Assessement of the Impact of Digital Economy on Revenue Generation in Rwanda (Case Study: Musanze)

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ABSTRACT

The digital economy has emerged as a transformative force in many developing countries, including Rwanda. This study aims to assess the impact of the digital economy on revenue generation in Musanze, Rwanda, by focusing on three key objectives, the study employs a mixed-methods approach, combining quantitative data analysis and qualitative interviews collected using Kobo toolbox with relevant Stakeholders. R-Studio was used to generate descriptive analysis as well inferential statistics for models. The research evaluates the revenue generation trends in Musanze the adoption of digital technologies. Additionally, it investigates the extent to which the cashless economy has influenced revenue collection processes, the growth of e-commerce sales, and the implications of ICT infrastructure taxation on revenue generation. The findings of this study provide valuable insights into the evolving landscape of revenue generation in Rwanda's digital economy, specifically in the Musanze region. This study found that there is a positive relationship between adoption of cashless economy and revenue generation with the p-value of 0.014, the adoption of E-commerce sales has increased the revenue since the p-value was 0.004 and finally utilization of adequate ICT infrastructure has increased revenue with p-value 0.03. It aims to inform policymakers, businesses, and the government on the potential benefits and challenges associated with the digital transformation in revenue collection. Ultimately, this research contributes to the broader understanding of how the digital economy can shape fiscal policies and revenue collection strategies in emerging economies like Rwanda.

INTRODUCTION

Background of the Study

Revenue Generation, which is determined by multiplying the average sales price by the quantity of units sold, is the money made through regular business activities. The top line (or gross income) figure is what is used to calculate net income by deducting costs. Sales are referred to as revenue on the income statement. (Ahmad & Ribarsky, 2018). Given the foregoing, the inclusion of national economies and markets has risen dramatically in recent years, putting strain on the international taxation laws that were set more than a century ago, according to the IFAC and the OECD (2020).

Globally, the growth of the digital economy has led to a surge in e-commerce and online transactions as well as the launch of new business ventures. Schiavone Panni 2019; Organisation for Economic Co-operation and Development (OECD) 2020 The digitization of the economy is viewed as a catalyst for connection, societal transformation, growth, and innovation.

Cashless was used. Between 68 and 87 percent of payments are made in Spain, France, and Japan, possibly indicating that some goods and services cannot be paid for using a card or other cashless method. In contrast, just 32% of payments in the United States are made using cash, and only 58% of respondents say becoming cashless is their preferred method of payment. Despite the fact that card payments are widely

accepted in the nation, they could have negative associations with debt and data security. It will be interesting to observe if card payments continue to take up in certain underdeveloped nations. Phone payments can actually spread more quickly in areas where payment cards are still uncommon, causing a leapfrog effect as people switch from using cash to mobile wallets and other phone payments right away (Olbert & Spengel, 2017)

E-commerce sales have witnessed a remarkable global surge in recent years, transforming the way people shop and businesses operate. With the advent of digital technology, consumers around the world have increasingly turned to online platforms to make purchases, from everyday essentials to luxury goods. E-commerce giants like Amazon, Alibaba, and others have not only revolutionized the retail landscape but have also expanded their presence across borders, enabling customers to access a wide array of products from different countries. This global trend has been accelerated further by the COVID-19 pandemic, which pushed even more consumers to embrace online shopping for convenience and safety. As a result, e-commerce sales have reached unprecedented levels, reshaping the dynamics of international trade and offering businesses opportunities to tap into new markets worldwide (Martinsons, 2008).

In Africa, with its rapidly growing population and increasing internet penetration, has emerged as an exciting frontier for e-commerce. While the continent faces unique challenges such as limited access to digital infrastructure and payment solutions, innovative start-ups and established players are actively working to overcome these hurdles. Countries like Nigeria, South Africa, and Kenya have witnessed significant e-commerce growth, driven by a burgeoning middle class and a youthful population that is increasingly tech-savvy. The convenience of shopping online and the ability to reach consumers in remote areas have made e-commerce an attractive prospect for businesses looking to expand their presence on the African continent. African entrepreneurs are also leveraging e-commerce platforms to showcase locally made products, fostering economic growth and job creation (Nanda *et al.,* 2021).

