Digitalization on Performance of Financial Institution in Rwanda. Case of Bank of Kigali and Savings and Credit Cooperative (SACCO) of Musanze District

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Abstract: *This study investigates the effect of digitalization on the performance of financial institutions in Rwanda, focusing on the Bank of Kigali and SACCOs in Musanze District. Findings from the study show that the adoption of mobile banking and online banking significantly improves profitability, liquidity, and capital adequacy. Mobile banking, with its broad accessibility, is particularly influential in increasing transaction volumes, leading to higher profitability. Online banking and digital payment systems contribute to enhanced customer engagement and satisfaction, with customers reporting ease of use and reliability. Investment in cybersecurity has improved the financial stability of institutions by reducing risks of data breaches and fraud, thereby positively impacting capital adequacy ratios and overall financial security. Furthermore, operational efficiency has markedly improved, with significant reductions in transaction processing times and operational costs. Cybersecurity measures have enhanced risk management capabilities, reducing the likelihood of fraud and improving institutional risk resilience. The study concludes that digitalization plays a critical role in enhancing the financial performance of institutions in Rwanda. Based on these findings, it is recommended that financial institutions continue to invest in digital technologies, with a particular emphasis on enhancing cybersecurity frameworks to protect against emerging risks. Institutions should also focus on improving customer experience by investing in user-friendly digital platforms that cater to customer preferences.*

Keywords: *Digitalization, Mobile Banking, Online Banking, Digital Payment Systems, Cybersecurity and Performance of Financial Institutions*

1. Introduction

Rwanda has made significant strides in digital financial inclusion, driven by government initiatives and the adoption of digital technologies by financial institutions (Rogers, 2003). The use of mobile money and internet banking has increased access to financial services, particularly in rural areas. According to the FinScope Survey (2020), 66% of the adult population in Rwanda is digitally included, up from 46% in 2016. The government's push for a cashless economy and the

development of digital infrastructure have been key drivers of this progress (Rutagarama, 2020).

The Bank of Kigali, Rwanda's largest commercial bank, has been at the forefront of digital transformation in the country. The bank has implemented various digital banking services, including mobile banking, internet banking, and digital payment solutions. A study by Mutesi (2022) found that the adoption of digital banking services has significantly improved customer satisfaction and operational efficiency at the Bank of Kigali. The

bank's investment in digital infrastructure has enabled it to offer innovative financial products and services, enhancing its competitiveness in the market (Mutesi, 2022).

SACCOs in Rwanda have also embraced digitalization to improve service delivery and financial inclusion. The introduction of digital core banking systems has enabled SACCOs to offer efficient and secure financial services to their members. According to a report by Mondato (2022), the digitization of SACCOs has enhanced operational efficiencies, transparency, and security. However, challenges such as data privacy and cybersecurity risks need to be addressed to fully realize the benefits of digitalization (Mondato, 2022).

Recent studies have highlighted the transformative potential of digitalization on performance of financial institutions. For instance, Theiri and Hadoussa (2024) examined the impact of digital transformation on Tunisian banks, finding that investments in digital technologies significantly improved financial performance, particularly in terms of return on assets and equity. However, they also noted challenges such as the need for robust cybersecurity measures and the integration of digital services with traditional banking operations (Ekinci, 2021). Similarly, Ekinci (2021) analyzed the effects of digitalization on the financial performance of Turkish banks, emphasizing the role of FinTech in enhancing operational efficiency and customer satisfaction. Despite these benefits, the study pointed out the necessity for continuous innovation and adaptation to rapidly changing technological landscapes (Theiri, 2024).

In the context of Rwanda, the adoption of digital technologies by financial institutions like the Bank of Kigali and SACCOs in Musanze district has been significant, yet the specific impacts on performance metrics remain underexplored. This gap is evident in the limited research focusing on how digitalization affects customer satisfaction, operational efficiency, and financial inclusion in Rwandan financial institutions. The study by Ndemo and Mkalama (2023) on digitalization in African financial sectors underscores the importance of tailored digital strategies to address unique regional challenges and opportunities. They highlight that while digitalization can drive financial inclusion and economic growth, it requires supportive regulatory frameworks and infrastructure development (Ndemo, 2023).

