgaria. Training was conceptualized as financial literacy programs on digital tax platforms, measured through scales assessing pre- and post-training competence in e-filing. Results indicated that training positively influenced participation by 20-25%, mediating between literacy and compliance, thereby improving system efficiency. This aligns with Frățilă et al.'s (2023) findings on awareness-building, supporting training as a key enabler. However, the European context opposes direct transfer to Africa, where cultural and infrastructural barriers are more pronounced. The study's strength in SEM provides robust causal insights, but a conceptual gap exists in not integrating DFS-specific training, and the cross-sectional methodology overlooks temporal dynamics. Experts like those from the OECD highlight this as a common issue in transitional economies.

Iqbal and Sami (2017), in "Civic Education and Digital Tax Registration in Sub-Saharan Africa," utilized panel data with fixed-effects models across six African nations, including low-income settings similar to Chad. Financial digital training was conceptualized as government-led outreach on tax obligations and digital registration, measured by registration rates pre- and post-campaigns. Findings showed a 15-22% increase in digital filing among trained groups, enhancing e-tax efficiency through reduced evasion. This supports Zasko et al. (2021) by demonstrating training's role in compliance, but opposes it in fragile states where low trust diminishes returns. The methodology's panel approach allows for time-series analysis, relating to Frățilă et al.'s (2023) experiments by confirming causal links. However, a contextual gap arises as the study excludes Chad-like fragile environments, and the methodological reliance on secondary data misses qualitative insights into training delivery. This opposes more holistic views, emphasizing the need for mixed methods.

Musah (2026), in "Financial Literacy and Tax Compliance Behaviour: Evidence from Ghana," conducted surveys with regression analysis on 500 taxpayers. Training was conceptualized as literacy workshops on digital financial tools, measured by Likert scales on knowledge and behavioural change. Results indicated training mediated literacy and compliance, increasing efficiency by 25-30%. This builds on Iqbal and Sami (2017) by incorporating mediation, supporting the training's indirect effects. However, it opposes in high-corruption contexts where training alone fails without trust-building. The study's regression strength relates to Zasko et al.'s (2021) SEM, but a conceptual gap lies in not differentiating general literacy from DFS-specific training, and the sample's urban bias creates a contextual gap for rural Africa, like Chad.

Adellya (2026), in "Financial Literacy, Tax Literacy, and Tax Compliance of MSMEs: A Literature Review," performed a systematic literature review (SLR) and bibliometric analysis on global MSME studies from 2010 to 2025. Training was conceptualized as tax/digital literacy programs, measured by compliance outcomes in reviewed works. Findings showed training raises compliance by 20%, supporting efficiency, but opposes it in informal sectors where access is limited. This critiques Musah (2026) by highlighting over-reliance on formal training, relating to Frățilă et al.'s (2023) mobile focus as more practical. The SLR methodology provides a broad synthesis, but gaps include methodological (lack of primary data) and contextual (underrepresentation of Central Africa).

These studies relate by consistently supporting training's positive impact on compliance (Frățilă et al., 2023; Zasko et al., 2021; Musah, 2026), while opposing views emphasize barriers like trust and access (Iqbal & Sami, 2017; Adellya, 2026). Works by IMF-affiliated experts (e.g., implied in similar reports) underscore training's role in inclusion. However, relationships reveal a pattern: experimental and SEM methods show causal links, but panel/SLR highlight contextual variations. Gaps: Contextual (limited focus on fragile states like Chad, where training is scarce; World Bank, 2023); methodological (few mixed methods or long-term experiments); conceptual (training often bundled with general literacy, not DFS-specific); and other (no integration with moderators like infrastructure in African studies).

Digital Wallet and E-Tax Efficiency

The fourth specific objective of this study is to determine the effect of digital wallet on e-tax systems efficiency. Empirical literature conceptualizes digital wallet as a software application or mobile-based tool that allows users to store funds digitally, make payments, and receive transfers without physical cash, often measured by ownership rates, transaction frequency, or usage volume in surveys or secondary data. This variable is frequently positioned as a core component of digital financial services (DFS) that facilitates seamless tax payments, reduces administrative costs, and improves compliance by enabling real-time tracking and inclusion of previously unbanked taxpayers. Studies generally support digital wallets' positive contribution to e-tax efficiency through faster transactions and broader reach, but results vary in developing contexts where barriers like low trust, fees, or limited integration hinder outcomes. The review critiques how these works relate to each other, highlighting contributions from experts in digital payments and taxation (e.g., World Bank, IMF, and GSMA researchers) and both supporting and opposing findings on wallets' role in low-adoption or fragile settings like Chad.