Problem statement

Rapid technical improvements have altered established company structures in the digital economy, opening up new opportunities for economic activity. Although there are many prospects for income creation in the digital economy, there is a theoretical issue with how well tax laws and revenue collecting methods can adjust to this changing environment. Understanding how traditional tax systems can effectively capture and tax digital transactions and activities is particularly difficult. The theoretical conundrum centres on the question of whether Rwanda's current tax laws and regulations are equipped to capture all of the potential revenue generated by the country's digital economy, or whether new theoretical frameworks and tax models are required to address this dynamic and increasingly globalized economic sector. (Simbarashe, 2020).

The question is figuring out how much taxation of the digital economy adds to total income collection and whether the present taxation system effectively handles the problems specific to Rwanda's digital economy. The following are important factors for the evaluation: Tax Policy Effectiveness: Does Rwanda's present tax policy framework successfully collect money from online activities? Are the tax policies in line with the unique traits and difficulties of the digital economy?

On the other hand, despite the fact that digital innovations have produced huge wealth in a remarkably short period of time, that money has been concentrated among a relatively limited number of people, businesses, and nations, which restricts the extent to which the advantages of implementing and utilizing digital trade platforms can be fully realized. As a result, it is probable that those with low levels of education and literacy, those without access to devices or the internet, small, micro, and medium-sized businesses, and those without gadgets will have trouble reaping the full rewards of the digital economy. Additionally, governments presently confront capacity issues in adapting tax policy to the quickly evolving business models in the digital sector due to the increased complexity of ways to generate money or conduct business

online. That is why this study was designed to assess the impact of digital economy on revenue generation in Rwanda.

Research objectives

This study was guided by the following research objectives:

General objective

The main objective of this study was to explore the taxation of the digital economy, specifically how it affects the creation of value-added tax, tax administration, and network infrastructure.

Specific objectives

The following specific objectives were integrated into the study:

- To evaluate the effect of Cashless economy on Revenue generation To examine how E-commerce
- Sales impacted the Revenue generation
- To assess the effect of the ICT infrastructure taxation on Revenue generation.

Research Hypotheses

This study will have the following hypotheses:

H1. Cashless economy affects positively the revenue generated in Rwanda.

H2. E-commerce sales has a positive impact on the revenue generation in Rwanda

H3. The ICT infrastructure taxation affects positively the revenue generated in Rwanda.

1.5 Concept Framework

In the context of assessing the impact of the digital economy on revenue generation in Rwanda, here are some examples of dependent and independent variables that will be considered:
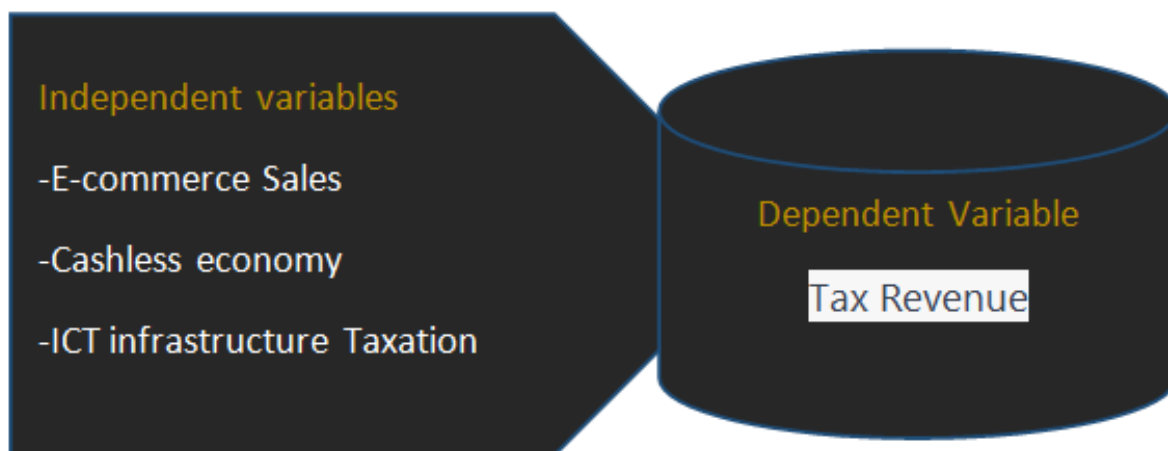

Figure 1 : Concept framework

Tax Revenue: The total tax revenue collected by the government from digital economic activities.

