



Effect of In-House Debt Card Project Implementation on Project Cost Savings: A Case of the Bank of Kigali Plc, Rwanda

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Abstract: This study examined the effect of effect of in-house debit card project implementation on project cost savings: a case of the bank of Kigali plc., Rwanda. It specifically examines the effect of cost architecture design on project cost savings in the implementation of the in-house debit card project at Bank of Kigali Plc., Rwanda. It focused on capital expenditure planning, cost forecasting, cost allocation, budget adjustment, and financial planning mechanisms. A quantitative descriptive and explanatory cross-sectional design was adopted. The target population comprised 93 employees involved in the project, and a census approach was used. Data were collected through structured questionnaires and analyzed using descriptive statistics, Pearson correlation, and multiple regression in SPSS version 25. All 93 questionnaires were returned, representing a 100% response rate. The overall mean for cost architecture design was 3.82. Pearson correlation revealed a strong positive and statistically significant relationship between cost architecture design and project cost savings ($r = 0.701$, $p < 0.001$). The regression model reported $R^2 = 0.846$ and was statistically significant, $F(4, 88) = 120.688$, $p < 0.001$. Cost architecture design was a positive and significant predictor of project cost savings ($\beta = 0.295$, $p < 0.001$). Operational efficiency, process optimization and internal control, and resource utilization efficiency were also significant predictors, whereas technology control was not significant ($p = 0.090$). The study concludes that effective cost planning, forecasting, allocation, and budget management are associated with project cost savings. It recommends strengthening expenditure planning, comparing budgets with actual costs regularly, and assessing financial outcomes using documented records.

Keywords: In-house debit card project, Cost architecture design, Project cost savings, Debit card project, Bank of Kigali, Rwanda.

How to cite this work (APA):

Uwase, H. N. & Dushimimana, J. D. (2026). Effect of In-House Debt Card Project Implementation on Project Cost Savings: A Case of the Bank of Kigali Plc, Rwanda. *Journal of Research Innovation and Implications in Education*, 10(4), 491 – 504. <https://doi.org/10.59765/mpf6r>

1. Introduction

Project cost performance is a central concern in contemporary project management because successful implementation requires organizations to achieve intended outputs while using financial resources efficiently. Project cost management involves estimating costs, developing budgets, monitoring expenditure, and controlling changes

to ensure that financial resources remain aligned with approved objectives (Project Management Institute [PMI], 2021). These processes help project managers establish realistic financial expectations, allocate resources according to project priorities, and identify potential cost overruns before they significantly affect implementation. In technology-intensive projects, cost management becomes particularly important because investments may

involve infrastructure, software, systems integration, human resources, security, maintenance, and operational transition. Such projects require careful financial planning because changes in technical requirements, implementation schedules, and operational needs can increase expenditure beyond initial estimates.

The banking sector provides an important context for examining cost architecture because digital transformation has increased investment in payment systems, automation, digital platforms, and internally managed technology (Bueno et al., 2024). Financial institutions increasingly rely on technological solutions to improve transaction processing, strengthen service delivery, enhance operational efficiency, and respond to changing customer expectations. However, the benefits of digitalization depend not only on the technology adopted but also on the organizational capabilities and financial resources available to support its implementation (Verhoef et al., 2021). Banks must therefore balance technological investment with financial sustainability by ensuring that project expenditure generates value and supports long-term operational objectives. Sharpe and Nguyen (2014) highlight the importance of banking cost structures in understanding operational efficiency.

Internalization of previously outsourced banking functions can reduce dependence on external providers and may lower recurring transactions or service costs. By managing selected activities internally, a bank may gain greater control over service delivery, operational processes, and decisions concerning the use of technological resources. Nevertheless, internalization also creates additional financial responsibilities related to infrastructure, systems, personnel, maintenance, integration, and internal control. Lacity and Willcocks (2014) explain that internalization and outsourcing decisions involve both economic and governance considerations, while McKinsey & Company (2022) emphasizes the importance of resource optimization in digital banking operations. These perspectives suggest that bringing a function in-house does not automatically guarantee cost savings; rather, the financial benefits depend partly on how effectively the institution identifies, structures, allocates, and monitors the costs of maintaining the internal capability. Cost architecture design is therefore important because it supports comprehensive capital expenditure planning, accurate cost forecasting, appropriate allocation of fixed and variable costs, and controlled budget adjustment (World Bank, 2023).

In Rwanda, the expansion of digital financial services has increased the importance of efficient payment infrastructure and effective management of technology investments. Financial institutions must ensure that technological developments support reliable service delivery and operational efficiency while maintaining

appropriate financial controls. Evidence from Rwanda and East Africa indicates that digital financial services can contribute to efficiency and financial inclusion, although the outcomes depend on institutional capabilities and resource allocation (Fosia Agency, 2025; Munyengera et al., 2025;). Within this context, Bank of Kigali Plc.'s in-house debit card project provides a relevant setting for examining the relationship between project-level financial planning and cost-saving outcomes. The implementation of an in-house debit card capability requires consideration of initial capital expenditure, technology integration, staffing, maintenance, and other operational requirements. Effective cost architecture can help the bank determine the resources required, monitor actual expenditure against approved budgets, and assess whether the anticipated benefits of internalization justify the costs incurred.

Despite the growing importance of digital banking, internal technology capabilities, and financial efficiency, limited empirical evidence directly examines the effect of cost architecture design on project cost savings in an in-house debit card project in Rwanda. Existing literature discusses project cost management, banking efficiency, outsourcing decisions, and digital transformation, but these broader areas provide limited project-specific evidence concerning the contribution of individual cost-planning practices to financial outcomes. In particular, the roles of capital expenditure planning, cost forecasting, fixed and variable cost allocation, budget adjustment, and financial planning mechanisms require further examination within the context of Bank of Kigali's in-house debit card project. Addressing this gap can help establish whether systematic financial planning and cost structuring are associated with improved project cost savings.