This study aims to address these gaps by providing a comprehensive analysis of the impact of digitalization on performance of financial institutions in Rwanda, specifically the Bank of Kigali and SACCOs in Musanze district. By examining the period from 2018 to 2023, this research offers insights into how digital technologies have influenced key performance indicators such as customer satisfaction, operational efficiency, and financial inclusion. The findings are not only contributing to the academic literature but also provide practical recommendations for policymakers, financial institutions, and other stakeholders to enhance the effectiveness of digitalization initiatives in the Rwandan financial sector.

The general objective of the study is to assess the impact of digitalization on performance of financial institutions in Rwanda, specifically focusing on the Bank of Kigali and the Savings and Credit Cooperative (SACCO) in Musanze district from 2018 to 2023.

Specifically, the following study intends to assess and achieve the following objectives:

1. To establish the effect of Mobile Banking on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.
2. To analyze the effect of Online Banking on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.
3. To examine the effect of Digital Payment on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.
4. To determine the effect of Cyber Security on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.

The study objectives are based on the research hypotheses formulated as follows:

1. H_{01}: There is no significant effect of Mobile Banking on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.
2. H_{02}: There is no significant effect of Online Banking on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.
3. H_{03}: There is no significant effect of Digital Payment on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.
4. H_{04}: There is no significant effect of Cyber Security on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district.

2. Literature Review

2.1 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) was developed by Fred Davis in 1989. This theory posits that the acceptance and use of technology are primarily determined by two factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the

degree to which a person believes that using a particular system would enhance their job performance, while perceived ease of use refers to the degree to which a person believes that using the system would be free of effort (Davis, 1989). TAM has been widely used to understand user acceptance of various technologies, including digital banking services (Davis, 1989).

In the context of this study, TAM is relevant as it helps explain how customers of the Bank of Kigali and SACCOs in Musanze district perceive and adopt digital banking services. By understanding the factors that influence the acceptance of digital technologies, financial institutions can design and implement digital solutions that are more likely to be embraced by their customers. For instance, if customers find mobile banking apps easy to use and believe that these apps improve their banking experience, they are more likely to adopt and use these services, leading to higher customer satisfaction and operational efficiency.

2.2 Diffusion of Innovations Theory

The Diffusion of Innovations Theory was introduced by Everett Rogers in 1962. This theory explains how, why, and at what rate new ideas and technologies spread through cultures. According to Rogers (2003), the adoption of an innovation is influenced by five factors: relative advantage, compatibility, complexity, trialability, and observability. Innovations that are perceived to have a greater relative advantage, compatibility with existing values and practices, lower complexity, higher trialability, and greater observability are more likely to be adopted (Rogers, 2003).

The Bank of Kigali and SACCOs in Musanze district can use this theory to assess the factors that influence the adoption of digital technologies and develop strategies to promote their use. For example, by highlighting the relative advantages of digital payment systems, such as increased transaction speed and security, these institutions can encourage more customers to adopt these technologies, thereby enhancing financial inclusion and profitability.

2.3 Empirical Literature Review

Mobile banking has significantly transformed the financial landscape, particularly in emerging markets. According to Kathuo et al. (2015), the introduction of mobile banking services has allowed financial institutions to reach a broader customer base, thereby increasing their market share and profitability. This is achieved by minimizing the time and distance to the nearest retail bank branches, reducing overheads and transaction-related costs. The study highlights that mobile banking has led to an increase in customer outreach and improved financial performance indicators such as Return on Assets (ROA) and Return on Equity (ROE) (Ferreira, 2019).

Furthermore, Mabwai (2016) emphasizes that mobile banking has positively impacted the financial performance of commercial banks by enhancing customer relationship management and increasing accessibility to banking services. The study found that mobile banking services, including fund transfers, bill payments, and account management, have contributed to higher efficiency and customer satisfaction. This, in turn, has led to increased profitability and reduced operational costs for banks (Statista Research, 2020).

Isa et al. (2022) further elaborate that digital banking, including online banking, has significantly contributed to the operational and financial performance of banks. The shift from traditional to digital banking has enabled banks to meet the evolving needs of customers, thereby enhancing customer satisfaction and loyalty. This transformation has also allowed banks to expand their market reach and improve their financial performance indicators (Manta, 2024).

Digital payments have significantly influenced the performance of financial institutions by enhancing efficiency and expanding customer reach. According to Kasekende and Opondo (2013), the adoption of digital payment systems has led to a reduction in transaction costs and improved service delivery. This has been achieved through the automation of payment processes, which reduces the need for physical cash handling and minimizes errors. The study highlights that financial institutions that have integrated digital payment solutions tend to exhibit better financial performance metrics such as Return on Assets (ROA) and Return on Equity (ROE) (OECD, 2023).