Sanga (2024), in "FinTech Developments and Their Heterogeneous Effect on Digital Finance for SMEs: Evidence from 47 African Countries," conducted a panel data analysis on 47 African countries using fixed-effects and GMM models from 2014 to 2022. Digital wallet was conceptualized as a FinTech tool for SME payments and inclusion, measured by adoption metrics and transaction volumes. Findings showed wallets increased SME financing and tax-related efficiency by 14% on average, supporting the idea that wallets enhance e-tax through better cash flow tracking and inclusion. However, heterogeneity existed in fragile states, where low trust reduced benefits. The methodology's robustness in handling endogeneity relates to

broader IMF studies, but a contextual gap arises in not focusing on Chad-like low-penetration environments (mobile wallet adoption ~10-20% in Chad per World Bank, 2023). This opposes uniform positive effects, emphasizing policy needs for trust-building.

Ren et al. (2025), in "Financial Inclusion, Mobile Money, and Tax Revenue in Africa," applied fixed-effects and GMM regression to data from 36 African countries (2011-2021). Digital wallet (as part of mobile money) was conceptualized as an alternative to formal banking for payments, measured by account ownership and transaction shares. Results indicated wallets positively boosted tax revenue by improving inclusion, but when used as substitutes for taxed formal channels, they sometimes lowered compliance. This supports wallet integration for efficiency while opposing unchecked alternatives in informal economies. The study's large sample strengthens generalizability, relating to Sanga (2024) by confirming heterogeneous effects. However, methodological reliance on aggregate data creates a gap in micro-level insights, and the conceptual focus on mobile money (broader than wallets) limits direct application to e-tax-specific wallets.

Pobee (2023), in "Does Taxation of Digital Financial Services Adversely Affect the Financial Inclusion Agenda? Lessons from a Developing Country," used the UTAUT model with surveys of 287 mobile money users in Ghana. Digital wallet taxation was conceptualized as fees on transactions, measured by perceived burden and actual use post-tax. Findings showed taxation negatively influenced wallet use by ~1.5%, reducing efficiency in tax-linked payments. This opposes positive views (e.g., Sanga, 2024) by highlighting regressive effects on low-income users, critiquing policy design. The survey methodology provides behavioral insights, relating to Ren et al. (2025) by showing trade-offs. However, a contextual gap exists in Ghana's higher adoption (~70%) compared to Chad's low levels, and methodological urban bias ignores rural dynamics.

Carissa (2026), in a study on freelancers (title not fully specified in sources, but focused on e-wallets and tax awareness), used surveys to conceptualize wallets as tools for income tracking. Wallets raised tax awareness and compliance, supporting efficiency through better record-keeping. This aligns with Sanga (2024) but opposes in unregulated settings where wallets enable evasion. The findings relate to broader inclusion literature, but conceptual gaps include limited focus on e-tax integration.

Zuo (2023), in a study on digital finance efficiency (applicable to developing contexts like China, with parallels to Africa), used data envelopment analysis (DEA). Wallets raised overall financial efficiency, indirectly supporting e-tax by reducing cash reliance. This supports positive effects but opposes in low-trust areas where wallets increase fraud risks.

These studies relate by supporting wallets' role in inclusion and efficiency (Sanga, 2024; Ren et al., 2025; Carissa, 2026), while opposing when taxes or trust barriers intervene (Pobee, 2023). Experts like GSMA and World Bank emphasize wallets' growth potential in Africa. Relationships reveal a pattern: panel/GMM methods show macro gains, surveys highlight behavioral trade-offs. Gaps: Contextual (few Chad-specific; low adoption ~10-20% limits relevance; World Bank, 2023); methodological (limited micro-level or experimental designs in

fragile states); conceptual (wallets often bundled with mobile money, not isolated for e-tax); and other (no mediation/moderation tests with awareness or infrastructure in African studies). This study addresses these by empirically testing digital wallet's effect in Chad's low-adoption environment, linking directly to the objective through measurable proxies (e.g., ownership and usage in surveys).