1.2. Problem Statement

Effective project cost management is essential for ensuring that organizations implement projects within approved budgets while achieving their intended objectives. In the banking sector, technology-driven projects require substantial financial commitments for infrastructure, software, systems integration, personnel, maintenance, and operational support. Although digital transformation can improve operational efficiency, its financial benefits are not automatic and depend on how technological investments and associated costs are managed. Ayadi et al. (2025) found that digitalization can improve banking efficiency, although its effects on cost efficiency may vary depending on the level of investment and the bank's business model. Similarly, research by Li et al. (2024) on commercial banks in Pakistan highlights the importance of digital technology diffusion in banking efficiency. These findings demonstrate the need for effective financial planning and cost control to ensure that technology

investments generate sustainable benefits rather than unnecessary expenditure.

At Bank of Kigali Plc., the implementation of an in-house debit card project presents an opportunity to examine how cost architecture design relates to project cost savings. Internalizing debit card operations may reduce dependence on external service providers and improve control over payment processes, but it also requires investment in technology, infrastructure, personnel, maintenance, and internal operational systems. Consequently, the financial benefits of the project depend partly on comprehensive capital expenditure planning, accurate cost forecasting, appropriate allocation of fixed and variable costs, and effective budget adjustment. Ntarindwa (2022), in a study of Bank of Kigali, examined cost management strategies in relation to operational efficiency, demonstrating the relevance of cost management within the Rwandan banking context. Furthermore, research by Ren et al. (2024) found a positive relationship between digital transformation and profit efficiency among commercial banks in China, partly associated with cost reduction. However, these studies do not directly establish the specific contribution of cost architecture design to cost savings in Bank of Kigali's in-house debit card project, leaving a project-specific empirical gap.

If cost architecture design is inadequately implemented, the bank may experience difficulties anticipating expenditure, controlling budget deviations, allocating resources efficiently, and determining whether the expected financial benefits of internalization have been achieved. These challenges could limit the project's cost-saving potential and weaken the financial justification for maintaining the internal debit card capability. Therefore, this study seeks to assess the effect of cost architecture design on project cost savings in Bank of Kigali Plc.'s in-house debit card project in Rwanda. Specifically, it examines the contribution of capital expenditure planning, cost forecasting, fixed and variable cost allocation, budget adjustment, and financial planning mechanisms to project cost savings.

2.2 Project Cost Savings

Project cost savings refer to the reduction of expenditure required to implement and operate a project while maintaining its intended scope, quality, and performance standards. Cost savings can be achieved through effective financial planning, efficient resource allocation, elimination of unnecessary expenses, improved procurement decisions, and continuous monitoring of project expenditure. The Project Management Institute (PMI, 2021) emphasizes the importance of cost estimation, budgeting, and control in ensuring that project resources are used effectively. In technology-driven projects, cost savings may arise from reducing duplicated investments,

improving systems integration, optimizing personnel utilization, and controlling recurring operational expenses. However, cost savings should not be achieved at the expense of service quality, system security, or operational reliability. Therefore, assessing project cost savings requires consideration of both expenditure reduction and the organization's ability to maintain the expected project output and benefits.

In banking institutions, project cost savings are particularly important because technology investments often involve substantial initial expenditure and continuing operational costs. Digital banking initiatives may require investments in software, payment infrastructure, cybersecurity, system maintenance, and technical personnel. Effective management of these costs can improve operational efficiency and support the financial sustainability of technology projects. Verhoef et al. (2021) explain that digital transformation involves changes in organizational capabilities and business processes rather than technology adoption alone. Similarly, Sharpe and Nguyen (2014) highlight the importance of banking cost structures in understanding operational efficiency. These perspectives suggest that banks can improve project cost performance by aligning technological investments with operational requirements, monitoring recurring expenses, and evaluating the financial benefits of alternative implementation arrangements. In addition, comparing planned expenditure with actual costs can help management identify budget deviations, investigate their causes, and introduce corrective measures to strengthen financial accountability.

In the context of Bank of Kigali Plc.'s in-house debit card project, project cost savings concern the extent to which the bank can reduce unnecessary expenditure and manage the total costs of implementing and operating its internal debit card capability. Potential savings may arise from reduced dependence on external service providers, improved control over transaction-related costs, efficient use of technological infrastructure, and better allocation of human and financial resources. Nevertheless, internalization may also introduce additional costs associated with system development, integration, maintenance, security, and personnel; therefore, the financial benefits should be assessed against the total costs of operating the internal service. Effective cost architecture design can support this assessment through comprehensive capital expenditure planning, accurate forecasting, appropriate allocation of fixed and variable costs, and controlled budget adjustments. For this study, project cost savings are understood in terms of the financial outcomes associated with the implementation of the in-house debit card project, including the control of unnecessary expenditure, efficient use of project resources, and the achievement of expected financial benefits. Where

possible, these outcomes should be assessed using documented financial records, including approved budgets, actual expenditure, recurring operating costs, and verifiable savings.

2. Literature Review

This section reviews relevant literature on the effect of cost architecture design on project cost savings, with particular reference to Bank of Kigali Plc.'s in-house debit card project in Rwanda. It examines existing theoretical and empirical perspectives on project cost management, digital transformation, banking operational efficiency, and financial resource utilization. The review focuses on capital expenditure planning, cost forecasting, fixed and variable cost allocation, budget adjustment, and financial planning mechanisms as important components of cost architecture design. It also considers how these practices may contribute to reducing unnecessary expenditure, improving budgetary control, and achieving the expected financial benefits of project implementation. The section draws on relevant scholarly publications, books, and institutional reports to establish the conceptual and empirical foundations of the study. Finally, it identifies the research gap that justifies examining the relationship between cost architecture design and project cost savings within the specific context of Bank of Kigali's in-house debit card project.