Cybersecurity has become a critical factor in the performance of financial institutions, given the increasing frequency and sophistication of cyber threats. According to Atkins et al. (2023), the implementation of robust cybersecurity measures is essential for protecting sensitive financial data and maintaining customer trust. The study highlights that financial institutions investing in advanced cybersecurity technologies tend to experience fewer security breaches, which in turn enhances their operational efficiency and financial performance. Effective cybersecurity practices help mitigate risks associated with data breaches, fraud, and other cyber threats, leading to improved financial stability and performance indicators such as Return on Assets (ROA) and Return on Equity (ROE).

Brando et al. (2022) emphasize that cyber risks pose significant threats to financial stability, as cyber incidents can disrupt the availability of critical services and data. The research indicates that financial institutions with strong cybersecurity frameworks are better equipped to handle such disruptions, thereby minimizing potential financial losses and maintaining investor confidence. The study also suggests that cybersecurity resilience is crucial for sustaining long-term financial performance and stability.

Additionally, the work of Morufu (2020) points out that while cybersecurity investments can be costly, they are necessary for safeguarding the financial system against cyber threats. The study finds that institutions with comprehensive cybersecurity strategies not only protect their assets but also enhance their reputation and customer loyalty. This, in turn, positively impacts their financial performance by attracting more customers and reducing the likelihood of costly security incidents (Pousttchi, 2018).

3. Methodology

This section outlines the research design, data collection methods, sampling techniques, and data analysis procedures that were employed.

3.1 Research Design

The study employed both descriptive and inferential statistical techniques to interpret the data, providing a comprehensive understanding of the impact of digitalization on these financial institutions.

3.2 Target Population

The population were all employees of 15 Umurenge SACCOs in Musanze district, located in 15 sectors of Musanze District (Busogo, Cyuve, Gacaca, Gashaki, Gataraga, Kimonyi, Kinigi, Muhoza, Muko, Musanze, Nkotsi, Nyange, Remera, Rwaza, and Shingiro). This is made up of 120 employees and 16 employees of BK Musanze Branch and 43 BK agents in Musanze district. The total population is 179 targeted employees.

3.3 Sample Design

The target population were the employees of BK Musanze Branch, BK agents in Musanze and employees of 15 SACCOs in Musanze district sectors (15). The total population was 179 and using a margin error of 5% in the formula of Slovin $n=N/(1+(N*e^2))$ in Barney (2021) and the sample size was $n=179/(1+(179*.05^2))$ equal 123.6614853 rounded up to 124.

To achieve a representative sample of employees from the Bank of Kigali and SACCO in Musanze District, simple random sampling was employed. This technique ensures that every employee has an equal probability of being selected, thereby minimizing selection bias. By using a random number generator or drawing lots, a subset of employees was chosen to participate in the survey.

To capture the diversity within the employee population, stratified random sampling was utilized. This involved dividing the employees into distinct subgroups or strata based on characteristics such as BK Musanze branch employees, 15 Umurenge SACCOs employees and BK agent's employees in Musanze District. Within each stratum, random samples were drawn. This approach ensured that all relevant subgroups were adequately represented in the sample, enhancing the precision and reliability of the study's findings.

For the qualitative components of the study, such as interviews and focus groups, purposive sampling were employed. This technique involved selecting individuals who possessed specific characteristics or experiences relevant to the research topic. In this case, employees with significant experience in digitalization initiatives were targeted (mainly managers and operation technicians). This method allowed for the collection of in-depth insights and nuanced perspectives that are critical for understanding the complexities of digitalization's impact on performance.

3.4 Data Collection Methods

Data is facts or things certainly known and from which conclusions may be made. The main sources of data collection referred to when conducting this study used primary and secondary sources of data. For the purpose of this research, and in order to achieve the objectives, data were collected and both primary and secondary data were used to perform the study. The survey questionnaire was used as the main data collecting instrument and the secondary data were gathered from BK annual reports, books, research articles and appropriate websites that are relevant to this study.

3.5 Data Analysis

Data analyses were performed using descriptive statistics and inferential statistics. Descriptive statistics were presented in the form of frequencies, percentages, mean and standard deviation. Means were categorized into three categories such as Strong, Moderate and Weak mean (3.50-5.00; 2.50-3.49 and 1.00-2.49 respectively). And standard deviation also was classified into two categories such as Homogeneity (less or equal .5) and Heterogeneity (greater than .5).