Independent Variables:

E-commerce Sales: The value of goods and services sold through online platforms in Rwanda.

Digital Payment Transactions: The number and value of digital payment transactions conducted in Rwanda.

Internet Penetration Rate: The percentage of the population with access to the internet.

ICT Infrastructure Development: Measures of infrastructure development, such as the number of mobile phone subscriptions, broadband coverage, and availability of digital services.

METHODOLOGY

This study used as research methodology to describe: research design, study population, sampling technique and sample size, data collection and finally data analysis.

Research design

According to Churchill (1979), a research design is simply a framework or plan for the study to be investigated. It is used as a guideline in collecting and analyzing data. For the purposes of this study, this research adopted a qualitative research methods and quantitative research methods.

In this study, quantitative research methods were applied to outline the methods for analyzing the collected data. Quantitative data analysis may involve statistical techniques such as regression analysis or descriptive statistics to measure the impact of the digital economy on revenue generation. Qualitative data analysis may include thematic analysis or content analysis to identify key themes and patterns related to taxation challenges, socioeconomic impacts, and policy.

Study population

About 850 businesses (secondary data from RRA Musanze Branch), enterprises and financial institutions make up the research population to determine how the digital economy affects income production in Musanze District. Gathering data from these diverse stakeholders ensures a comprehensive understanding of the research objectives and allows for a holistic assessment of the digital economy's impact on revenue generation. Selecting an appropriate study population facilitates data collection, provides valuable insights, and supports evidence-based recommendations to optimize revenue generation in the digital era.

Sampling technique and sample size

This study on Assessment of the effect of digital economy on revenue generation aims to capture quantitative data from the feedback of taxpayers in Musanze district, Muhoza sector.

The target population of this study were taxpayers from eight cells that are doing business activities in this area. the sample size was determined by using Simple random by using the following formula:

$$n = \frac{Zc^2 p(p-1)}{e^2}$$

Where Z_c is value for selected alpha level of 0.05 is to be 1.96, **e** is the acceptable margin of error and p is expected proportion. According to Naing *et al*. (2006) if there is doubt about the value of p, it is best to error towards 50% as it would lead to a larger sample size.

Thus to be 95% sure, we have to assume that the sample size is large enough to allow the sample mean or proportion to be considered as having a normal distribution. This implies that in case of proportion, we needto the estimate p of P such that

$$p\left(\lceil p - P \rceil \le 0.05\mathrm{P}\right) = 0.95$$

$$n = \frac{(1.96)^2 0.5(1 - 0.5)}{(0.05)^2}$$

≈384

Where n_A is adjusted sample size and N (129) is total population.

The final sample size in each cell was found by taking its total population multiplied by a sampling fraction (S_f).

$$n_A = \frac{N * n}{(N - 1) + n}$$

This implies that

$$n_A = \frac{850 * 384}{(850 - 1) + 384}$$

=265

$$S_f = \frac{nA}{N} = 265/850 = 0.312$$

The allocation of the total sample size was done as follows:

Sample size by cell

cell	Female	Male	Total	**n**
1 Ruhengeri	230	188	409	**127**
2 Kigombe	110	80	190	**59**
3 Mpenge	98	87	185	**58**
4 Cyabararika	41	25	66	**21**
TOTAL	**479**	**371**	**850**	**265**

Source: Authors' compilation 2023

The table 3 presents the allocation of sample size in each prominent sending cells of respondents.

Data Analysis

Data processing and analysis are crucial stages in Analyzing how the digital economy affects Musanze District's ability to generate income. This phase involves organizing and analyzing the collected data to extract meaningful insights and draw conclusions. The following outlines the steps involved in data processing and analysis. The Multiple Linear Regression model can be represented as follows:

Revenue Generation = β_0 + β_1Digital Economy Indicator 1 + β_2Digital Economy Indicator 2 + ... + β_n*Digital Economy Indicator n + ε

In this model: Revenue Generation is the dependent variable, representing the total revenue generated in Rwanda over the study period.

