



Effect of Digital Automation on Operational Efficiency of Microfinance Institutions: A Case Study of District SACCO Nyarugenge, Rwanda

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Abstract: This study examined the effect of digital automation on the operational efficiency of microfinance institutions, with specific focus on the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge, Rwanda. The study employed a descriptive and correlational research design within a mixed-methods case-study approach. The target population comprised 84 employees of District SACCO Nyarugenge, and all 84 employees participated in the quantitative survey. Data were collected using a structured questionnaire and documentary review of institutional records and were analyzed using descriptive statistics and Pearson correlation analysis. The findings showed that respondents generally agreed that IT investment was well established at the SACCO, with a composite mean of 4.24 (SD = 0.66). IT support staff being sufficient and competent recorded the highest mean (M = 4.82, SD = 0.71), while increased IT capital investment reducing operational expenses recorded the lowest mean (M = 3.30, SD = 0.76). Pearson correlation analysis revealed a strong positive and statistically significant relationship between IT investment ratio and operational efficiency ($r = .736$, $p < .001$). The study concludes that IT investment is positively associated with operational efficiency at District SACCO Nyarugenge, particularly through improved system reliability and service delivery. However, the direct translation of IT investment into cost reduction remains comparatively weak. The study recommends strengthening IT investment planning, continuous digital skills development, and the integration of technology investments with process-level cost-reduction measures to maximize operational efficiency.

Keywords: Digital automation; IT investment ratio, Operational efficiency, Microfinance institutions, SACCO, Nyarugenge District, Rwanda.

How to cite this work (APA):

Bizimana, J. P. & Tarus, T. (2026). Effect of Digital Automation on Operational Efficiency of Microfinance Institutions: A Case Study of District SACCO Nyarugenge, Rwanda. *Journal of Research Innovation and Implications in Education*, 10(3), 3100 – 3110. <https://10.59765/bbf5e3>

1. Introduction

Digital technology has increasingly become an important component of modern financial service delivery because it enables institutions to process transactions more quickly, improve information management, reduce manual errors, and extend services to a wider range of customers. Microfinance institutions and Savings and Credit

Cooperative Societies (SACCOs) have therefore adopted technologies such as core banking systems, digital payment platforms, automated reporting systems, and other information technology infrastructure to improve their operational processes. The increasing use of such technologies has changed the way microfinance institutions organize their daily activities and has created greater expectations for efficiency, accuracy, and service quality (Srinivas, 2022).

At the global level, information technology investment is increasingly viewed as a strategic resource for financial service organizations. Investments in modern systems, reliable infrastructure, skilled technical personnel, and digital platforms can improve the speed and quality of service delivery while reducing dependence on manual processes. Brynjolfsson and Hitt (2000) argued that investments in information technology can generate measurable productivity gains, although the benefits may take time to become fully visible. In banking and other financial institutions, technology investment has similarly been associated with improved service throughput and operational performance, although cost-efficiency gains may depend on complementary organizational changes (Berger, 2003).

In Africa, digitalization has become particularly important for microfinance institutions because many providers operate with limited resources while serving large numbers of customers. Digital technologies can reduce transaction time, support accurate record keeping, improve loan administration, and strengthen the ability of institutions to monitor operations. However, the benefits of technology investment depend not only on the availability of equipment and systems but also on staff competence, system reliability, and the extent to which technological investments are translated into effective operational processes. Ivatury and Mas (2008) observed that digital investment in microfinance can improve service quality and revenue generation, while direct reductions in operating costs may require deeper automation and process redesign.

In Rwanda, the development of digital financial services has also affected the operations of SACCOs and other microfinance institutions. The modernization of SACCO operations has increasingly involved core banking systems and digital platforms intended to improve financial inclusion and institutional efficiency. District SACCO Nyarugenge provides an important case because it operates in a highly active urban environment and has undertaken investments in digital systems and related infrastructure. Nevertheless, the extent to which IT investment has translated into measurable operational efficiency, particularly in terms of service delivery, system reliability, and cost reduction, requires empirical assessment. This study therefore focuses specifically on the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge, Rwanda.

