

The correlation analysis between the use of electronic billing system and public revenue collection in Rwanda was conducted using Pearson coefficient correlation. As shown in Table 4.9, the use of electronic billing machine ($r=0.809$, $p=0.000$) was found to be strong positive and significant to the public revenue collection in Rwanda. This implied that the use of EBM greatly impacts on the public revenue collection. On the relationship between online payment platform ($r=0.807$, $p=0.000$) and public revenue collection, the Pearson collection showed that the correlation was strong and positive. It was also significant since the p-value was less than 5%. Similarly, virtual sales control system ($r=0.810$, $p=0.000$) was strongly and positively related to public revenue collection. The p-value was also less than 5% showing that the correlation was statistically significant. These findings are in line with the finding from Adu *et al.*, (2020) and Uyar, *et al.* (2021) who showed that the use of online billing systems greatly influences the revenue collection. In addition, Gnanon and Brun (2018) research indicated that the use of internet increases public revenue mobilization and hence increase the government potential to collect revenues. Twizeyimana, *et al.* (2018) study showed that the use of *irembo* government online platform improved the quality of service delivered while at the same time increasing revenue collection. Similarly, Ayakwah, Damoah and Osabutey (2021) study indicated the same effect showing that the use of digital platforms increases quality service delivery, accountability, reduce corruption, thereby increasing the revenue collected.

Table 4: Correlation analysis between System Integration and Public Revenue Collection

		Revenue Collection	IFIMIS	Electronic Window	One Stop
Revenue Collection	Pearson Correlation	1	.745**	.875**	.869**
	Sig. (2-tailed)		.000	.000	.000
	N	200	200	200	200
IFIMIS	Pearson Correlation	.745**	1	.684**	.552**
	Sig. (2-tailed)	.000		.000	.000
	N	200	200	200	200
Electronic Window	Pearson Correlation	.875**	.684**	1	.790**
	Sig. (2-tailed)	.000	.000		.000
	N	200	200	200	200
One Stop	Pearson Correlation	.869**	.552**	.790**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	200	200	200	200

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

Source: Researcher (2022)

Table 4 shows the findings obtained after conducting Pearson correlation analysis between system integration and public revenue collection. As shown in the table, all the three indicator variables used to measure the integration of the information system were positive and significant at 5% since their p-values were less than 5%. For the use of IFIMIS ($r=0.745$, $p=0.000$), the correlation analysis showed that the relationship was positive and significant at 5%. Similarly, the use of electronic single window system (eSW) ($r=0.875$, $p=0.000$) was positive and significant. It was also very strong. Lastly, the use of one stop border post system ($r=0.869$, $p=0.000$) significantly helps RRA in revenue collection. This is indicated by the positive and strong correlation which was also found to be significant since the p-value was less than 5%.

Table 5: Regression Analysis Model

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.952 ^a	.906	.905	.11961

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	27.178	3	9.059	633.173	.000 ^b

Residual	2.804	196	.014
Total	29.982	199	

a. Dependent Variable: Revenue Collection

b. Predictors: (Constant), E-Filing, E-Billing, System Integration

Source: Researcher (2022)

The regression analysis output of shown in Table 5. The findings in this research have shown that digitalization has a significant effect on public revenue collection. This conclusion is drawn from the fact that the regression model (F=633.173, p=0.000) was significant since the p-value was less than 5%. In addition, the regression analysis has given an R²=0.906, which indicated that 90.6% of the changes in public revenue in Rwanda Revenue Authority can be attributed to the use of digital technologies. These results confirm that the digitalization process adopted by RRA has been bearing fruits on the compliance issues, taxpayers’ awareness and thereby on increasing the public revenue collection.

Table 6: Regression Coefficient Analysis

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-.007	.112		-.060	.952
1 E-Filing	.281	.029	.266	9.776	.000
E-Billing	.289	.034	.307	8.500	.000
System Integration	.430	.030	.506	14.181	.000

a. Dependent Variable: Revenue Collection

Source: Researcher (2022)

In the said regression analysis, the researcher further analyzed the contributing effect of each of the indicator variables of digitalization. In this study, three key indicator variables were used, namely, e-filing system, e-billing system and information systems integration. As shown in Table 6, all the variables were significant since their individual p-values were less than 5%. For e-filing ($\beta_1 = 0.281, p = 0.000$) indicated that e-filing positively influences the public revenue collection. An increase by one unit in e-filing would result to an increase in public revenue collection by 0.281 units. E-billing system ($\beta_2 = 0.289, p = 0.000$) was also positive and statistically significant at 5%. A one unit increase in e-billing would give an increase in public revenue collection by 0.289. Similarly, information system integration ($\beta_3 = 0.430, p = 0.000$) meant that there is significant effect of system integration on the public revenue collection. An increase by one unit in system integration would lead to an increase in public revenue collection by 0.43. The findings showed that integration of the information system has a higher contributing effect as compare to the other factors.