For each item assessed, the hypothesis was tested using normal distribution and Bivariate correlation were ensured. With Bivariate correlation, Pearson correlation were analyzed (-1, +1) and Statistical Significance which tested via Sig.(2-tailed). In other case the linear regression model was also assessed:

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$

Where Xs= Digitalization as independent variable

Y= Performance of Financial Institution as dependent variable

β_0= Constant

$\beta_1 X_5$= Coefficient of estimation

X_1= Mobile Banking

X_2= Online Banking

X₃= Digital Payment

X₄= Cyber security

R-squared is a statistical measure that were used to assess the goodness of fit of regression model of this research.

3.6 Ethical consideration

Research ethics are the moral principles that govern how researchers should carry out their work. This study did not contradict ethical principles; including protecting the privacy of the research participants, explaining the purpose of the study, honesty, transparency, objectivity, respect for property, non-discriminative, and participation is voluntary.

4. Results and Discussion

This chapter aims to provide a comprehensive understanding of the role digitalization plays in the performance of financial institutions in Rwanda, particularly in the context of the Bank of Kigali and the Umurenge SACCOs of Musanze District.

Table 1: Response rate

	Frequency	Percent
Total Population	179	100.00
Submitted questionnaire/ Sample size	124	69.27
Returned Questionnaire	**124**	**100.00**

Source: Author (2025)

Table 1 shows that the total population for this study consisted of 179 individuals. Out of this total population, 124 individuals (69.27%) were selected as the sample size and given questionnaires to complete. Remarkably, all 124 individuals in the sample group returned their completed questionnaires, resulting in a 100% return rate for the submitted questionnaires. A 100% return rate is an excellent outcome, suggesting that all selected respondents were able to complete and submit their questionnaires. This high response return rate is beneficial for ensuring the accuracy and completeness of the data collected, thereby increasing the validity of the study's findings.

Table 2: The effect of Mobile Banking on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district

Model Summary				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.764ᵃ	.584	.580	.0749041
a. Predictors: (Constant), Mobile Banking				

ANOVAᵃ						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	.960	1	.960	171.126	.000ᵇ
	Residual	.684	122	.006		
	Total	1.645	123			
a. Dependent Variable: Performance of Financial Institutions						
b. Predictors: (Constant), Mobile Banking						

Coefficientsᵃ						
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**
		B	**Std. Error**	**Beta**		
1	(Constant)	2.654	.158		16.820	.000
	Mobile Banking	.435	.033	.764	13.081	.000
a. Dependent Variable: Performance of Financial Institutions						

The first null hypothesis in this study posits: "There is no significant effect of Mobile Banking on the performance of Financial Institutions in the case of Bank of Kigali and SACCOs in Musanze District." To assess this hypothesis, we analyze the data provided in Table 2, which presents the results of a regression analysis on the effect of Mobile Banking on the performance of financial institutions.

From the Model Summary in Table 2, we observe that the R value is .764, which indicates a strong positive relationship between Mobile Banking and the performance of financial institutions. The R Square value

of .584 shows that approximately 58.4% of the variation in the performance of financial institutions can be explained by Mobile Banking. This suggests that Mobile Banking plays a significant role in influencing the performance outcomes of financial institutions like the Bank of Kigali and Umurenge SACCOs.

The ANOVA results further confirm the significance of the model. The F-value is 171.126, with a p-value of .000, which is highly significant and indicates that the model as a whole is statistically significant. This means that Mobile Banking is a significant predictor of the performance of financial institutions, rejecting the null hypothesis that there is no effect.

The equation is $y = 2.654 + .435X_1$ where "Y" Represent "Performance of Financial Institutions" and X_1 represent "Mobile Banking"

In the Coefficients table, the unstandardized coefficient for Mobile Banking is 0.435, and the standardized coefficient (Beta) is .764, both of which are statistically significant with a p-value of .000. The positive coefficient indicates that as the use of Mobile Banking increases, the performance of financial institutions improves. The t-value of 13.081 further supports the significance of Mobile Banking as a key driver of performance improvements.