1.1. Statement of the Problem

IT investment is generally expected to improve operational efficiency by providing institutions with modern infrastructure, reliable information systems, technical support, and digital capabilities that reduce manual work

and improve service delivery. In an ideal situation, sustained investment in IT infrastructure should contribute to faster transactions, fewer operational errors, better information management, improved customer service, and lower operating costs. Such benefits are particularly important for SACCOs because their operational sustainability depends on efficient use of limited financial and human resources (Dumba, 2023).

Despite substantial investment in digital automation within the SACCO sector, the actual contribution of IT investment to operational efficiency is not always clear. The source thesis identifies an important practical concern at District SACCO Nyarugenge: while the institution has invested in digital systems and infrastructure, it has not previously established clear empirical evidence showing how these investments affect operational efficiency indicators such as transaction processing time, service accuracy, service delivery, and operating expenses. This creates uncertainty for management and policymakers when assessing whether continued investment is producing the expected operational benefits (Mukeshimana, 2024).

Existing studies have frequently concentrated on broader financial performance indicators or on digital adoption in general, with comparatively less attention to the specific relationship between IT investment and operational efficiency at the institutional level of a Rwandan SACCO (Kanali, 2024). This creates a contextual and empirical gap because the operational effects of IT investment may vary according to institutional capacity, staff competence, system quality, and the way technology is integrated into daily processes. The present study addresses this gap by examining the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge, thereby providing evidence that can guide technology investment and operational improvement decisions.

1.2. Objective of the Study

This study was guided by the following specific objective

- i. To evaluate the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge, Rwanda.

2. Literature Review

This section reviews literature relevant to IT investment and operational efficiency in microfinance institutions. The review first clarifies the meaning of IT investment and operational efficiency, then considers theoretical and empirical perspectives that explain how investment in information technology can contribute to institutional performance. Particular attention is given to evidence that relates technology investment to service quality, system

reliability, productivity, and operating costs, because these dimensions are directly relevant to the selected objective.

2.1.1. Digital Automation

Digital automation refers to the application of digital technologies, computerized systems, software, and interconnected platforms to perform and coordinate organizational activities that were previously undertaken manually. In financial institutions, automation can support transaction processing, record management, reporting, customer communication, internal control, and service delivery by improving the speed and accuracy of operations. Recent evidence from Rwanda demonstrates the growing importance of this transformation in the SACCO sector. In June 2024, the Ministry of Finance and Economic Planning reported the completion of automation for all 416 Umurenge SACCOs, marking a transition from manual operations to automated management information systems. The automation was intended to improve operational efficiency and member services, eliminate physical journals, and facilitate real-time mobile notifications and digital financial services (Ministry of Finance and Economic Planning [MINECOFIN], 2024).

Digital automation has also become an important component of Rwanda's broader financial-sector modernization strategy. The National Bank of Rwanda (NBR, 2025) reported that the full automation of Umurenge SACCOs was completed in June 2024 and that the subsequent consolidation of these institutions into District SACCOs was expected to strengthen service delivery and operational sustainability. The NBR further reported that financial inclusion reached 96% by June 2025, supported partly by expanded access through Umurenge SACCOs and greater adoption of digital financial services. These developments demonstrate that digital automation is not limited to replacing manual activities with computerized procedures; it also facilitates institutional restructuring, real-time information management, digital transactions, and broader access to financial services. In the context of District SACCO Nyarugenge, such developments are particularly relevant because the institution operates within this broader national transition toward automated and digitally enabled SACCO operations.

The practical contribution of digital automation to operational efficiency is also supported by recent empirical evidence from Rwanda. Philbert and Kasozi (2026) found that digitalization among financial institutions in Rwanda, including SACCOs, was associated with improvements in operational efficiency, including reductions in transaction-processing time and operational costs. Similarly, evidence from Access to Finance Rwanda indicates that automation of SACCO operations can improve efficiency in service

provision, while staff capacity building is necessary to ensure that digital systems are effectively utilized (Access to Finance Rwanda, 2020).

2.1.2. IT Investment Ratio

IT investment ratio refers to the extent to which an institution commits financial resources to information technology infrastructure, systems, technical support, and related digital capabilities. In the context of a SACCO, such investment may include expenditure on hardware, networks, software, core banking systems, system maintenance, and staff digital skills. IT investment is important because technology cannot generate operational benefits if institutions lack adequate infrastructure and competent personnel to maintain and use it. The thesis operationalized this construct through indicators covering capital allocation to IT infrastructure, system modernization, staff training, technical support, service delivery improvement, and reduction of operational expenses.