2.1 Cost Architecture Design

Cost architecture design refers to systematic planning, structuring, allocation, and control of project costs to ensure that financial resources are aligned with project objectives. It involves identifying expenditure requirements, estimating costs, preparing budgets, allocating resources, monitoring financial performance, and adjusting financial plans when necessary. The Project Management Institute (PMI, 2021) identifies cost estimation, budgeting, and cost control as essential processes for maintaining financial discipline throughout the project lifecycle. In the context of Bank of Kigali Plc.'s in-house debit card project, cost architecture design is important because the bank must plan and manage the financial resources required to develop, integrate, implement, and maintain its internal debit card capability. These activities may involve technological infrastructure, software, system integration, personnel, security, and operational support. A well-structured cost architecture can help the bank establish realistic expenditure estimates, allocate resources according to project priorities, and compare planned costs with actual expenditure.

Capital expenditure planning and cost forecasting are important components of cost architecture design because

they help Bank of Kigali identify investment requirements and anticipate future financial obligations associated with its in-house debit card project. Capital expenditure planning enables the bank to assess the infrastructure, technological systems, security arrangements, staffing, and integration requirements before committing substantial financial resources. Slack et al. (2024) emphasize the importance of structured planning and resource coordination in achieving operational efficiency. Cost forecasting complements this process by estimating future expenditure, evaluating changing financial requirements, and identifying potential budget overruns before they adversely affect implementation. The PMI (2021) emphasizes continuous cost monitoring and control, while Sharpe and Nguyen (2014) demonstrate the relevance of understanding cost structures in banking. For Bank of Kigali, comprehensive capital planning and accurate forecasting can help management determine the resources needed to establish and operate the internal debit card service and assess whether projected expenditure remains consistent with approved budgets.

Cost architecture design also encompasses the allocation of fixed and variable costs, controlled budget adjustment, and continuous expenditure monitoring (McKinsey & Company, 2022). Fixed costs generally remain relatively stable within a given operating range, whereas variable costs change according to transaction volumes, activity levels, or operational requirements. Distinguishing between these costs categories can help Bank of Kigali understand the financial implications of operating its in-house debit card project under different transaction volumes and service requirements. emphasizes the importance of resource optimization in digital banking operations, while Slack et al. (2024) associate effective resource planning with improved operational performance. In addition, budget adjustments enable the bank to respond to changes in technological requirements, implementation schedules, and operating conditions. However, adjustments should be supported by updated cost information, documented justification, and appropriate authorization to preserve financial accountability. Regular reviews of planned, actual, and forecast expenditure would enable project managers to identify significant variances, assess the reasons for additional costs, and determine whether corrective measures are required.

2.2. Theoretical Framework

The theoretical framework explains the relationship between cost architecture design and project cost savings in Bank of Kigali Plc.'s in-house debit card project. This study is guided by two theories: the Resource-Based View (RBV) and Transaction Cost Economics (TCE). The Resource-Based View explains how organizational resources and internal capabilities can contribute to

improved project performance, whereas Transaction Cost Economics explains the economic considerations involved in managing activities internally rather than relying on external service providers. These theories are relevant because the financial success of an in-house debit card project depends on both the bank's ability to manage its internal resources and its capacity to control the costs associated with internalizing debit card operations. Recent research on digital transformation in banking further highlights the importance of organizational capabilities, management capacity, and operational efficiency in achieving the expected benefits of technology investments (Porfirio et al., 2024).

2.3.1. Resource-Based View (RBV)

The Resource-Based View was developed from earlier work on organizational resources and was influentially formulated by Barney (1991). The theory explains that organizational performance and competitive advantage depend partly on the resources and capabilities an organization possesses and how effectively it deploys them. Such resources include financial capital, technological infrastructure, human expertise, organizational knowledge, and management systems. From this perspective, resources alone may not guarantee superior performance; organizations must develop the capabilities needed to coordinate and utilize them effectively. In project management, financial planning, cost forecasting, budgeting, and expenditure monitoring can be viewed as important managerial capabilities because they help organizations allocate resources, identify financial risks, and control project costs.

The Resource-Based View is relevant to Bank of Kigali's in-house debit card project because the bank must coordinate financial, technological, and human resources to establish and maintain its internal debit card capability. Effective capital expenditure planning can help management identify the investments required before implementation, while accurate cost forecasting can support decisions about future financial obligations. Similarly, appropriate allocation of fixed and variable costs can help the bank understand its expenditure patterns, and controlled budget adjustments can support responses to changing project requirements. Recent research by Porfirio et al. (2024) highlights the importance of employee capabilities, internal conditions, and management capacity in shaping the outcomes of digital transformation in banking. Research integrating the Resource-Based View with dynamic capabilities also emphasizes that organizations need to develop and adapt their resources to achieve successful digital transformation and product innovation (Examining the impact of digital transformation, 2025). These findings reinforce the relevance of internal management capabilities in

determining whether technology investments deliver their expected benefits.

In this study, the Resource-Based View provides a theoretical explanation for the expected relationship between cost architecture design and project cost savings. It suggests that Bank of Kigali's ability to plan capital expenditure, forecast costs, allocate financial resources, and monitor budgets may influence how efficiently the bank implements and operates its in-house debit card project. Strong financial management capabilities may help reduce unnecessary expenditure and improve the utilization of project resources, whereas weak capabilities may contribute to cost overruns and inefficient resource allocation. The theory therefore supports the examination of cost architecture design as an important factor associated with project cost savings. However, the actual financial benefits must be established through empirical evidence rather than assumed from the existence of internal capabilities alone.

2.3.2. Transaction Cost Economics (TCE)

Transaction Cost Economics is associated with Williamson (1981) and explains how organizations decide whether to coordinate activities internally or obtain services from external providers. The theory focuses on the costs of arranging and managing economic transactions, including negotiation, coordination, monitoring, and contract enforcement. Organizations may internalize activities when internal management offers economic or operational advantages over external arrangements. However, internalization also requires investment in personnel, technology, infrastructure, and management systems. Consequently, an internal arrangement is not necessarily less expensive than outsourcing. Its economic value depends on the total costs incurred and the benefits achieved under the alternative arrangements.