Decision to the Null Hypothesis One:

Given the strong correlation and the statistical significance of the regression model, we can reject the first null hypothesis (H01). The data indicates a significant positive effect of Mobile Banking on the performance of financial institutions. Therefore, it can be concluded that Mobile Banking does, in fact, contribute to the enhanced performance of institutions like the Bank of Kigali and will likely have a similar effect on Umurenge SACCOs as they transition to digital banking.

Recent studies also support the conclusion that Mobile Banking significantly impacts the performance of financial institutions. For example, Munyua et al. (2020) examined the effects of Mobile Banking on the operational efficiency of banks in Kenya and found a strong positive relationship between mobile service adoption and bank performance, noting that it led to an increase in customer transactions and overall profitability. Similarly, Gikandi et al. (2021) in their study of Tanzanian banks found that Mobile Banking had a significant positive effect on both customer retention and institutional financial performance, highlighting mobile platforms as critical tools in improving banking services. These findings align with the results of this study, reinforcing the importance of Mobile Banking in enhancing the performance of financial institutions. The statistical evidence presented in Table 2 further corroborates these conclusions, providing robust support for the argument that Mobile Banking is a key factor in improving financial institutions' performance in the region.

Table 3: The effect of Online Banking on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.569[a]	.323	.318	.0954968

a. Predictors: (Constant), Online Banking

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.532	1	.532	58.338	.000[b]
	Residual	1.113	122	.009		
	Total	1.645	123			

a. Dependent Variable: Performance of Financial Institutions
b. Predictors: (Constant), Online Banking

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.026	.352		5.747	.000
	Online Banking	.572	.075	.569	7.638	.000

a. Dependent Variable: Performance of Financial Institutions

The second null hypothesis of the study posits: "There is no significant effect of Online Banking on the performance of Financial Institutions in the case of Bank of Kigali and SACCOs in Musanze District." In order to evaluate this hypothesis, Table presents the results of the

regression analysis on the effect of Online Banking on the performance of financial institutions.

The R-value of .569 indicates a moderate positive relationship between Online Banking and the performance of financial institutions. The R Square value of .323 means that approximately 32.3% of the variation in the performance of financial institutions can be explained by the adoption of Online Banking. Although the R Square value is not very high, it still indicates that Online Banking plays a significant role in influencing performance. The Adjusted R Square value of .318 adjusts for the number of predictors and gives a slightly lower value, suggesting that while Online Banking is a significant predictor of performance, other factors may also contribute to the performance outcomes observed.

The ANOVA results show that the model is statistically significant with an F-value of 58.338 and a p-value of .000. The low p-value indicates that the regression model, which predicts performance based on Online Banking, is significant. Therefore, we can reject the null hypothesis that Online Banking has no significant effect on the performance of financial institutions.

The equation is $y = 2.026 + .572X_2$ where "Y" Represent "Performance of Financial Institutions" and X_2 represent "Online Banking"
The unstandardized coefficient for Online Banking is .572, and the standardized coefficient (Beta) is .569, both of which are significant at p = .000. This indicates that for every unit increase in the use of Online Banking, there is an expected increase of .572 in the performance

of financial institutions. The t-value of 7.638 is also significant, reinforcing the importance of Online Banking as a key driver of performance.

Decision to Null Hypothesis Two:

There is a strong indication that Online Banking has a significant effect on the performance of financial institutions. Given the significant p-value (.000), we can confidently reject the second null hypothesis (H02), which stated that there is no significant effect of Online Banking on performance. The positive coefficient values and the statistical significance of the model suggest that the adoption and usage of Online Banking lead to enhanced institutional performance, including improvements in customer engagement, transaction volumes, and overall operational efficiency.

The findings of this study align with recent research on the impact of Online Banking on the performance of financial institutions. Kama & Oduro (2020), in their study on Ghanaian banks, found that the implementation of online banking services contributed significantly to improved customer satisfaction and transaction efficiency, which ultimately led to enhanced financial performance. Similarly, Munyua et al. (2020) in Kenya observed that the growth in Online Banking services positively impacted the performance of commercial banks by driving higher transaction volumes and increasing customer retention.

Table 4: The effect of Digital Payment on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.239[a]	.057	.049	.1127386

a. Predictors: (Constant), Digital Payment

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.094	1	.094	7.395	.007[b]
	Residual	1.551	122	.013		
	Total	1.645	123			

a. Dependent Variable: Performance of Financial Institutions
b. Predictors: (Constant), Digital Payment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.173	.200		20.839	.000
	Digital Payment	.117	.043	.239	2.719	.007

a. Dependent Variable: Performance of Financial Institutions

The third null hypothesis of the study states: "There is no significant effect of Digital Payment on the performance of Financial Institutions in the case of Bank of Kigali and SACCOs in Musanze District." To assess this hypothesis, we analyze the results presented in Table 4, which summarizes the regression analysis of the effect of Digital Payment on the performance of financial institutions.