From a resource perspective, technology investment can be understood as an organizational capability that enables an institution to process information and transactions more efficiently. Modern systems can reduce dependence on manual procedures, improve the availability of accurate information, and facilitate faster decision-making. However, investment alone does not automatically guarantee efficiency because the value of technology depends on how effectively systems are integrated into organizational processes and how well employees are equipped to use them. This distinction is important when assessing the operational contribution of IT investment at District SACCO Nyarugenge.

2.1.2. Operational Efficiency

Operational efficiency refers to the ability of a financial institution to utilize its available human, financial, technological, and organizational resources to deliver services accurately, promptly, and at the lowest reasonable cost. In microfinance institutions, operational efficiency is particularly important because institutions must balance the need to provide accessible financial services with the need to control operating costs and maintain sustainable operations. Zineelabidine et al. (2024), in their study of 95 microfinance institutions in Africa, emphasized that efficiency is an important dimension of microfinance institutional performance because financial sustainability cannot be adequately assessed through profitability alone. Their findings showed that institutional characteristics, capitalization, loan structure, and operating environment can significantly influence the efficiency of microfinance institutions.

In Rwanda, operational efficiency has become an important consideration in the transformation and consolidation of SACCOs. The automation of Umurenge SACCOs and their transition toward larger District SACCOs are intended to improve operational processes, strengthen internal controls, and enhance service delivery. The National Bank of Rwanda (2025) reported that the automation of Umurenge SACCOs was completed in June 2024 and that the transformation contributed to the development of stronger and more efficient institutions at district level. Similarly, the International Monetary Fund (2025) reported that Rwanda's continued consolidation of smaller U-SACCOs into larger District SACCOs is expected to enhance operational efficiency and improve monitoring and supervision of the microfinance sector.

Recent empirical evidence further demonstrates the relevance of digitalization to operational efficiency in Rwanda's financial institutions. Uwilingiyimana and Kasozi (2025) found that digitalization among financial institutions in Rwanda, including SACCOs, was associated with significant reductions in transaction-processing time and operational costs, alongside improvements in service delivery and institutional performance. The Rwanda Financial Sector Development Strategy 2025–2029 also identifies digitization, automation, and shared digital infrastructure as important mechanisms for reducing operational costs and improving service delivery within the microfinance and SACCO sector (Republic of Rwanda, 2026). Therefore, operational efficiency in District SACCO Nyarugenge can be understood in terms of the institution's ability to process transactions efficiently, minimize operational costs, reduce errors and delays, utilize resources effectively, and provide reliable services to members. This understanding provides an appropriate basis for examining how IT investment ratio influences operational efficiency at District SACCO Nyarugenge.

2.2. Theoretical Review

The study is informed by the Technology Acceptance Model (TAM) and the Resource-Based View (RBV), which provide complementary explanations of digital technology use and organizational performance. TAM explains why users accept and use technology based on perceived usefulness and perceived ease of use, while RBV views technological infrastructure and organizational capabilities as resources that can create value when they are effectively developed and utilized. Together, these perspectives provide a useful basis for understanding why IT investment may be associated with operational efficiency in a SACCO.

2.2.1. Technology Acceptance Model

The Technology Acceptance Model (TAM), developed by Davis (1989), explains users' acceptance and use of information technology through two central beliefs: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which an individual believes that using a particular technology will improve job performance, whereas perceived ease of use concerns the extent to which the technology is perceived to require little effort. Davis (1989) established that these beliefs are important determinants of technology acceptance. The continued relevance of TAM is demonstrated by recent research on digital financial services, where the model remains one of the most frequently applied theoretical perspectives for explaining users' intention to adopt and use digital technologies (Anane & Nie, 2025).

The model is relevant to the present study because the effectiveness of IT investment at District SACCO Nyarugenge depends partly on employees' ability and willingness to use the technological systems provided by the institution. Investment in modern information systems, digital skills training, and technical support can improve employees' ability to perceive technology as useful and manageable in performing their responsibilities. When employees effectively use digital systems for transaction processing, information management, reporting, and communication, technological investment is more likely to generate operational benefits. Recent evidence further indicates that digital capabilities are increasingly important for organizational performance, although organizations need to distinguish between basic IT resources and the broader capabilities required to derive value from digital technologies (Grego et al., 2025).