Digital Economy Indicator 1, Digital Economy Indicator 2, ..., Digital Economy Indicator n are the independent variables related to the digital economy that were collected as part of your primary data. **β_0** is the intercept term, representing the constant value of revenue generation when all the independent variables are zero. **β_1, β_2, ..., βn** are the coefficients of the digital economy indicators, indicating how changes in each digital economy indicator affect revenue generation. **ε** represents the error term, accounting for the variability in revenue generation not explained by the digital economy indicators or other variables in the model.

RESULT AND DISCUSSIONS

The results of a researcher's data collection from the field are explained in this chapter. The researcher used a variety of techniques, programs, and models to analyze the data, including inferential and descriptive techniques, R-studio software, and a multiple regression model.

Demographic Profile of Respondents
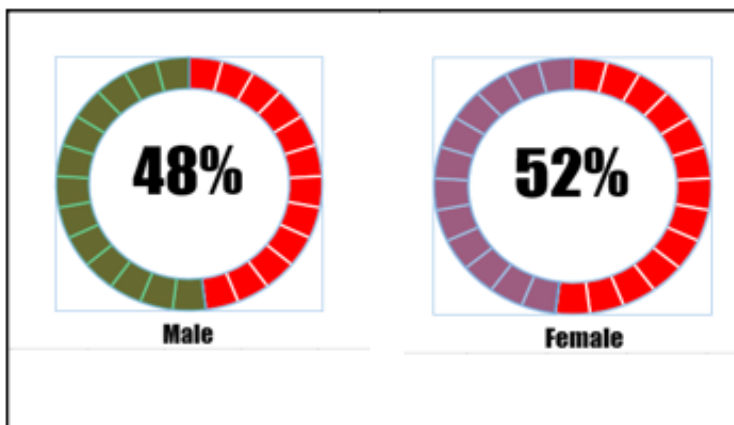
Figure 2: Gender of Respondents

This data suggests that within the population being considered, females make up a slightly larger portion, accounting for 52% of the total, while males account for 48%.

Gender and Marital status of respondents

Gender	Marital Status of the respondent	2	1	3	4	Totals
1		62	32	24	8	126
2		71	35	24	9	139
Totals		133	67	48	17	265

Source: Authors' compilation 2023

Gender: 1=Male 2=Female

Marital Status: 1=Single 2=Married 3=Divorced 4=Widow

This table illustrates the distribution of respondents based on their gender and marital status. Among the 265 participants, 126 are male and 139 are female. Marital status breakdown indicates that 67 respondents are single, 133 are married, 48 are divorced, and 17 are widowed. Among the male respondents, 32 are single, 62 are married, 24 are divorced, and 8 are widowed. For female respondents, 35 are single, 71 are married, 24 are divorced, and 9 are widowed. This breakdown offers insights into the demographic.

The effect of cashless economy on Revenue Generation

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	t	Sig.
	B	Std. Error	Beta		
(Constant)	160714.327	38737.867	2.054	4.149	.000
II_1	-663.023	0.605	.006	3.033	.014
II_2	0.149	4.005	.068	1.095	.253
II_3	5.132	0.155	.073	4.095	.034
II_4	-3.111	2.675	.098	1.095	.075
II_5	8495.131	0.955	.068	5.095	.004
II_6	0.149	4.033	.068	4.095	.002
II_7	-662.099	20221.605	-.006	1.033	.974
II_8	0.149	0.335	.068	2.195	.034
a. Dependent Variable: Revenue generated per year					

Source: Authors' compilation 2023

Variables	P-value	Meaning
II_1 The adoption of cashless payment methods has improved revenue collection efficiency for the government.	.014	**Sig**
II_2 The use of digital payment platforms has increased tax compliance among businesses and individuals.	.253	**Non-sig**
II_3 A cashless economy has facilitated better tracking and monitoring of financial activities, reducing opportunities for tax evasion.	.034	**Sig**
II_4 The shift towards a cashless economy has broadened the tax base, leading to higher revenue collection.	.075	**Non-sig**
II_5 Has the cashless economy helped reduce instances of revenue leakage or fraud	.004	**Sig**
II_6 Have you faced any challenges in transitioning to the cashless economy	.002	**Sig**
II_7 Are you confident that the cashless economy will continue to positively impact revenue generation in Rwanda	.974	**Non-sig**
II_8 Have you noticed any changes in customer behavior since adoption cashless	.034	**Sig**