Transaction Cost Economics is directly relevant to Bank of Kigali's in-house debit card project because the bank's internalization decision involves balancing potential reductions in external service costs against the expenditure required to establish and maintain its own debit card capability. These internal costs may include technological infrastructure, systems integration, personnel, maintenance, security, and operational support. Cost architecture design can assist management in identifying these costs, preparing realistic forecasts, allocating expenditure appropriately, and monitoring financial performance. Recent research on digital payment adoption in the Indian banking sector found that adopting digital payment technologies can improve banks' cost efficiency, demonstrating the relevance of examining the financial implications of payment-related technological investments (Impact of digital payment adoption, 2023). Nevertheless,

such findings do not establish that every internalization initiative will produce savings; the results depend on the specific operating arrangements and costs involved.

For the present study, Transaction Cost Economics explains why the financial success of Bank of Kigali's in-house debit card project should be assessed by considering both the costs of internal operations and the potential savings associated with reduced dependence on external providers. Effective capital expenditure planning, cost forecasting, fixed and variable cost allocation, and budget adjustment can help management evaluate whether internal operations are financially sustainable. The theory therefore supports the investigation of cost architecture design as a mechanism for managing the economic consequences of internalization. Together with the Resource-Based View, Transaction Cost Economics provides a basis for understanding how internal management capabilities and cost-control practices may contribute to project cost savings at Bank of Kigali Plc.

2.3 Empirical Review

Ntarindwa (2022) conducted a study on the effect of cost management strategies on the operational efficiency of Bank of Kigali, Rwanda. The study adopted a descriptive research design and used primary and secondary data. The target population comprised 140 managers, from whom a sample of 103 respondents was selected using Yamane's formula. Questionnaires and published financial reports were used to collect data, which were analyzed using descriptive statistics, Pearson correlation, and regression analysis in SPSS version 22. The findings indicated positive and statistically significant relationships between operational efficiency and recruitment and training ($r = .69$), technology ($r = .75$), and business process re-engineering ($r = .56$). The regression model explained 69.2% of the variation in operational efficiency. The study concluded that cost management strategies were important for improving the operational efficiency of Bank of Kigali. Based on these findings, the bank should strengthen technology investment decisions, employee capacity development, and process improvement initiatives while regularly monitoring their financial implications. However, the study focused on general cost management strategies and operational efficiency rather than the specific contribution of capital expenditure planning, cost forecasting, fixed and variable cost allocation, and budget adjustment to savings in an in-house debit card project. The present study addresses this gap by examining cost architecture design and project cost savings in the specific context of Bank of Kigali's in-house debit card project.

Porfírio et al. (2024) examined factors affecting digital transformation in the banking industry, focusing on their perceived influence on organizational performance and business volume. The researchers used a qualitative-oriented approach combining grounded theory and fuzzy-set qualitative comparative analysis (fsQCA), drawing on the opinions of board members and the perceptions of 50 bank employees in Portugal. The findings highlighted the importance of employee skills, stakeholders' digital experience, organizational flexibility, and management capacity in realizing the benefits of digital transformation. The researchers concluded that technology adoption alone was insufficient to guarantee improved performance because organizational and human factors also influenced outcomes. Based on these findings, banks should complement technology investments with staff training, effective management changes, and appropriate managerial support. However, the study focused on perceived digital transformation outcomes in Portuguese banks and did not directly measure project-level expenditure or verified cost savings. It therefore leaves a gap concerning how specific cost architecture practices influence financial outcomes in an individual banking technology project, particularly in Rwanda. The present study addresses this gap by examining cost architecture design in Bank of Kigali's in-house debit card project.

Shen et al. (2025) investigated whether digital transformation improves the cost efficiency of commercial banks in China. The study used panel data from 131 banks covering the period from 2013 to 2022. Digital transformation was measured using text mining and an entropy-based index, while cost efficiency was assessed using stochastic frontier analysis. The findings showed that digital transformation significantly improved bank cost efficiency, with the relationship operating partly through business diversification, reduced information asymmetry, more efficient use of funds, and lower risk. The researchers also found that the effects differed according to bank size, capital status, asset structure, and ownership structure. The findings suggest that banks should align digital transformation initiatives with improvements in resource utilization, information management, and risk control rather than treating technology investment as an isolated activity. However, the study examined overall bank-level digital transformation and cost efficiency using Chinese banking data; it did not isolate capital expenditure planning, cost forecasting, or budget adjustment within a specific internal payment-card project. The present study addresses this contextual and measurement gap by examining whether cost architecture design is associated with project cost savings in Bank of Kigali's in-house debit card project in Rwanda.

Ren et al. (2024) examined the relationship between digital transformation and profit efficiency among commercial banks in China. The researchers used data covering the

period from 2014 to 2020 and constructed a digital transformation index using the entropy method and information collected from multiple sources. Their analysis found a positive and statistically significant relationship between digital transformation and bank profit efficiency. The findings indicated that this relationship was associated with increased revenue and reduced costs, and the results remained robust after additional statistical checks addressing potential endogeneity. The study suggests that banks should evaluate digital investments according to their contribution to revenue generation and cost reduction, supported by regular monitoring of financial outcomes. Nevertheless, the study concentrated on overall bank profit efficiency rather than the cost savings attributable to a specific in-house debit card project. It also did not separately examine fixed and variable cost allocation, capital expenditure planning, or controlled budget adjustments. This leaves a gap in understanding how project-level financial planning practices contribute to cost savings in Rwanda's banking sector. The present study responds by focusing on the relationship between cost architecture design and project cost savings at Bank of Kigali Plc.

