



Digitalisation of the tax administration and mobilisation of public revenue in the Democratic Republic of the Congo: an empirical analysis

BANGONZY ESSOLISONGO Jean Marie¹

¹Learner in the DEA Program in Economics and Management Sciences at the National Pedagogical University (UPN), specializing in Public Economics, DRC

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ABSTRACT

This article analyses the relationship between the digitalisation of tax administration and the mobilisation of public revenue in the Democratic Republic of the Congo (DRC). The study combines an institutional analysis of the digital services provided by the Directorate-General of Taxes (DGI) with an econometric estimation based on annual data from the World Bank for the period 2000–2023. Digitalisation

is measured using a standardised index combining internet usage and mobile subscriptions, whilst tax mobilisation is measured by tax revenue as a percentage of GDP. The main model, estimated using ordinary least squares with Newey–West standard errors, shows a positive and statistically significant association between the digital index and tax revenue: an additional standard deviation in the index is associated with approximately 1.46 percentage points of GDP in additional tax revenue, conditional on economic growth. An alternative specification attributes the association primarily to

mobile penetration. However, the first-differences model does not confirm a significant short-term relationship, which points to the risk of common trends and endogeneity. Digitalisation must therefore be understood as an infrastructure for compliance and information, not as an automatic solution. The priorities are interoperability, the quality of tax identification, electronic invoicing, cybersecurity, digital inclusion and the assessment of compliance costs.

Keywords: tax administration; digitalisation; tax revenue; compliance; DRC; the Internet; mobile telephony.

1. Introduction

The mobilisation of public revenue is a prerequisite for fiscal sovereignty. It enables the financing of infrastructure, security, education, health and sovereign functions without relying exclusively on extractive revenues or external aid. In the DRC, this issue is particularly important because the country has vast economic potential but a domestic revenue ratio that remains low relative to its needs and to comparable countries.

Digitalisation is gradually transforming tax administrations. It encompasses electronic registration, online tax returns, online payments, electronic invoicing, risk analysis, data exchange and the automation of procedures. Its theoretical benefits are twofold. It can reduce compliance costs for taxpayers and improve the administration's ability to identify the tax base, detect inconsistencies and track payments.

The DGI now offers online services including online tax returns, the e-NIF, registration, document authentication and electronic invoicing systems. However, these innovations are not sufficient on their own to guarantee an increase in revenue. Their effectiveness depends on connectivity, the quality of registers, trust, data protection, the competence of officials and integration with customs, banks and the Treasury.

The research question is as follows: is the progress of digitalisation associated with a measurable improvement in tax revenue mobilisation in the DRC? Hypothesis H1 predicts a positive association between the digital index and tax revenue. Hypothesis H2 predicts that the relationship is stronger when digitalisation is measured by mobile phone usage, given the low penetration of fixed-line internet.

2. Context of the study: taxation and digital transformation in the DRC

The IMF estimates that domestic revenue mobilisation in the DRC reached 13.7 per cent of GDP in 2023, following improvements under the programme supported by the

Extended Credit Facility. This level remains low relative to comparable countries. The IMF identifies potential for improvement of around ten percentage points of GDP through the combined effect of better fiscal policy and more efficient collection.

The Congolese tax system is managed by several agencies, including the DGI for taxes, the DGDA for customs and the DGRAD for administrative and state revenue. Digitalisation can therefore yield benefits when systems communicate with one another. It can also fragment information if each agency develops isolated platforms.

The DGI states that more than 200,000 taxpayers are registered in its general register and that more than 60 per cent of domestic revenue is collected by its services. This institutional information highlights the importance of the DGI, but it does not yet provide a public, longitudinal measure of the actual use of digital services, the number of online tax returns or the costs avoided.

Table 1. Institutional factors and challenges in tax collection.

Dimension	Finding	Tax-related issue
Revenue	13.7 per cent of GDP in 2023 according to the IMF.	Broadening the tax base and reducing tax losses.
DGI	Over 200,000 taxpayers and more than 8,000 staff, according to the DGI.	Improving the reliability of registers and skills.
Digital services	Online tax returns, e-NIF, registration, authentication, invoicing.	Reducing interactions and improving traceability.
Connectivity	Internet and mobile coverage remain limited and unevenly distributed.	Avoiding digitalisation that excludes people.

2.1. Tools for tax digitalisation

Online tax returns shift part of the tax relationship to a digital interface. They can reduce queues, data entry errors and undocumented contacts. Their effectiveness depends on the

simplicity of the forms, the stability of the platform and the ability to resolve incidents quickly.

The e-NIF and electronic registration serve as infrastructure. They provide the tax authorities with a common identifier to link taxpayers, business activities, employees, returns and payments. However, an incomplete or duplicated identifier limits the ability to cross-reference data and may create a false impression of a broader tax base.