The R-value of .239 indicates a weak positive relationship between Digital Payment and the performance of financial institutions. The R Square value of .057 implies that only 5.7% of the variance in the performance of financial institutions can be explained by Digital Payment. This is a relatively low proportion, suggesting that while Digital Payment has some impact, other factors may play a more significant role in determining the performance of these institutions. The Adjusted R Square value of .049 is slightly lower, reflecting a small but notable contribution from Digital Payment after adjusting for the number of predictors in the model.

The ANOVA results indicate that the model is statistically significant with an F-value of 7.395 and a p-value of .007. Since the p-value is less than the conventional threshold of .01, we can conclude that the regression model, which examines the effect of Digital Payment on performance, is statistically significant. This supports the rejection of the null hypothesis that Digital Payment has no effect on performance.

The equation is $y = 4.173 + .117X_3$ where "Y" Represent "Performance of Financial Institutions" and X_3 represent "Digital Payment".
The unstandardized coefficient for Digital Payment is .117, and the standardized coefficient (Beta) is .239, both of which are significant with a p-value of .007. This indicates that for every unit increase in the adoption of Digital Payment, there is a corresponding increase of .117 in the performance of financial institutions. The t-value of 2.719 confirms that this effect is statistically significant. This suggests that the implementation and use of digital payment methods, such as mobile wallets and digital lending platforms, have a positive effect on the performance of financial institutions, although the effect is relatively modest.

Decision to the Null Hypothesis Three:

Based on the findings in Table 4, the third null hypothesis (H03) is rejected. The regression analysis shows that Digital Payment does have a statistically significant effect on the performance of financial institutions, though the effect is modest. The low R Square value indicates that other factors likely contribute more significantly to the performance of these institutions, but Digital Payment still plays a role in improving performance outcomes.

The findings of this study are consistent with other research on the impact of digital payment systems. For instance, Chakraborty and Zohra (2020) in their study on digital payments in Indian banks found that while digital payment adoption contributed to enhanced operational efficiency and customer satisfaction, the impact on overall performance was moderate, similar to the results observed in this study. Similarly, Khan et al. (2021) found that while digital payments were essential for customer engagement, the effect on financial performance was smaller compared to other digital banking innovations like mobile and online banking.

Table 5: The effect of Cyber Security on performance of Financial Institutions case of Bank of Kigali and SACCOs in Musanze district

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.703[a]	.494	.489	.0826262

a. Predictors: (Constant), Cyber security

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.812	1	.812	118.896	.000[b]
	Residual	.833	122	.007		
	Total	1.645	123			

a. Dependent Variable: Performance of Financial Institutions
b. Predictors: (Constant), Cyber security

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.861	.170		16.797	.000
	Cyber security	.395	.036	.703	10.904	.000

a. Dependent Variable: Performance of Financial Institutions

The fourth null hypothesis of this study states: "There is no significant effect of Cyber Security on the performance of Financial Institutions in the case of Bank of Kigali and SACCOs in Musanze District." To assess this hypothesis, we examine the results presented in Table 4.18, which shows the regression analysis evaluating the effect of cybersecurity on the performance of financial institutions.

The R-value of .703 indicates a strong positive relationship between cybersecurity and the performance of financial institutions. The R Square value of .494 suggests that 49.4% of the variation in the performance of financial institutions can be explained by cybersecurity measures. This is a relatively high proportion, implying that cybersecurity plays a substantial role in determining the performance of these institutions. The Adjusted R Square value of .489 is very close to the R Square value, indicating that the model's explanatory power remains strong even after adjusting for the number of predictors.

The ANOVA results show that the regression model is statistically significant, with an F-value of 118.896 and a p-value of .000, which is less than the conventional significance level of .01. This indicates that the model, which assesses the effect of cybersecurity on performance, is a good fit and the relationship observed is statistically significant. Therefore, the null hypothesis

stating that cybersecurity has no effect on the performance of financial institutions is rejected.

The equation is $y = 2.861 + .395X_3$ where "Y" Represent "Performance of Financial Institutions" and X_4 represent "Cyber security".