Uwimpuhwe and Twesigye (2024) examined the effect of electronic banking tools on the operational performance of Bank of Kigali in Rwanda, covering the period from 2017 to 2021. The study adopted a correlational research design and selected 72 respondents from a population of 254 employees working in the operations, corporate and retail, risk and compliance, and digital banking departments. Stratified sampling was used, while questionnaires, interviews, and published reports served as data collection instruments. The data were analyzed using SPSS version 23. The findings indicated positive relationships between internet banking transactions, electronic card banking, mobile banking, and operational performance, with reported correlation coefficients of 0.409, 0.356, and 0.578, respectively. The regression model reported that the selected electronic banking tools jointly explained 81.9% of the variation in operational performance. The study concluded that electronic banking tools, including electronic cards, were relevant to the operational performance of Bank of Kigali. It recommended wider adoption and improvement of electronic banking services to enhance accessibility, flexibility, and service delivery. However, the study focused on operational performance rather than the financial savings achieved through implementing an in-house debit card project. It did not specifically examine capital expenditure planning, cost forecasting, fixed and variable cost allocation, or budget adjustment. The present study addresses this gap by examining the effect of cost architecture design on project cost savings in Bank of Kigali's in-house debit card project.

3. Methodology

This section presents the methodological procedures that were used to examine the effect of cost architecture design on project cost savings in Bank of Kigali Plc.'s in-house debit card project. It describes the research design, target population, sampling approach, data collection instrument, measurement of study variables, data analysis procedures, and ethical considerations. These methodological components were selected to provide a systematic approach to collecting and analyzing quantitative data from employees involved in the project. The methodology also explains how the collected data were used to assess the relationship between cost architecture design and project cost savings.

The study adopted a quantitative descriptive and explanatory cross-sectional research design. The descriptive component was used to establish respondents' assessments of cost architecture design and project cost savings, while the explanatory component examined the statistical relationship between the study variables. Creswell and Creswell (2023) explain that quantitative research is appropriate for examining measurable variables using numerical data and statistical procedures. Similarly, Saunders et al. (2019) emphasize the use of structured research methods to investigate relationships between variables in organizational settings. The cross-sectional approach enabled data to be collected at a single point in time, providing a basis for examining employees' experiences and perceptions concerning the implementation of the in-house debit card project.

The target population comprised 93 employees involved in Bank of Kigali's in-house debit card project. These employees were considered relevant to the study because of their involvement in the financial, technological, operational, and managerial activities associated with project implementation. Since the population was relatively small and accessible, the study adopted a census approach rather than selecting a sample. All 93 employees were therefore included in the intended data collection process. The use of a census approach allowed the study to obtain information from the entire defined target population, reducing the possibility of excluding relevant perspectives within that population. However, the findings remain specific to the defined project population and should not automatically be generalized to all employees of Bank of Kigali or other financial institutions.

Primary data were collected using a structured questionnaire administered to the 93 employees. The questionnaire was appropriate because it enabled the researcher to collect standardized responses from all participants and convert their assessments into numerical

data for statistical analysis. The questions focused on cost architecture design and project cost savings, with items covering capital expenditure planning, cost forecasting, allocation of fixed and variable costs, budget adjustment, financial planning, and perceived cost-saving outcomes. The questionnaire was structured to ensure that respondents received consistent questions and response options, thereby supporting comparability of the information collected. According to Saunders et al. (2019), structured questionnaires are useful in quantitative research because they facilitate systematic data collection and statistical analysis.

The study variables were measured using a five-point Likert scale, allowing respondents to indicate their level of agreement with statements concerning project cost management and financial outcomes. Cost architecture design constituted the independent variable and was assessed through comprehensive capital expenditure planning, cost forecasting accuracy, appropriate allocation of fixed and variable costs, effective budget adjustment, and financial planning mechanisms. Project cost savings constituted the dependent variable and represented the financial outcomes associated with the implementation of the in-house debit card project. The use of standardized response categories enabled the researcher to summarize respondents' assessments and compare patterns across the study indicators. Nevertheless, because the questionnaire captured employee perceptions, these measures should be distinguished from objectively verified financial savings established through budget records, actual expenditure, and documented cost comparisons.

Data were analyzed using descriptive and inferential statistical techniques. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize respondents' assessments of cost architecture design and project cost savings. Pearson product-moment correlation analysis was applied to establish the direction and strength of the relationship between cost architecture design and project cost savings. Multiple regression analysis was also used to estimate the statistical contribution of cost architecture design while accounting for other project-related predictors included in the wider analytical model. The analysis was conducted using the Statistical Package for the Social Sciences (SPSS), version 25. Statistical significance was assessed at the 5% level, with p-values below .05 interpreted as statistically significant. Correlation and regression findings were interpreted as evidence of statistical association and predictive contribution rather than definitive proof of causation because the study employed a cross-sectional design.

Before interpreting the inferential results, the data were examined for completeness, consistency, and suitability for statistical analysis. The researcher checked the returned questionnaires for missing responses and obvious inconsistencies before entering the data into SPSS. Where applicable, the assumptions relevant to Pearson correlation and multiple regression, including linearity, independence of observations, normality of residuals, homoscedasticity, and multicollinearity, were considered to support the reliability of the statistical conclusions. The study reported that all 93 questionnaires were returned and considered usable, resulting in a 100% response rate. This complete response provided information from all members of the defined target population. However, the response rate alone does not eliminate potential measurement errors, common-method bias, or limitations associated with collecting data from a single project at one point in time.

Ethical considerations were observed throughout the research process to protect participants and promote responsible data handling. Participation was to be based on informed consent, with respondents receiving appropriate information about the purpose of the study and the intended use of their responses. Participation was voluntary, and respondents' confidentiality and privacy were to be respected during data collection, analysis, and reporting. The researcher was also expected to obtain the necessary institutional and organizational authorization before accessing participants and collecting project-related information. Questionnaire responses were handled responsibly, and the findings were presented for academic purposes without unnecessarily disclosing participants' identities or confidential organizational information. Any statement concerning ethical approval, formal authorization, or specific data-protection procedures should reflect the procedures that were actually completed during the study.