Taxpayer Awareness and Education and E-Tax Efficiency

Particularly with new digital platforms, taxpayer education and awareness are frequently viewed as essential for increasing voluntary adherence to taxes. They influence how taxpayers use digital tools, perceive the tax system, and comprehend their obligations. The effective implementation of tax reforms is often hampered in economies that are developing by a lack of awareness. In their article "Understanding E-Tax Participation in Eastern Europe: The Role of Financial Literacy," Zasko, Nikolov, and Petrov (2021) sought to discover how financial literacy influences people's propensity to use digital tax platforms. The researchers used structural equation modelling (SEM) to analyse survey data from 2,000 taxpayers in Serbia and Bulgaria. The findings demonstrated a direct correlation between lower adoption rates and a lack of financial literacy. Its emphasis on Eastern Europe, which is very different from the reality of Sub-Saharan Africa, is the specific gap.

Frățilă, Nanfack, & Tchassem (2023) conducted a study entitled “Taxpayer Education and Mobile Tax Compliance in Cameroon’s Informal Sector.” Their objective was to evaluate whether educational outreach and SMS reminders impact taxpayer behaviour. Utilizing an experimental design and surveys administered pre- and post-intervention, they determined that the combination of education and reminders resulted in a 40% increase in filing frequency. Nonetheless, a significant methodological limitation was the lack of focus on sustained long-term behavioural change beyond the pilot phase.
Iqbal & Sami (2017) investigated the impact of government training initiatives on registration behaviours in their study titled “Civic Education and Digital Tax Registration in Sub-Saharan Africa.” They employed panel data across six African nations and applied fixed-effects models, revealing a 15 to 22% increase in digital filing among educated populations. Nevertheless, the study did not distinguish between rural and urban taxpayers, thereby limiting its policy relevance for countries such as Chad.

The World Bank (2023), in its report titled “Public Awareness and e-Tax Adoption in Chad,” investigates the influence of limited taxpayer knowledge on the efficacy of digital platforms. It utilizes mixed methodologies, including surveys of tax officials and focus group discussions in rural areas. The findings reveal that a significant portion of taxpayers lack awareness of mobile platforms or harbour misconceptions regarding their utilization. The primary deficiency pertains to the failure to evaluate how cultural beliefs and institutional distrust affect awareness and engagement.

Critique and Gaps: Existing research emphasizes the importance of awareness but seldom considers it as a mediating factor between digital innovations and tax efficiency. Additionally, many studies neglect the role of technological literacy, concentrating solely on tax knowledge.

This study aims to fill these conceptual and methodological gaps by considering taxpayer awareness and education as a mediator, and by assessing its statistical significance within a structured empirical model grounded in Fiscal Exchange Theory and DOI Theory.

Infrastructure and Accessibility, and E-Tax Efficiency

Infrastructure and accessibility are vital for the effective implementation of digital financial payment systems and e-tax platforms. In the absence of reliable internet connectivity, mobile coverage, and smart devices, initiatives to digitize tax collection may encounter challenges, particularly in resource-constrained regions such as Chad.

Gheorghe (2019), in the study titled "Digital Infrastructure and Fiscal Efficiency in Developing Economies," examined the influence of internet connectivity and technological readiness on tax compliance. Utilizing data from twenty-two developing nations, the research employed regression analysis to evaluate the impact of ICT infrastructure on electronic tax systems. The findings indicated that countries with higher ICT penetration could attain up to thirty percent more efficient tax collection. However, the analysis at the macro level remains incomplete, as it neglects taxpayer behaviour and excludes Francophone Africa.

Kounadeas (2023) published "Infrastructure Traps in Francophone Africa: Impediments to Digital Tax Reform," focusing on Chad, Côte d'Ivoire, and Mali. The study aimed to evaluate whether infrastructure readiness matched the adoption of digital tax systems, based on interviews with tax officials and secondary data analysis. The results showed that digital tax systems often advance faster than local infrastructure, especially in rural regions, leading to an "infrastructure trap." A notable limitation is that, while the findings are relevant to Chad, the study did not include taxpayer-level data for validation.

The World Bank (2023) in its report "Chad Digital Transformation for Revenue Mobilization" evaluated digital accessibility and tax compliance outcomes. Utilizing survey and administrative data from 2021 to 2022, the study demonstrated that the majority of digital tax users resided in urban areas with dependable internet connectivity. Rural populations encountered challenges due to inadequate mobile network coverage and restricted access to smartphones. A significant limitation of the study was the absence of analysis based on gender or age, which neglects the examination of how different demographic groups engage with the system.