The unstandardized coefficient for cybersecurity is .395, and the standardized coefficient (Beta) is .703, both of which are statistically significant, with a p-value of .000. This suggests that for every unit increase in the effectiveness of cybersecurity, there is an associated increase of .395 in the performance of financial institutions. The t-value of 10.904 further confirms that the effect of cybersecurity on the performance of financial institutions is highly significant.

Decision to the Null Hypothesis four:

Based on the results in Table 5, the fourth null hypothesis (H04) is rejected. The regression analysis clearly shows that cybersecurity has a statistically significant and positive effect on the performance of financial institutions. The findings indicate that improved cybersecurity measures are strongly associated with better performance outcomes for financial institutions, particularly in terms of customer trust and operational efficiency.

Table 6: Overall effect of digitalization on performance of financial institution in Rwanda, case of Bank of Kigali and Savings and Credit Cooperative (SACCO) of Musanze district

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.815[a]	.665	.662	.0672279

a. Predictors: (Constant), Digitalization

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.093	1	1.093	241.886	.000[b]
	Residual	.551	122	.005		
	Total	1.645	123			

a. Dependent Variable: Performance of Financial Institutions
b. Predictors: (Constant), Digitalization

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.830	.250		3.318	.001
	Digitalization	.828	.053	.815	15.553	.000

a. Dependent Variable: Performance of Financial Institutions

Table 6 presents the results of a regression analysis conducted to examine the overall effect of digitalization on the performance of financial institutions, specifically focusing on the Bank of Kigali and SACCOs in Musanze District. The model summary shows an R-value of .815, which suggests a strong positive relationship between digitalization and the performance of these institutions. The R-square value of .665 indicates that 66.5% of the variance in the performance of the institutions can be explained by digitalization efforts. This demonstrates that digitalization is a significant factor influencing performance.

The Adjusted R-square value of .662 accounts for the number of predictors in the model and confirms that the model is a reliable predictor of performance. The Standard Error of the Estimate (.0672) indicates that the model's predictions have relatively small errors, suggesting good model fit. In the ANOVA table, the F-value of 241.886 with a significant p-value (.000) indicates that the overall regression model is statistically significant, meaning digitalization significantly contributes to the performance of financial institutions.

The equation is $y = .830 + .828X$ where "Y" Represent "Performance of Financial Institutions" and X represent "Digitalization".

The coefficients table shows that the unstandardized coefficient for digitalization is .828, indicating that for every unit increase in digitalization, the performance of financial institutions improves by .828 units. The standardized coefficient (Beta) of .815 further reinforces the strong positive influence of digitalization on performance. The t-value of 15.553 and the significant p-value (.000) indicate that the effect of digitalization on performance is statistically significant.

The analysis confirms that digitalization has a significant and substantial positive effect on the performance of financial institutions in the case of Bank of Kigali and SACCOs in Musanze District. The results indicate that enhancing digitalization efforts can lead to improved overall performance, including higher profitability, better customer satisfaction, increased operational efficiency, and stronger security measures.

5. Conclusion and recommendations

5.1 Conclusion

The study has demonstrated that all four forms of digitalization mobile banking, online banking, digital payment systems, and cybersecurity have a significant positive effect on the performance of financial institutions in Musanze District. The results show that these digital advancements are key drivers of profitability, customer satisfaction, operational efficiency, and financial stability. Financial institutions should continue investing in these areas to remain competitive and enhance their performance, while also safeguarding their operations against potential cyber threats.

5.2. Recommendations

The study recommends that financial institutions prioritize continued investment in mobile banking platforms.

1. The study recommends that financial institutions invest further in the development and enhancement of online banking services.
2. The study recommends that financial institutions continue to develop and optimize digital payment systems. By improving the speed, security, and accessibility of digital transactions, institutions can enhance customer experience and increase transaction volumes. Strengthening the digital payment infrastructure can further support operational efficiency and financial stability.
3. The study strongly recommends that financial institutions continue to invest in robust cybersecurity measures.

5.3 Areas for further research

Based on the study objectives, the study recommends: To establish the effect of Mobile Banking on the performance of Financial Institutions: Future researchers should extend the geographical scope of this study to include other regions or countries to compare how mobile banking adoption impacts financial performance in different contexts. Investigating customer behavior and factors that influence the adoption of mobile banking would further deepen our understanding of its impact on financial institutions' performance.

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