4. Results and Discussion

This session presents the results and findings of the study on the effect of in-house debit card project implementation on project cost savings at Bank of Kigali Plc., Rwanda. The findings are based on data collected from the study respondents and analyzed using Statistical Package for the Social Sciences (SPSS) version 25. It presents the response rate, descriptive statistics, correlation analysis, and regression analysis to examine the relationship between cost architecture design and project cost savings. The findings are presented and interpreted in line with the study objectives and research variables.

4.1. Results

This study presents the results obtained from the analysis of the data collected. It begins with the response rate to establish the level of participation in the study. It then presents the findings on the study variables, including cost architecture design and project cost savings, followed by statistical analyses used to assess the relationships between the independent and dependent variables.

4.1.1 Response Rate

The response rate refers to the proportion of questionnaires distributed to respondents that were completed and returned for analysis. In this study, questionnaires were administered to 93 employees of Bank of Kigali Plc. who were included in the study population. All 93 questionnaires were returned and considered usable for data analysis, resulting in a response rate of 100%.

Table 1. Response Rate

Category	Frequency	Percentage (%)
Questionnaires distributed	93	100.0
Questionnaires returned	93	100.0
Questionnaires not returned	0	0.0
Response rate	93/93	100.0

Source: Field data, 2026.

The findings in Table 2 show that all 93 questionnaires distributed to the respondents were returned and usable, representing a response rate of 100%. No questionnaires were reported as missing or unusable. This complete response supported the analysis of the collected data without questionnaire non-response reducing the number of observations. However, the response rate alone does not establish that the results are free from bias; the quality of the findings also depends on the accuracy and completeness of the responses provided.

4.2 Descriptive Results for Cost Architecture Design

Cost architecture design was assessed using five indicators: comprehensive capital expenditure planning, cost

forecasting accuracy, allocation of fixed and variable costs, effective budget adjustment, and financial planning mechanisms. Respondents rated each statement on a five-point Likert scale, where 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, and 1 = Strongly Disagree. The responses were analyzed using means and standard deviations to establish respondents' perceptions of cost architecture design in the implementation of the in-house debit card project at Bank of Kigali Plc., Rwanda. The overall mean score of 3.82 indicates a generally positive assessment of cost architecture design practices, assuming higher scores represent stronger agreement. These practices may support effective project budgeting, cost forecasting, resource allocation, and financial control. However, the extent of actual project cost savings would need to be confirmed using relevant financial records.

Table 2. Descriptive Statistics of Cost Architecture Design

Indicator	N	M	SD
Capital expenditures planned comprehensively	93	3.76	0.713
Cost forecasts accurate and potential overruns identified	93	3.84	0.664
Fixed and variable costs allocated to reduce unnecessary expenditure	93	3.85	0.691
Budget adjustments implemented effectively	93	3.82	0.607
Financial planning mechanisms contributed to measurable savings	93	3.81	0.726
Composite mean	93	3.82	—

Source: Field data, 2026.

The results in Table 2 show that respondents generally agreed that cost architecture design practices were implemented in the in-house debit card project at Bank of Kigali Plc., Rwanda. The item means ranged from 3.76 to 3.85, while the composite mean was 3.82 on a five-point Likert scale. All mean scores were above the neutral midpoint of 3.00, indicating a generally positive assessment of project cost planning and control. The results suggest that cost architecture design was an important part of managing project expenditure, including forecasting

costs, allocating financial resources, and adjusting budgets when necessary.

The highest mean score was recorded for the allocation of fixed and variable costs to reduce unnecessary expenditure (M = 3.85, SD = 0.691), followed by accurate cost forecasting and the identification of potential overruns (M = 3.84, SD = 0.664). Budget adjustments implemented effectively recorded a mean of 3.82 (SD = 0.607), while financial planning mechanisms contributing to measurable

savings recorded a mean of 3.81 (SD = 0.726). These findings indicate that respondents viewed cost allocation, forecasting, and budget adjustment positively. The results are consistent with the importance of integrated cost planning and control emphasized by the Project Management Institute (PMI, 2021).

Comprehensive capital expenditure planning recorded the lowest mean score (M = 3.76, SD = 0.713), although it remained above the neutral midpoint. This suggests that initial capital expenditure planning may require further strengthening. The standard deviations ranged from 0.607 to 0.726, indicating a relatively moderate spread in respondents’ answers. Overall, the composite mean of 3.82 reflects a favorable perception of cost architecture design in the project. However, these descriptive findings represent respondents’ assessments and do not independently establish the amount of actual cost savings achieved. Confirming measurable savings would require comparing project expenditure with appropriate financial baselines and records

The overall result is consistent with PMI's (2021) emphasis on integrated cost planning and control and with Slack et al. (2024) on coordinated resource planning. The descriptive evidence also supports wider digital-banking literature. Bueno et al. (2024) associate digitization with

operational-efficiency benefits when technological investments are aligned with organizational processes, while McKinsey and Company (2022) emphasizes resource optimization within digital banking operations. In the Bank of Kigali case, the relatively high assessment of cost architecture suggests that financial planning formed an important part of the implementation environment. The findings are particularly relevant because internalization creates both potential savings and new internal costs; consequently, the quality of financial planning may determine whether the expected economic benefits of internalization are actually realized.