Therefore, TAM provides a useful theoretical explanation of the relationship between IT investment ratio and operational efficiency. The theory suggests that investment in technology should be accompanied by appropriate user training, technical support, and systems that employees can use effectively. This is particularly important in financial institutions, where the adoption of digital systems involves both technological and human factors. A recent systematic review of digital financial-service adoption found that perceived usefulness, ease of use, digital literacy, infrastructure, trust, and service quality are among the factors influencing technology adoption (Anane & Nie, 2025). In the context of District SACCO Nyarugenge, TAM therefore provides a theoretical basis for examining whether IT investment is translated into effective technology utilization and, ultimately, improved operational efficiency.

2.2.2. Resource-Based View

The Resource-Based View (RBV), formally developed by Barney (1991), explains organizational performance from

the perspective of resources controlled and effectively utilized by an organization. Barney (1991) argued that resources can provide a basis for sustained competitive advantage when they are valuable, rare, difficult to imitate, and appropriately organized. From this perspective, organizational resources extend beyond physical assets to include knowledge, employee skills, technological infrastructure, and organizational capabilities. The RBV is particularly relevant to technology-based organizations because technological resources can create value when they are effectively combined with complementary human and organizational capabilities.

The RBV is relevant to the present study because IT infrastructure, information systems, technical expertise, and employee digital skills can constitute important organizational resources within District SACCO Nyarugenge. Recent empirical synthesis supports this argument. Karim et al. (2022), using a meta-analysis of 147 studies, found that information and communication technologies can function as strategic resources and have a significant influence on business performance, although the strength of the relationship depends partly on the level of ICT development in the surrounding environment. More recent evidence also shows that technological capability is positively associated with organizational performance, although the strength of the relationship varies according to the type of capability and organizational context (González-Campo et al., 2024).

Consequently, the RBV provides a strong theoretical basis for expecting a positive relationship between IT investment ratio and operational efficiency. Recent research continues to demonstrate the usefulness of the RBV for explaining how digital technologies generate organizational value. Hanafizadeh and Tavakoli (2026), based on a synthesis of 245 empirical studies published between 2010 and 2024, found that digital technological resources and organizational resources can have significant effects on organizational performance. Similarly, recent research on digital capabilities emphasizes that organizations must develop and integrate technological capabilities rather than merely acquire IT assets (Grego et al., 2025). For District SACCO Nyarugenge, this implies that investment in IT infrastructure, technical personnel, digital skills, and reliable information systems can contribute to operational efficiency when these resources are effectively integrated into everyday organizational processes.

2.3. Empirical Literature

Recent empirical studies provide evidence that information technology and digitalization can improve the efficiency and performance of financial institutions. Uwiringiyimana and Kasozi (2025) examined the effect of digitalization on the performance of financial institutions, focusing on Bank of Kigali and SACCOs in Musanze District, Rwanda. The

study employed a quantitative research approach and investigated the contribution of mobile banking, online banking, digital payment systems, and cybersecurity to institutional performance. The findings showed that digitalization was associated with improved operational efficiency, including reductions in transaction-processing time and operational costs, while mobile and online banking also improved customer engagement and institutional performance. The study concluded that digitalization plays an important role in strengthening the performance of financial institutions and recommended continued investment in digital technologies, particularly cybersecurity and user-friendly digital platforms. This study is closely related to the present research because it provides Rwanda-specific evidence that investment in digital technologies can generate operational benefits in SACCOs. However, it considered digitalization broadly rather than specifically examining the IT investment ratio as an indicator of investment intensity.