Electronic invoicing and electronic tax systems can improve visibility of transactions, particularly in sectors where sales are difficult to verify. They can reduce under-reporting if the data is integrated into the audit process and if the obligations are proportionate to the size of the businesses.

Finally, digital authentication and QR codes enhance the verifiability of documents. The transformation thus becomes a data-driven system, rather than a simple shift from paper to digital. The tax authority must manage the data, define access rights, secure data exchanges and ensure operational continuity.

3. Review of the literature

The literature distinguishes between the digitisation of a form and the digital transformation of a public administration. The former involves reproducing an existing procedure online. The latter reorganises processes around data, interoperability, automation and risk analysis. This distinction is essential for analysing outcomes: a little-used online platform does not necessarily transform compliance.

Okunogbe and Pouliquen demonstrate that information technology can help identify the tax base, reduce compliance costs and improve monitoring. They also highlight limitations: poor connectivity, a lack of skills, privacy risks and the possibility that technology may shift rather than resolve institutional problems.

The OECD emphasises improvements in service delivery, the reduction of errors, the breaking down of silos between processes and risk assessment. It stresses that transformation must be aligned with a government strategy, developed in consultation with users and reviewed periodically.

Work on revenue mobilisation in Africa highlights the role of trust, the simplicity of the system, the transparency of public spending and the quality of public administration. Digitalisation can strengthen trust through traceability, but it can also widen the gap with vulnerable taxpayers.

4. Theoretical foundations and conceptual framework

The theoretical framework combines the economics of tax compliance, transaction cost theory and the administrative capacity approach. In the rational agent model, a taxpayer weighs up the cost of compliance against the risk and cost of penalties. Digitalisation can reduce the cost of filing tax returns and increase the probability of detection, thereby altering the compliance equilibrium.

Transaction cost theory holds that tax collection requires the exchange of information between the state, businesses, banks and citizens. Digital platforms have the potential to reduce the costs of searching for, transmitting and verifying information. The effect depends on the quality of the data and the level of trust in its use.

The administrative capacity approach takes into account the competence of officials, procedures, coordination and integrity. High-performance technology does not replace human oversight, the interpretation of the law or the handling of appeals. It amplifies existing capacity; it can also amplify a flawed procedure.

Tax mobilisation can be expressed as: $T_t = F(D_t, C_t, A_t, X_t)$, where T represents tax revenue, D represents digitalisation, C represents administrative capacity, A represents economic activity and X represents institutional factors. The central assumption is $\beta_D > 0$, but the observed coefficient may combine the effects of digitalisation, growth, reforms and common trends.

Table 2. Conceptual framework for tax digitalisation.

Mechanism	Digital channel	Expected outcome
Identification	e-NIF, registration, interconnection.	More transparent tax base.
Compliance	Online filing, online payment, pre-filled forms.	Reduced costs and errors.
Control	Invoicing, reconciliation, risk analysis.	Enhanced detection.

Governance	Traceability, audit, authentication.	Reduced opportunities for fraud.
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5. Methodology

The study employs a quantitative approach based on annual national data, supplemented by an institutional analysis. The indicators are drawn from the World Bank's World Development Indicators API for 2000–2023. Tax revenue is expressed as a percentage of GDP. Digitalisation is measured using two indicators of the digital environment: internet users and mobile subscriptions per 100 people.

Table 3. Variables and data coverage.

Variable	Indicator	Role	Observations
Tax revenue	GC.TAX.TOTL.GD.ZS, % of GDP	Dependent variable	22
Internet	IT.NET.USER.ZS, % of population	Digital component	23
Mobile	IT.CEL.SETS.P2, per 100 people	Digital component	24
Growth	NY.GDP.MKTP.KD.ZG, annual %	Macroeconomic control	24
Numerical index	Average of two z-scores	Main explanatory variable	21

The numerical index is the average of the z-scores for the internet and mobile telephony calculated across the entire available dataset. It measures a relative position within the observed distribution; it does not represent a percentage of tax digitalisation. The measure is therefore a proxy for the digital environment, not a direct observation of the number of online tax returns or online payments.

5.1. Econometric specifications

The main model is:

$$\text{TAX}_t = \alpha + \beta_1 \text{DIGITAL}_t + \beta_2 \text{GROWTH}_t + \varepsilon_t$$

TAX is the ratio of tax revenue to GDP, DIGITAL is the digital index, and GROWTH is real GDP growth. An alternative specification replaces the index with separate measures for internet and mobile usage. A third model estimates the annual change in tax revenue in order to reduce the risk that long-term trends might produce an artificial correlation.