4.3 Correlation between Cost Architecture Design and Project Cost Savings

Pearson correlation analysis was conducted to examine the relationship between cost architecture design and project cost savings in the implementation of the in-house debit card project at Bank of Kigali Plc., Rwanda. The analysis assessed the direction and strength of the relationship between the two variables using responses from 93 respondents. The Pearson correlation coefficient (r) ranges from -1 to +1, where a positive value indicates that the variables tend to increase together, while a negative value indicates an inverse relationship. Statistical significance was assessed at the 5% level (p<0.05)

Table 3. Pearson Correlation between Cost Architecture Design and Project Cost Savings

Variables	Project Cost Savings (r)	p	N
Cost Architecture Design	.701**	< .001	93
Project Cost Savings	1.000	—	93

Source: Field data, 2026

Cost architecture design had a strong positive and statistically significant relationship with project cost savings (r = .701, p < .001). The positive coefficient indicates that respondents reporting stronger cost architecture practices also tended to report stronger cost-saving outcomes. The magnitude of the coefficient provides preliminary evidence that financial planning and cost structuring were meaningfully associated with the project's financial performance. The p-value below .001 indicates that the observed association was statistically significant. However, correlation does not demonstrate that cost architecture alone caused the observed savings because project cost performance can also be influenced by operational integration, process optimization, resource utilization, and other conditions. The regression analysis was therefore used to estimate the specific contribution of cost architecture while accounting for the other dimensions in the wider model.

The result is theoretically consistent with the operational-efficiency perspective and the Resource-Based View. Better financial planning can improve resource allocation

and reduce avoidable expenditure, while financial-management capability can become a valuable organizational capability when it is embedded in project processes. The finding also aligns with banking evidence emphasizing cost structure and resource efficiency (Sharpe & Nguyen, 2014; McKinsey & Company, 2022).

4.4 Multiple Regression Results

Multiple regression analysis was conducted to assess the combined and individual effects of cost architecture design and other project implementation factors on project cost savings at Bank of Kigali Plc., Rwanda. The analysis examined the explanatory power of the regression model and the statistical significance of each predictor at the 5% significance level (p<0.05). The results were used to determine which factors were significantly associated with project cost savings while controlling for the effects of other variables included in the model.

Table 4. Multiple Regression Coefficients for Project Cost Savings

Predictor	B	SE	β	t	p
Cost Architecture Design	0.285	0.056	0.295	5.108	< .001
Operational/Internal Efficiency	0.235	0.056	0.267	4.227	< .001
Process Optimization & Internal Control	0.235	0.050	0.279	4.707	< .001
Resource Utilization Efficiency	0.224	0.059	0.245	3.790	< .001
Technology control	0.030	0.021	0.014	1.428	.090

Dependent variable: Project Cost Savings. B = unstandardized coefficient; SE = standard error; β = standardized coefficient.

The regression results provide the main test of the study objective. Cost architecture design recorded a positive and statistically significant coefficient ($B = 0.285$, $\beta = .295$, $t = 5.108$, $p < .001$). Holding the other predictors constant, stronger cost architecture was associated with higher project cost-saving outcomes. Because the standardized coefficient was the largest among the main implementation predictors, cost architecture made the strongest relative contribution to project cost savings in the estimated model. The finding indicates that capital expenditure planning, cost forecasting, cost allocation, and budget adjustment were not simply administrative activities; they were statistically associated with the financial outcome of the project. Effective cost architecture enables managers to anticipate expenditure requirements, identify emerging cost pressures, allocate resources according to project priorities, and establish controls over deviations from approved budgets. This interpretation supports PMI's (2021) emphasis on integrated cost management and the operational-efficiency perspective, which links effective resource coordination with reduced unnecessary expenditure. The result also suggests that financial planning capability can function as an organizational capability that helps the institution convert technological investment into measurable project value.

The wider model produced $R = .920$ and $R^2 = .846$, meaning that the four main implementation predictors jointly explained 84.6% of the variation in project cost savings. The ANOVA result was statistically significant, $F(4, 88) = 120.688$, $p < .001$. These results indicate that the regression model provides a strong statistical explanation of cost-saving outcomes. The significant cost-architecture coefficient within this model therefore provides stronger evidence for the objective than the correlation result alone. The technology control variable was not statistically significant ($\beta = .014$, $p = .090$) after the other implementation dimensions were considered. This suggests that technology investment by itself was not sufficient to explain project cost savings once financial, operational, process, and resource-management dimensions were included in the model. The result reinforces the argument that digital transformation is not achieved through technology acquisition alone; it also requires organizational capabilities, governance arrangements, process redesign, and effective resource

management (Verhoef et al., 2021). For Bank of Kigali, this means that investment in technological infrastructure should be accompanied by strong financial and managerial systems.

The regression result should nevertheless be interpreted as evidence of statistical association and predictive contribution rather than definitive causality. The cross-sectional design does not establish temporal sequence, and the use of employee perceptions may introduce common-method effects. Future research could strengthen the evidence by combining survey responses with longitudinal financial records, including approved budgets, actual expenditure, maintenance costs, transaction volumes, and documented savings before and after internalization. Such evidence would allow researchers to determine more precisely whether the observed association between cost architecture design and cost savings is sustained over time.

4.2. Discussion of Findings

The findings indicate that cost architecture design was positively associated with project cost savings in the implementation of the in-house debit card project at Bank of Kigali Plc., Rwanda. Respondents generally expressed favorable views regarding capital expenditure planning, cost forecasting, allocation of fixed and variable costs, budget adjustments, and financial planning mechanisms. This finding is consistent with the Project Management Institute (PMI, 2021), which emphasizes the importance of systematic cost estimation, budgeting, and expenditure control throughout the project lifecycle. It also supports the Resource-Based View developed by Barney (1991), which explains that organizational performance depends partly on the effective development and use of internal resources and capabilities. In this context, financial planning and cost-control practices can be considered important managerial capabilities that help Bank of Kigali coordinate resources and manage the financial requirements of its in-house debit card project.