Murekezi and Yeşilada (2023) investigated the effectiveness of information and communication technology in enhancing strategic management among SACCOs in Nyagatare District, Rwanda. The researchers used surveys, interviews, and documentary analysis to collect data from SACCOs and examined ICT infrastructure, ICT integration in daily operations, and ICT skills and training. The findings indicated that ICT infrastructure positively supported strategic management, while ICT integration contributed to the automation of tasks, streamlining of operational processes, and improvement of service delivery. The study also found that ICT skills and training were important in enabling employees to utilize technology effectively and improve customer service. The researchers concluded that SACCOs could obtain greater benefits from ICT when technological infrastructure was accompanied by employee capacity development and recommended addressing infrastructure limitations and increasing staff training. Although the study provides important evidence on the contribution of ICT to SACCO operations in Rwanda, its focus was on strategic management and service delivery rather than measuring the relationship between the proportion of institutional resources allocated to IT and operational efficiency. This creates a specific empirical gap that the present study addresses at District SACCO Nyarugenge.

Uwimpuhwe and Twesigye (2023) examined the effect of electronic banking tools on the operational performance of Bank of Kigali in Rwanda. The study adopted a correlational research design and selected 72 employees from a population of 254 employees working in operations, corporate and retail customer services, risk and compliance, and digital banking departments. The study examined internet banking transactions, electronic cards, and mobile banking as explanatory variables of operational

performance. The findings demonstrated the relevance of electronic banking tools to operational performance and provided evidence that digital financial technologies can support more efficient banking operations. The researchers recommended continued development and effective management of electronic banking services to strengthen operational performance. Similarly, Liu et al. (2024) examined ICT and mobile banking adoption among microfinance institutions in Ghana using both qualitative and quantitative methods and found that ICT and mobile banking contributed positively to efficiency, institutional growth, outreach, loan repayment, and financial inclusion. Taken together, these studies support the expectation that technological investment can contribute to operational efficiency; however, most previous studies have focused on specific digital services or broad digitalization rather than the IT investment ratio. The present study therefore extends the empirical literature by examining whether the proportion of institutional investment devoted to IT is associated with operational efficiency at District SACCO Nyarugenge.

3. Methodology

The study employed a descriptive and correlational research design to examine the relationship between digital automation and operational efficiency at District SACCO Nyarugenge. The descriptive component described the existing situation concerning digital automation, IT investment, Core Banking System (CBS) utilization, and operational efficiency, while the correlational component established the strength and direction of relationships among the study variables. The study also adopted a cross-sectional approach to capture the contemporary situation within the institution. Descriptive statistics, including frequencies, means, and standard deviations, summarized the data, while correlation and regression analysis examined relationships among the variables (Creswell, 2014; Kothari, 2004; Hair et al., 2019).

The target population comprised individuals and institutional information relevant to the operations of District SACCO Nyarugenge. The study focused particularly on employees involved in management, accounting, lending, operations, and activities related to digital systems and service delivery. The institution had a total of 84 employees, who constituted the population frame. Institutional records, including financial statements and Management Information System reports, also provided secondary information concerning operational performance. The inclusion of employee perspectives and institutional records provided information on both the use of digital automation and measurable operational outcomes (Saunders, Lewis, & Thornhill, 2019).

Because the study population was relatively small and accessible, the research used a census approach, whereby all 84 employees were included rather than selecting a smaller sample. This approach provided comprehensive coverage of the institution and ensured representation across different departments. Purposive sampling was also applied to select senior personnel for key informant interviews because managers and heads of departments possessed relevant knowledge concerning decision-making, resource allocation, and implementation of digital automation. Operational and frontline personnel involved in automated SACCO procedures were covered through universal sampling, enabling the study to capture experiences from employees directly involved in daily operations.

The study employed both primary and secondary data. Primary data were collected through structured questionnaires administered to employees and semi-structured interviews conducted with selected management personnel. The questionnaire contained closed-ended statements measured using a five-point Likert scale ranging from strongly disagree to strongly agree and collected information concerning IT investment, automation, CBS utilization, and operational efficiency. Interviews provided additional information concerning strategic decisions, resource allocation, challenges, and experiences associated with implementing digital technologies. Secondary data were obtained from SACCO annual reports, policy documents, system performance records, Management Information System reports, and audited financial statements covering the previous five years. These records provided information concerning indicators such as the Operating Expense Ratio, Personnel Expense Ratio, and Portfolio at Risk.