The estimates use ordinary least squares and Newey–West standard errors with a one-year lag. This correction improves the robustness of the errors in the presence of heteroscedasticity and moderate autocorrelation, but it does not resolve endogeneity. The tests are presented as descriptive tools rather than as causal identification.

The main limitations are the lack of direct data on online procedures, the small number of common years, the indirect measurement of tax digitalisation, and the use of a single national unit. A provincial or sectoral panel would allow for a comparison of implementation timelines and improve identification.

6. Results: trends and descriptive statistics

Table 4. Descriptive statistics, 2000–2023.

Indicator	N	Mean	Standard deviation	Minimum	Maximum
Tax revenue (% of GDP)	22	6,657	2,198	0.780	10.662
Internet (% of population)	23	5,105	6,737	0.006	18,968
Mobile (per 100)	24	25,180	18,736	0.030	53,189
GDP growth (%)	24	4,935	4.903	-6,911	17.516

Internet usage rose from around 0.6 per cent of the population in 2000 to nearly 19 per cent in 2023. Mobile subscriptions rose from fewer than one subscription per 100 people at the start of the period to more than 53 per 100 in 2023. This increase is substantial, but it does not mean that all taxpayers have access to digital tax services.

Tax revenue rises from 0.78 per cent of GDP in 2000 to 10.66 per cent in 2022 in the WDI series, with fluctuations and missing years. The discrepancy between the international series and institutional or IMF figures may stem from differences in definitions, reference years and the scope of revenue. This article consistently uses the WDI series for the estimate and draws on the IMF as a source of context.

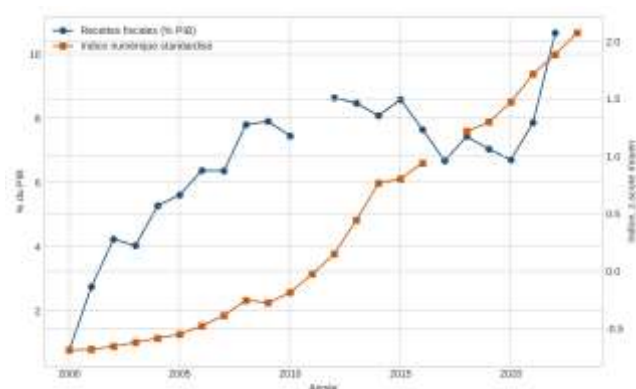


Figure 1. Trends in tax revenue and the numerical index

6.1. Results of the main model

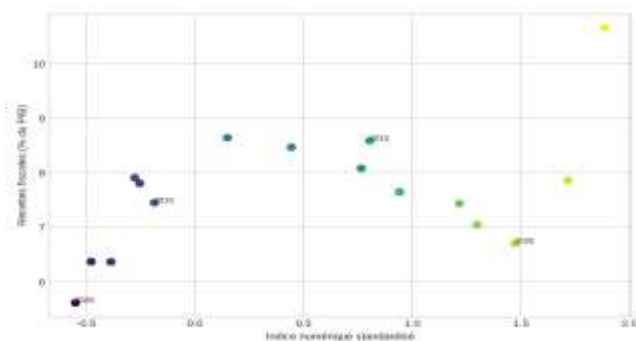


Figure 2. Descriptive relationship between the numerical index and tax revenue.

The main model is estimated using 21 observations. Its R^2 is 0.730 and the overall test is significant. The coefficient for the numerical index is 1.455, with an HAC standard error of 0.259 and a p-value of less than 0.001. In this specification, a one-standard-deviation increase in the index is associated with 1.455 percentage points of GDP in additional tax revenue, conditional on growth.

Table 5. Main model: tax revenue and numerical index.

Variable	Coefficient	HAC SE	t	p-value
const	5.061	0.514	9.852	0.000
digital_index	1.455	0.259	5,617	0.000
GDP_growth	0.242	0.059	4.090	0.000

The growth coefficient is also positive and significant. This relationship is consistent with the idea that a more dynamic economy provides a broader tax base. It also shows why digitalisation cannot be analysed without controlling for economic activity.

6.2. Alternative specification and difference model

The specification separating the two digital components yields a differentiated result. The coefficient for mobile subscriptions is positive and significant, equal to 0.073 percentage points of GDP for an additional subscription per 100 people, all other things being equal. The coefficient for the internet is not significant. This result does not mean that the internet has no effect; it reflects multicollinearity, the measure of usage and the fact that mobile telephony has been the main driver of connectivity in the DRC.

Table 6. Alternative specification: Internet, mobile and tax revenue.