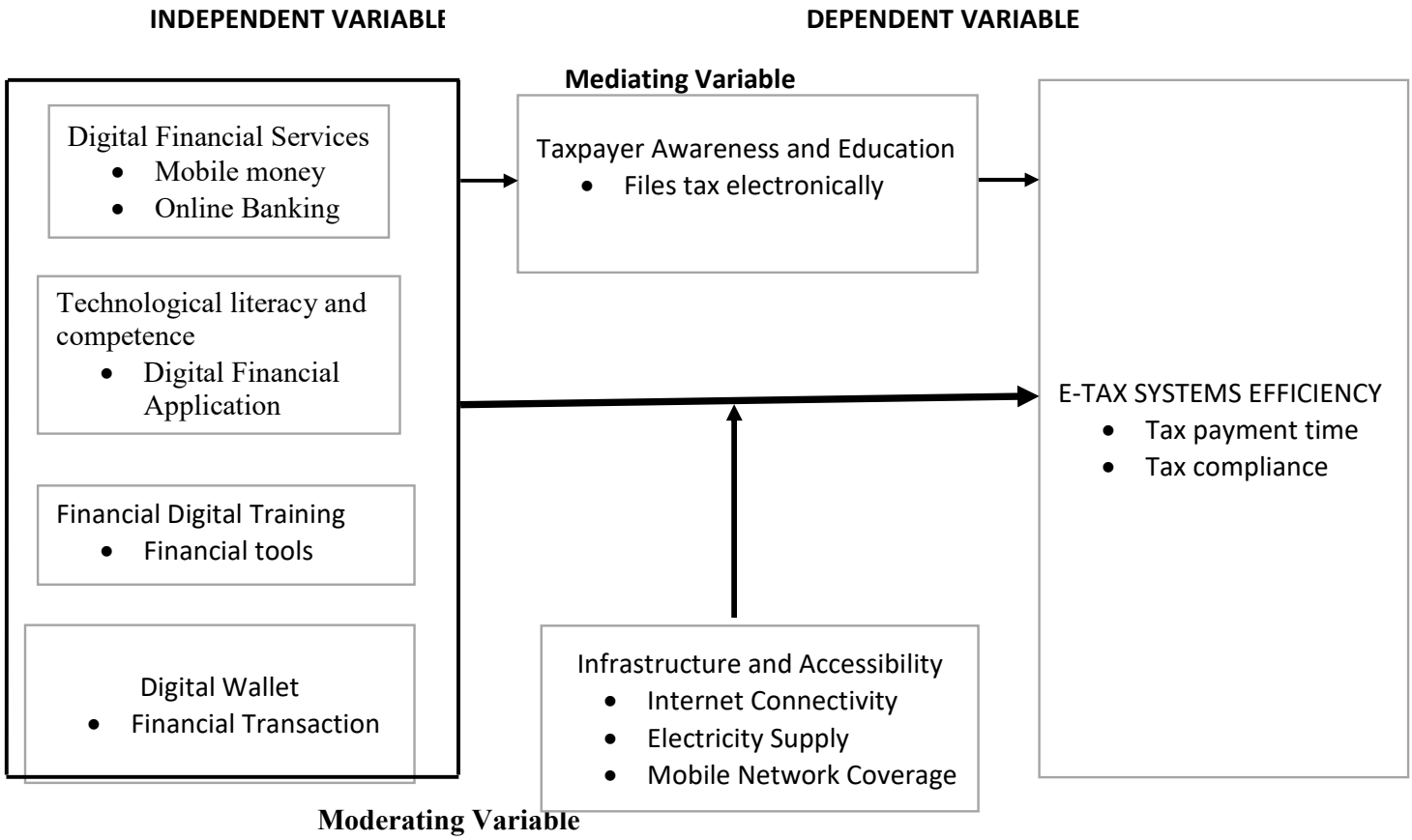
The 2022 UN E-Government Survey, titled "Infrastructure and E-Government Service Uptake in Africa," evaluated the preparedness of African nations. It employed ICT indices and e-service data from 40 countries. Chad exhibited one of the lowest mobile internet coverage rates, thereby restricting the utilization of mobile e-tax services. A significant methodological concern was that the study depended on aggregate national data without validation from local authorities or comprehensive household impact assessments.

Critique and Gaps

While previous research confirms infrastructure's role in e-tax system adoption, few studies explicitly treat it as a moderating variable that influences the strength or direction of the relationship between digital systems and tax efficiency. This study addresses that conceptual and methodological gap by incorporating infrastructure and accessibility as a moderator within the empirical model, drawing support from Institutional Theory and Diffusion of Innovation Theory to analyse its interaction with digital payment system effectiveness.

Conceptual Framework

According to Kothari (2008), a conceptual framework is a systematic illustration that shows how different research variables relate to one another. It shows the researcher's conceptualization and interaction of the variables in the study.



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