The study used a structured questionnaire and an interview guide as the principal data collection instruments. The questionnaire captured respondents' perceptions of digital automation and operational efficiency, while the interview guide supported the collection of contextual information from management. The questionnaire was assessed for reliability using Cronbach's Alpha, with a coefficient of 0.70 or above considered acceptable. The reliability assessment demonstrated strong internal consistency across the study constructs, with IT Investment, Automation Extent, CBS Utilization, and Operational Efficiency recording acceptable to excellent reliability. Content validity was assessed using the Content Validity Index (CVI) based on expert judgment, with items failing to meet the required relevance standard revised or removed (Kothari, 2004; Hair et al., 2019; Polit & Beck, 2006).

Data were processed and analyzed using SPSS version 25. Descriptive analysis involved frequencies, percentages, means, and standard deviations to summarize respondent

characteristics and perceptions concerning digital automation and operational efficiency. Inferential analysis involved Pearson's Product Moment Correlation Coefficient to establish the strength and direction of relationships between the study variables. Multiple regression analysis was also used to assess the contribution of IT Investment Ratio, Automation Extent, and CBS Utilization to Operational Efficiency. Operational Efficiency represented the dependent variable, while the three digital automation components represented the independent variables. The coefficient of determination and significance levels were used to assess the explanatory capacity and statistical significance of the regression model (Hair et al., 2019; Field, 2018).

The study observed ethical principles throughout the research process. Formal permission was obtained from District SACCO Nyarugenge before data collection, and participants received information concerning the purpose, scope, and objectives of the study. Participation was voluntary, and respondents had the right to withdraw from the study. Confidentiality and anonymity were maintained by avoiding personal identifiers such as names and employee numbers. The collected information was securely maintained and used strictly for academic purposes. The study also recognized limitations related to access to confidential institutional information, respondents' possible reluctance to disclose operational

challenges, and restrictions on time and staff availability. These limitations were addressed through formal institutional authorization, self-administered questionnaires, confidentiality measures, and careful handling of collected information.

4. Results and Discussions

This section presents, analyzes, and interprets the findings related to the selected objective: to evaluate the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge, Rwanda. The findings are presented sequentially, beginning with the response rate, followed by descriptive statistics for IT investment ratio, Pearson correlation analysis, and discussion of the findings in relation to previous studies.

4.1. Response Rate

The study targeted all 84 employees of District SACCO Nyarugenge for the quantitative survey. Because the accessible population was small, all employees were invited to participate. All 84 questionnaires were completed and returned, giving a response rate of 100%. The response rate therefore provided a complete representation of the targeted employee population for the quantitative component of the study.

Table 1. Response Rate of Respondents

Category	Questionnaires Distributed	Questionnaires Returned	Response Rate (%)
Employees	84	84	100.0
Total	84	84	100.0

Note. The quantitative survey covered all employees of District SACCO Nyarugenge.
Source: Field data, 2026.

Table 1 shows that all 84 questionnaires distributed to employees were returned and usable, resulting in a 100% response rate. This complete response provides strong coverage of the accessible employee population and reduces the possibility that the descriptive findings were substantially affected by non-response. It also means that the findings on IT investment reflect the perceptions of the entire targeted staff population rather than a partial sample.

4.1.1. Descriptive Statistics of IT Investment Ratio

The specific objective selected for this study was to evaluate the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge. Respondents rated six statements on a five-point Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The means and standard deviations presented in Table 2 summarize the respondents' perceptions of the institution's IT investment environment.

Table 2. Descriptive Statistics of IT Investment Ratio

Statement	M	SD
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SACCO allocates sufficient capital budget toward IT infrastructure.	4.30	0.76
IT systems are modern and rarely cause operational breakdowns.	4.58	0.78
SACCO invests adequately in digital skills training for staff.	3.88	0.48
IT support staff are sufficient and competent.	4.82	0.71
IT investments have improved service delivery.	4.58	0.78
Increased IT capital investment has reduced operational expenses.	3.30	0.76
Composite IT Investment Ratio	4.24	0.66

Note. M = mean; SD = standard deviation. Responses were measured on a five-point Likert scale.

Source: Field data, 2026.

Table 2 shows that respondents generally agreed that IT investment was well established at District SACCO Nyarugenge, as indicated by the composite mean of 4.24 (SD = 0.66). The highest-rated statement was that IT support staff were sufficient and competent (M = 4.82, SD = 0.71), followed by the view that the IT systems were modern and rarely caused operational breakdowns (M = 4.58, SD = 0.78) and that IT investments had improved service delivery (M = 4.58, SD = 0.78). These findings suggest that respondents perceived the institution's technological environment as adequately supported, reliable, and capable of contributing to improved service delivery.