Variable	Coefficient	SE HAC	t	p-value
const	3.920	0.582	6.739	0.000
internet	0.006	0.064	0.091	0.928
mobile	0.073	0.018	4.048	0.000
GDP_growth	0.199	0.070	2.837	0.005

The first-differences model has an R^2 of 0.121 and a non-significant overall test. The digital index is not significant: its

coefficient is 0.089, with a p-value of 0.751. This divergence between levels and differences is significant. It suggests that the positive association in the main model may stem in part from common long-term trends rather than an immediate annual effect of digitalisation.

Table 7. First-differences model: variation in tax revenue.

Variable	Coefficient	SE HAC	t	p-value
const	-0.046	0.398	-0.114	0.909
digital_index	0.089	0.283	0.316	0.752
GDP_growth	0.076	0.065	1.174	0.240

6.3. Empirical summary and robustness tests

Table 8. Summary of estimates.

Model	N	R ²	Adjusted R ²	F p-value
main	21	0.730	0.700	0.000
alternative	21	0.757	0.714	0.000
difference	20	0.121	0.018	0.515

The estimates yield a three-tiered result. Firstly, at the level of indicators and when controlling for growth, the numerical index is strongly associated with tax revenue. Secondly, when the indicators are considered separately, the moving component dominates the association. Thirdly, when measured in terms of year-on-year changes, the relationship disappears. The reasonable conclusion is therefore that digitalisation goes hand in hand with the modernisation and gradual expansion of the taxable economic base, but that its specific effect on tax collection in the short term has not been established.

Several mechanisms may explain this pattern. Digital reforms are often rolled out during periods of broader fiscal reform. Growth in the mining sector and the formalisation of businesses may simultaneously increase revenue and the demand for digital services. Digitalisation may also have a

lagged effect, particularly when identification precedes invoicing and monitoring.

It would be methodologically risky to convert the coefficient of 1.455 into a mechanical budget yield. The coefficient depends on the standardised index, the period, data quality and the s of omitted variables. It serves to document an association, not to calculate the tax revenue generated by a digital investment.

7. Discussion of the results

The results are consistent with the international literature, which links technologies to greater visibility of economic activity, reduced compliance costs and a more targeted assessment of risks [4–6]. They are also consistent with the context of the DRC, where the DGI is developing platforms for online tax returns, identification and authentication.

The importance of mobile technology in the alternative specification is highly plausible. Mobile telephony is the most widespread access infrastructure, whilst internet connectivity remains limited and expensive. A digital tax strategy must therefore provide for interfaces adapted to mobile phones, mobile payments where the legal framework permits, and support centres for taxpayers with limited access to technology.

However, the lack of significance in the difference model serves as a reminder that a platform does not immediately generate revenue. The tax authority must link digital data to audit decisions, recovery procedures and applicable penalties. Without operational implementation, data collection may increase costs without improving compliance.

Digitalisation is also changing the skills required. Tax officials must be proficient in data management, risk analysis, cybersecurity and the handling of digital appeals. Technological reform is therefore also a reform of human capital and organisation.

8. Public policy recommendations

Table 9. Public policy recommendations.

Priority	Action	Indicator	Risk to be managed
Tax identity	Roll out a single, interoperable e-NIF that is compatible with the relevant registers.	Proportion of active taxpayers with a verified identifier.	Duplicates, exclusion, data protection.
Invoicing	Gradually roll out electronic invoicing according to business size and sector.	Proportion of transactions covered; discrepancies between declared and collected amounts.	Cost to SMEs and system failures.
Payment	Integrate banks, mobile money and the Treasury into a secure payment journey.	Proportion of digital payments; reconciliation time.	Digital fraud and transaction fees.
Data	Establish data governance and quality audits.	Reconciliation rate; documented incidents.	Unauthorised access and cyberattacks.
Skills	Train staff in risk analysis and digital services.	Staff trained; risk-based controls.	Organisational resistance.
Inclusion	Maintain service counters, support and offline alternatives.	Failure rates; satisfaction by category.	Digital divide.

The sequence of reforms is important. Data identification and quality must precede extensive automation. Digital obligations must be tested with taxpayers and accompanied by support. Performance must be assessed using revenue indicators, but also in terms of compliance costs, processing times, complaints, system availability and the protection of rights.

9. Conclusion

This study examined the digitalisation of tax administration and the mobilisation of public revenue in the DRC. The available data show a positive relationship between the digital environment and tax revenue, particularly when controlling for growth. Mobile telephony appears to be the component most consistently associated with revenue mobilisation. However, the absence of a significant relationship in the difference-in-differences model prevents any conclusion regarding a causal effect or an automatic fiscal return.

Tax digitalisation must be conceived as an institutional reform. It is effective when data are reliable, systems are interoperable, staff are trained, procedures are simple and controls are proportionate. It must also ensure inclusivity, as a fully digital requirement may penalise taxpayers in poorly connected areas.

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