Source: Authors' compilation 2023

According to the findings above, this study found the strong relationship between cashless economy and revenue collection the same as Cashless economy and Tax Revenues in Africa is a separate research done. The study looked at how the cashless economy affected tax collections in African nations. The findings demonstrated a favourable impact of the cashless economy on tax receipts. According to the author, increased Internet use promotes economic expansion, increases tax compliance, and boosts the effectiveness of tax administration.

Given the significant positive impact on revenue collection efficiency and the reduction in opportunities for tax evasion. Address the challenges faced during the transition to a cashless economy to ensure smoother adoption. Consider public awareness campaigns to boost confidence in the long-term benefits of a cashless economy.

Effect of e-commerce sales on Revenue Generation

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	6.327	7.867	2.054	4.149	0.000
III_1	0.023	0.042	0.006	3.017	0.023
III_2	1.129	0.791	0.114	3.235	0.014
III_3	0.022	0.435	0.073	1.095	0.074
III_4	-2.141	0.175	0.098	0.095	0.085
III_5	0.132	0.125	0.068	5.095	0.004
III_6	0.149	4.033	0.068	1.025	0.022
III_7	2.099	1.605	0.006	2.033	0.044
III_8	0.199	0.125	0.088	3.035	0.024
a. Dependent Variable: Revenue generated per year					

Source: Authors' compilation 2023

Variables in the model

Variables	P-value	Meaning
III_1 E-commerce sales have led to an increase in overall tax revenue for the government	0.023	**Non-sign**
III_2 The growth of e-commerce platforms has positively affected revenue collection from online transactions.	0.014	**Sign**
III_3 Taxing e-commerce sales has contributed to a broader tax base, resulting in higher revenue collection.	0.074	**Non-sign**
III_4 Have you noticed an increase in sales volume since implementing e-commerce sales	0.085	**Non-sign**
III_5 Has the adoption of e-commerce impacted revenue growth for your business?	0.004	**Sign**

III_6 Has the government of Rwanda provided any support or initiatives to promote e-commerce sales for revenue generation?	0.022	**Sign**
III_7 Have you faced any challenges in implementing e-commerce sales for revenue generation?	0.044	**Non-sign**
III_8 Has the COVID-19 pandemic affected e-commerce sales and revenue generation in Rwanda?	0.024	**Sign**

The study discovered that by offering a fresh source of tax income, ICT taxation can have a favourable influence on revenue collection, this study is on the same agreement since the e-commerce sales is affecting positively the revenue collection. It also contradicted to research by Alojail, "E-commerce and Sales Tax: An Empirical Analysis" (2022). The impact of e-commerce on US sales tax receipts was the main topic of this study. The study found that e-commerce has a detrimental effect on sales tax receipts, partly because there are inconsistencies in state-by-state taxation laws. The author argued that simplified tax laws are necessary to promote equitable and effective revenue collection.

3.4. Effect of ICT infrastructure taxation on revenue generation

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	6.317	7.827	0.054	2.149	0.03
IV_1	-63.023	0.605	0.406	1.033	0.06
IV_2	0.112	0.095	0.018	3.015	0.01
IV_3	5.132	0.155	0.073	2.995	0.03
IV_4	-3.111	2.675	0.098	1.005	0.07
IV_5	8495.131	0.955	0.068	4.045	0.00
IV_6	0.149	4.033	0.068	3.055	0.002
IV_7	-662.099	20221.605	0.006	0.033	0.994
IV_8	0.149	0.335	0.068	2.095	0.034
a. Dependent Variable: Revenue generated per year					