The relatively high rating for IT support staff is important because technology investment requires competent personnel to maintain systems and assist users when operational difficulties arise. The high mean for system modernization similarly indicates that the institution's technology infrastructure was perceived as sufficiently current to support routine activities. The rating for improved service delivery further suggests that respondents could observe practical operational benefits from IT investments. These findings are consistent with Brynjolfsson and Hitt (2000), who reported that information technology investment can produce measurable productivity gains, and with Berger (2003), who found that technology investment in banking can

improve service throughput and the quality of financial service processes.

However, the lowest-rated statement concerned whether increased IT capital investment had reduced operational expenses (M = 3.30, SD = 0.76). Although the score remained around the agreement level, it was considerably lower than the ratings for system reliability and service delivery. This suggests that the operational benefits of IT investment may be more visible in service quality and system performance than in direct cost savings. The finding supports Ivatury and Mas (2008), who observed that digital investment in microfinance can improve service quality and revenue generation, while reductions in personnel and other operating costs may take longer to materialize because they require deeper automation and process redesign. Therefore, District SACCO Nyarugenge may need to complement IT investment with targeted process improvement if technology is to produce stronger cost-efficiency outcomes.

4.1.2. Pearson Correlation Analysis

Pearson correlation analysis was used to examine the strength and direction of the relationship between IT investment ratio and operational efficiency. The correlation coefficient ranges from -1 to +1, with positive values indicating that higher levels of one variable are associated with higher levels of the other. The results are presented in Table 3.

Table 3. Correlation Between IT Investment Ratio and Operational Efficiency

Variable	IT Investment Ratio	Operational Efficiency
IT Investment Ratio	1.000	.736**
Operational Efficiency	.736**	1.000

Note. ** Correlation is significant at the 0.01 level (2-tailed). N = 84.

Source: Primary data analysis, 2026.

The results in Table 3 indicate a strong positive and statistically significant relationship between IT investment ratio and operational efficiency at District SACCO Nyarugenge ($r = .736$, $p < .001$). This finding means that higher levels of IT investment were associated with higher levels of operational efficiency. The magnitude of the correlation indicates that the relationship was substantial,

while the significance level below .001 demonstrates that the observed association was statistically significant at the conventional 5% level.

The finding is consistent with previous empirical evidence. Brynjolfsson and Hitt (2000) established that information technology investment can contribute to productivity

gains, while Berger (2003) found that technology investment in financial institutions can improve service throughput. The present finding extends these observations to a Rwandan SACCO context by demonstrating a strong association between IT investment and operational efficiency at the institutional level. The result also supports the view that modern systems, competent technical support, and adequate technology infrastructure can contribute to more reliable and efficient service delivery.

4.1.3. Hypothesis Testing

The study formulated the null hypothesis that there is no significant effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge. Pearson correlation analysis produced a strong positive and statistically significant relationship between the two variables ($r = .736, p < .001$). Since the probability value is below the 0.05 significance level, the null hypothesis is rejected. The evidence therefore indicates a statistically significant positive relationship between IT investment ratio and operational efficiency.

The implication of this finding is that investment in IT infrastructure, modern systems, technical support, and related digital capabilities is associated with better operational outcomes at District SACCO Nyarugenge. Nevertheless, the descriptive results show that the cost-reduction dimension of IT investment received a comparatively lower rating than system reliability and service delivery. The finding therefore suggests that IT investment is an important contributor to operational efficiency, but its full potential may depend on how effectively technology is integrated with process redesign and cost-management practices.

4.2. Discussion of Findings

The objective of this study is to examine the effect of IT investment ratio on operational efficiency at District SACCO Nyarugenge, Rwanda. The descriptive findings indicate that respondents generally perceived IT investment positively at the institution. The findings suggest that investment in IT infrastructure, modernization of systems, technical support, and digital skills contributed to the functioning of SACCO operations. Respondents particularly recognized the importance of reliable technological systems and competent IT support in facilitating daily activities. However, the findings suggest that the contribution of IT investment to reducing operational expenses was less pronounced than its contribution to service delivery and operational processes. This observation is consistent with the Resource-Based View (RBV) of Barney (1991), which considers technological infrastructure and employee competencies as

organizational resources that can improve performance when they are effectively developed and utilized.