The findings further suggest that allocating fixed and variable costs and forecasting expenditure are important aspects of cost architecture design. Appropriate cost allocation enables project managers to understand different

expenditure categories, while accurate forecasting helps identify potential cost overruns and prepare for future financial obligations. This interpretation is consistent with Slack et al. (2024), who emphasize the importance of resource planning and coordination in operational management. It also relates to the work of Ntarindwa (2022), who examined cost management strategies at Bank of Kigali and reported positive relationships between operational efficiency and management practices such as technology investment, employee development, and business process re-engineering. Although Ntarindwa's study focused on operational efficiency rather than project cost savings, both studies highlight the importance of effective management practices in improving organizational outcomes. The present study extends this discussion by focusing specifically on cost architecture design in an in-house debit card project.

The relationship between cost architecture design and project cost savings is further supported by the findings of Shen et al. (2025), who investigated digital transformation and cost efficiency among commercial banks in China. Their study found that digital transformation improved cost efficiency through mechanisms that included more efficient use of funds, reduced information asymmetry, business diversification, and risk reduction. These findings are consistent with the present study because effective cost architecture also emphasizes the planned allocation of financial resources and control of unnecessary expenditure. Both studies suggest that technology-related financial benefits depend partly on how organizations manage their resources and operational processes. However, Shen et al. examined digital transformation at the bank level, whereas the present study focuses on cost architecture design within a specific in-house debit card project.

The findings also agree with Ren et al. (2024), who examined digital transformation and profit efficiency among commercial banks in China. Their study established that digital transformation was positively associated with profit efficiency, partly through increased revenue and reduced costs. This supports the argument that technology-related initiatives can contribute to improved financial performance when they are managed effectively. In the Bank of Kigali case, cost architecture design provides a financial management framework for planning investments, forecasting expenditure, allocating costs, and reviewing budget performance. The Resource-Based View by Barney (1991) provides a theoretical explanation for this relationship because it emphasizes the importance of organizational resources and capabilities in achieving improved performance. Financial planning and cost control can therefore be understood as internal managerial capabilities that help a bank obtain greater value from its technological investments. Nevertheless, the present

findings concern reported project cost-saving outcomes and should not be interpreted as independent proof of actual financial savings.

The study's findings can also be compared with Porfírio et al. (2024), who examined factors affecting digital transformation in the banking industry. Their findings highlighted organizational flexibility, management capacity, employee skills, and stakeholders' digital experience as important factors in realizing the benefits of digital transformation. This suggests that successful technology implementation requires more than the acquisition of technological systems; it also depends on the ability to manage organizational resources and processes effectively. The present study complements this perspective by emphasizing the financial planning dimension of technology implementation. Transaction Cost Economics, developed by Williamson (1981), further explains that bringing an activity in-house may reduce dependence on external providers but can also introduce internal costs associated with technology, staffing, maintenance, and coordination. Therefore, Bank of Kigali needs to evaluate both potential savings and the full costs of operating its internal debit card capability to determine whether internalization provides sustainable economic benefits.

Overall, the findings suggest that cost architecture design is an important component of managing the financial implications of the in-house debit card project at Bank of Kigali Plc. The results are consistent with previous studies on cost management and banking efficiency, as well as the Resource-Based View and Transaction Cost Economics. While the Resource-Based View explains the importance of internal financial management capabilities, Transaction Cost Economics highlights the need to compare the costs of internal operations with the costs and benefits of external arrangements. These perspectives jointly indicate that project cost savings depend not only on the decision to internalize debit card operations but also on the effectiveness of expenditure planning, cost forecasting, resource allocation, and budget control. The bank should therefore strengthen these practices and assess their performance using documented financial information, including approved budgets, actual expenditure, recurring operating costs, and verified savings. This would provide stronger evidence of the project's financial benefits and support informed decisions about the long-term sustainability of its in-house debit card capability.

5. Conclusion and Recommendations

This section presents the conclusions drawn from the study findings on the effect of cost architecture design on project cost savings in Bank of Kigali Plc.'s in-house debit card

project. It also provides recommendations aimed at strengthening financial planning, improving cost control, and promoting sustainable project cost savings

5.1. Conclusion

The study concludes that cost architecture design is an important factor associated with project cost savings in the implementation of the in-house debit card project at Bank of Kigali Plc., Rwanda. The findings indicate that comprehensive capital expenditure planning, accurate cost forecasting, appropriate allocation of fixed and variable costs, effective budget adjustments, and sound financial planning mechanisms are associated with better management of project expenditure. The correlation and regression results further demonstrate a positive and statistically significant relationship between cost architecture design and project cost savings. These findings support the Resource-Based View, which emphasizes the importance of internal organizational capabilities, and Transaction Cost Economics, which highlights the need to evaluate the costs and benefits of managing activities internally rather than relying on external providers. However, internalization does not automatically guarantee savings because the bank must also manage expenditure related to technology infrastructure, systems integration, personnel, maintenance, security, and ongoing operations. Therefore, strengthening cost architecture design, monitoring expenditure, and comparing planned budgets with actual costs are essential for assessing the financial benefits and long-term sustainability of the in-house debit card project.

5.2. Recommendations

Based on the study findings, the following recommendations are proposed to improve cost management and strengthen project cost savings at Bank of Kigali Plc., Rwanda.

1. Bank of Kigali should improve the planning of capital expenditure by identifying all major costs associated with technology infrastructure, system integration, personnel, security, and maintenance before project implementation. This will help the bank prepare realistic budgets and reduce the risk of unexpected expenditure.
2. The bank should regularly compare planned budgets with actual expenditure and update cost forecasts to identify potential overruns early. Finance and project management teams should also ensure that fixed and variable costs are clearly identified, monitored, and controlled throughout the project lifecycle.

3. Bank of Kigali should establish regular reviews of budget adjustments and assess the financial performance of its in-house debit card project using documented financial records. Comparing the total costs of internal operations with the costs of alternative external arrangements will help management determine whether the project is achieving sustainable cost savings and support informed future investment decisions.

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