Variables in the model

Variables	P-value	Meaning
IV_1: Have you observed any changes in the usage and adoption of ICT services among businesses and consumers in Rwanda since the implementation of ICT infrastructure taxation?	0.06	Non-sign
IV_2: ICT infrastructure taxation has led to a broader tax base in Rwanda, contributing to higher revenue collection.	0.01	**Sign**
IV_3: Do you think the revenue generated from ICT infrastructure taxation is adequately utilized to support the dev IV_3 Do you think the revenue generated from ICT infrastructure development of ICT in Rwanda?	0.03	**Sign**
IV_4: Has the ICT infrastructure taxation impacted your business operations or industry?	0.07	Non-sign
IV_5: Are you aware of the ICT infrastructure taxation policies in Rwanda?	0.00	**Sign**

IV_6: Have you noticed any changes in ICT infrastructure investment and development in Rwanda since the implementation of ICT infrastructure taxation?	0.002	**Sign**
IV_7: Has ICT infrastructure taxation influenced revenue generation in Rwanda?	0.994	Non-sign
IV_8: Has ICT infrastructure taxation affected the cost of ICT services for businesses and consumers in Rwanda?	0.034	**Sign**

Source: Authors' compilation 2023

The p-value is 0.002, demonstrating a significant impact on ICT infrastructure investment and development. This indicates that there have been noticeable improvements in ICT infrastructure investment and development, which is essential for digital economy growth. Influence on Revenue Generation. The p-value is 0.994, suggesting a non-significant influence on revenue generation.

While ICT infrastructure taxation may not directly impact revenue generation, policymakers should explore other strategies to align taxation policies with revenue generation goals. Impact on the Cost of ICT Services. The p-value is 0.034, indicating a significant impact on the cost of ICT services. Monitoring the impact on ICT service costs is essential to ensure competitiveness and accessibility for businesses and consumers. As the research "Taxation of ICT Infrastructure and Revenue Collection: Evidence from Developed Economies". The study looked at how taxes on ICT infrastructure affect industrialized nations' ability to raise money. It was discovered that sensible tax laws may help raise money while ensuring the ICT industry's long-term expansion and this study also find a very strong relationship between ICT infrastructure taxation and Revenue collection.

General Regression Model

Coefficients[a]					
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	t	Sig.
	B	Std. Error	Beta		
(Constant)	9.127	7.867	2.054	4.149	0.000
II_1	3.023	0.605	0.006	2.033	0.014
II_2	0.149	1.105	0.178	2.095	0.033
II_5	5.131	0.125	0.068	2.095	0.034
II_6	0.149	4.143	0.538	3.015	0.002
II_7	2.199	1.225	0.146	0.033	0.004
III_1	0.323	0.942	0.236	2.017	0.013
III_2	1.149	0.991	0.334	2.235	0.034
III_3	0.012	0.135	0.343	3.095	0.014
III_4	2.131	0.575	0.028	2.095	0.035
III_8	0.169	0.115	1.188	1.035	0.022
IV_2	0.612	0.125	0.218	3.015	0.019
IV_3	5.122	0.215	0.113	2.095	0.032
IV_4	-3.111	2.555	2.448	4.005	0.011
IV_5	5.151	0.435	0.458	4.645	0.008
IV_6	0.133	4.123	0.118	3.055	0.002
a. Dependent Variable: Revenue generated per year					

As Researchers had also examined how e-commerce purchases affect the collection of taxes. Here was a few

empirical analyses and conclusions. The Impact of E-commerce on Tax Revenues: Evidence the study looked into the connection between e-commerce sales and tax receipts. According to the data, there is a correlation between e-commerce sales and tax collections, indicating that more e-commerce activity results in better tax revenue collection. The author emphasized how crucial it is to modify tax laws to accommodate the problems brought on by e-commerce. Therefore, this study also found a positive relationship of Cashless economy. the study found the positive effect with the p-value is 0. 014 for the adoption of cashless economy with revenue generation.

This study also found a positive effect between e-commerce sales and Revenue, the study highlighted that the e-commerce sales has led to increased revenue with the p-value of 0.013 with agreement of The influence of E-commerce on Tax Revenues: Evidence from Cross-Country Analysis, examined the influence of e-commerce on tax revenues across a number of nations and discovered a favourable association. It implies that the expansion of e-commerce may lead to a rise in tax receipts via a number of avenues, including direct taxes on e-commerce transactions and indirect taxation on other economic activity.

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