The inferential findings demonstrate a strong positive relationship between IT investment ratio and operational efficiency. This means that improvements in IT investment were associated with improvements in operational efficiency at District SACCO Nyarugenge. The finding is consistent with Murekezi and Yeşilada (2023), who found that ICT infrastructure, ICT integration, and ICT skills contributed to improved operational processes and service delivery among SACCOs in Nyagatare District, Rwanda. It also agrees with Uwiringiyimana and Kasozi (2025), who reported that digitalization contributed to improved operational efficiency and service delivery among financial institutions in Rwanda. Similarly, Ivatury and Mas (2008) observed that technology could improve the efficiency and quality of microfinance operations by facilitating faster transactions and improving institutional processes. The consistency of these findings suggests that technological investment is an important factor in strengthening the efficiency of financial institutions and SACCOs.

The findings are further supported by the Technology Acceptance Model (TAM) developed by Davis (1989), which explains that the usefulness and ease of use of technology influence users' acceptance and effective utilization of technological systems. In the present context, investment in modern systems, technical support, and employee digital skills can enable SACCO employees to use technology more effectively in transaction processing, information management, reporting, and service delivery. The positive relationship identified in the inferential analysis therefore supports the argument that technological resources generate greater operational value when employees can effectively use them. At the same time, the descriptive findings suggest that IT investment does not necessarily translate automatically into immediate cost reductions, indicating the importance of combining technological investment with staff training, process redesign, and effective management. Overall, the findings support both TAM and RBV, while also agreeing with previous empirical studies, and demonstrate that effective IT investment can contribute substantially to improving operational efficiency at District SACCO Nyarugenge.

5. Conclusion and Recommendations

This section summarizes the findings, presents the conclusion drawn from the selected objective, and provides recommendations based directly on the evidence concerning IT investment ratio and operational efficiency at District SACCO Nyarugenge.

5.1. Conclusion

The study concludes that IT investment ratio has a positive and statistically significant relationship with operational efficiency at District SACCO Nyarugenge, Rwanda. Respondents generally agreed that the institution had adequate IT infrastructure, modern systems, competent technical support, and technology investments that improved service delivery. The strong positive correlation provides empirical evidence that higher levels of IT investment are associated with better operational efficiency. The conclusion is further supported by previous studies showing that technology investment can improve productivity and service throughput in financial institutions. However, the study also concludes that the benefits of IT investment have not been equally realized across all dimensions of operational efficiency. While system reliability and service delivery received high ratings, the reduction of operational expenses received a comparatively lower mean. This indicates that investment in technology should be accompanied by process redesign, staff development, and deliberate cost-efficiency strategies. IT investment is therefore an important foundation for operational efficiency, but the full value of such investment depends on how effectively the technology is integrated into day-to-day operations.

5.2. Recommendations

Based on the findings of the selected objective, the following recommendations are proposed for District SACCO Nyarugenge management and other stakeholders responsible for digital transformation in the microfinance sector.

1. District SACCO Nyarugenge management should continue investing in reliable and modern IT infrastructure while establishing clear performance indicators for each major technology investment. Investment decisions should be linked to measurable outcomes such as transaction processing time, error reduction, service turnaround, and operating cost savings.
2. The SACCO should strengthen continuous digital skills development for employees. Although respondents rated IT support staff highly, ongoing training is necessary to ensure that employees can use new systems effectively and that technological investments continue to generate operational benefits as digital platforms evolve.
3. Management should place greater emphasis on translating IT investment into measurable cost reductions. This can be achieved by identifying repetitive administrative activities that can be automated, reducing unnecessary manual re-

entry, and monitoring the effect of technology investments on personnel and operating expenses.

4. The Rwanda Cooperative Agency and other relevant financial-sector institutions should support SACCOs through practical guidance on digital investment planning, system integration, cybersecurity, and measurement of technology-related operational efficiency. Such guidance would help institutions evaluate not only whether digital systems have been installed but also whether they are producing measurable operational improvements.

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