Discussion on findings

This study endeavoured to investigate the effect of digitalization on public revenue collection in Rwanda. The research was concerted around three key indicators identified in literature as concerning digitalization. This included e-filing system, e-billing system and information system integration. The e-filing system was concerned on the availability of electronic filing platforms where a taxpayer can be able to compute ad file his/her taxes using the digital technologies. On the other hand, e-billing system entailed electronic payment systems including use of Electronic Billing Machine (EBM) and online payment platforms for government services. Lastly, the information system integration looked at the use of digital technologies interlink different systems for efficient coordination and communication among different government entities. It identified the use of IFMIS and other system integration like electronic single window and one stop border post services.

Form the findings obtained, it was demonstrated that most of the participants involved in this study saw the link between digitalization and public revenue collection. In particular, majority of the

participants indicated that the use of e-filing, e-billing and system integration has increased the public revenue collection in Rwanda. The research went further and used Pearson correlation and multiple regression analysis to establish the relationship and the effect of the indicator variables to public revenue collection. As the analysis have shown, e-filing, e-billing and system integration all have positive and statistically significant relationship with the public revenue collection. The regression analysis showed that the three variables contribute to 90.6% of the public revenue collection. In particular, the regression coefficient showed the contributing effect of each of these variables towards public revenue collection. Further, the analysis showed that information system integration has the highest contributing effect followed by e-billing system. This research has therefore supported the government's effort towards moving all government service delivery and payments to online and use of digital platforms for the same. This also supports the work by RRA towards improving tax compliance through digitalization and public awareness efforts.

Further, the findings in this research have shown the need for digital transformation where the use of internet technologies has increased the level of public revenue collection. These findings are consistence with previous findings by other researchers. For instance, past researchers like Gitaru (2017) showed that with system automation governments across the globe can increase their ability to collect revenue. Adu *et al.*, (2020) demonstrated that the use of digitization of local revenue collection influence the amount of revenue collection. Ayakwah, Damoah and Osabutey (2021) study pointed out that the use of online and digital platforms not only improve on quality service delivery, but also tends to increase revenue generation. It also brings accountability in the system enabling the government to save a lot in the process. Further, Gnangnon and Brun (2018) and Uyar, *et al.* (2021) studies emphasized the effect of using modernization and internet on public revenue mobilization.

CONCLUSION

This study sought to investigate the effect of digitalization on the public revenue collection. As per this study, three indicator variables were identified, namely, e-filing system, e-billing system and information systems integration. The research therefore undertook the study to investigate how these factors would influence the public revenue collection in Rwanda Revenue Authority. The findings have shown that e-filing system, e-billing system and information integration system has significant effect on the public revenue collection. The use of these digital technologies increase efficiency, transparency, quality of services delivered and at the same time improve revenue collection.

Recommendations

The study recommends that the Government of Rwanda should continue in its trajectory in digital transformation. Digital transformation reforms and policies should focus on incorporating new innovations that can help in reducing the costs of tax administration as well as on the side of the taxpayers' compliance aspects. Therefore, the use of digital technologies should be such that they are user friendly. They should not bring complications in use or applying them. Moreover, the government agencies should always carry out sensitization and public campaign whenever new technologies are adopted. This would increase the taxpayers' awareness, and thereby improve on the usage of these technologies. In addition, the use of integrated system should be accomplished to cover all the government agencies and all revenue collection points. Further, the findings in this research have highlighted the efficiency created through the use of digital platforms and their effect on public revenue collection. However, despite these positive benefits, the government must be vigilant to monitor its systems to avoid system failures. Therefore, the researcher recommends that RRA in conjunction with other government agencies should continuously monitor the performance of the information system to protect and safeguard the system from vulnerabilities, hacking and complete system failures. Further, such continuous monitoring would help the government to incorporate new technologies as they may arise.

Suggestions for Further Studies

The researcher suggests the following topics for future research. Future research could be carried to investigate the effect of the use of digital platforms on increasing tax compliance in Rwanda. The purpose of the use of these digital platforms is to ensure that the costs associated with revenue collection and administrations are reduced and that revenue collection is maximized. However, study on the compliance issues would add a gist to these arguments. Secondly, future study to investigate the effect of digitalization on the efficient public administration process in Rwanda could be carried out. Lastly, the researcher suggests further research to be carried out to investigate the effect of digital information on creating public awareness and increasing public revenue collection in Rwanda.

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