



Effect of Exchange Rate Volatility on Budget of the Stelir Project in Rwanda: A Project Management Perspective (2022-2025)

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Abstract: This study examined the effect of exchange rate volatility on the budget of the STELIR Project in Rwanda from 2022 to 2025. Specifically, it assessed budget variations arising from RWF/USD exchange rate fluctuations during the implementation of the STELIR Project. The study employed a case study research design using both quantitative and qualitative approaches. The target population comprised 38 STELIR Project staff, including financial specialists, operations managers, support staff, and technical staff, together with 20 key informants from the British Council, Mastercard Foundation, Rwanda Education Board, and STELIR Project Team. Census sampling was used for project staff, while purposive sampling was used to select key informants. Data were collected using structured questionnaires, semi-structured interviews, and documentary review of project budgets, expenditure reports, procurement records, financial statements, supplier invoices, and budget revision documents. Data were analyzed using descriptive statistics, Pearson correlation analysis, simple regression analysis, and thematic analysis. The findings indicated that RWF/USD exchange rate fluctuations contributed to variations between planned and actual project expenditure. Pearson correlation analysis revealed a statistically significant relationship between exchange rate volatility and budget variations ($r = -.538, p < .05$). Regression analysis further showed that exchange rate volatility explained 28.9% of the variation in budget outcomes ($R^2 = .289, p < .05$). The study concludes that exchange rate fluctuations affected financial planning, procurement costs, forecasting, and budget control during project implementation. The study recommends strengthening exchange rate monitoring, adopting flexible budgeting, establishing appropriate currency contingency provisions, and improving coordination between financial and procurement functions.

Keywords: Exchange rate volatility; Budget variations; Project management; Financial planning; STELIR Project; Rwanda

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1. Introduction

At the global level, exchange rate volatility has increasingly become an important financial risk affecting the planning, budgeting, procurement, and implementation of projects involving international transactions. Fluctuations in exchange rates can change the domestic-currency value of foreign-denominated project funds and increase the cost of imported goods, equipment, materials, consultancy services, and other project inputs. Projects that depend on foreign financing are particularly exposed

because changes in currency values can create differences between the budget initially approved and the actual cost incurred during implementation. Effective project management therefore requires project teams to identify foreign exchange exposure, incorporate appropriate contingencies into project budgets, monitor exchange rate movements, and adjust financial plans when significant currency changes occur. Exchange rate risk management has consequently become an important component of financial planning and cost control for projects operating

across international markets (International Monetary Fund [IMF], 2025).

In developed countries, exchange rate volatility affects projects through international procurement, cross-border contracts, imported materials, and foreign-denominated financial obligations. Although developed economies generally have more sophisticated financial markets and risk-management mechanisms, project budgets can still be affected when exchange rates change significantly during implementation. Large infrastructure, construction, energy, manufacturing, and technology projects may involve suppliers and contractors from different countries, creating exposure to multiple currencies. Project managers may therefore use financial forecasting, currency hedging, contractual arrangements, and contingency provisions to reduce the effects of exchange rate movements on project costs. The experience of developed economies demonstrates that effective management of exchange rate exposure requires integration of financial risk assessment into project planning, procurement management, cost estimation, and budget monitoring.

China provides an important example of an economy where exchange rate movements can have implications for project budgeting because of the country's extensive international trade, infrastructure investment, construction activities, and global supply chains. Projects involving imported equipment, international suppliers, foreign contractors, or payments denominated in foreign currencies can experience changes in project costs when the value of the Chinese yuan changes against major international currencies. Exchange rate movements can therefore influence procurement costs, contractor payments, project cash flows, and budget forecasts. For project managers, monitoring currency movements and incorporating foreign exchange risks into project financial plans can help reduce unexpected budget deviations. The Chinese experience demonstrates the importance of considering currency exposure when managing projects with substantial international procurement and financial transactions.

In Sub-Saharan African countries, exchange rate volatility has become a significant concern for project financial management because many economies depend on imported machinery, equipment, construction materials, fuel, technology, and professional services. Depreciation of local currencies can increase the domestic-currency cost of these project inputs and consequently create budget pressures. Projects financed through international development partners may be particularly exposed when funding is provided in currencies such as the US dollar while project expenditure is incurred in local currencies. Regional evidence suggests that currency-induced budget deviations can affect project cost control and resource allocation, particularly where project teams have limited access to financial risk-management instruments (Ndung'u

& Ngugi, 2022). Consequently, project managers in Sub-Saharan Africa need to integrate exchange rate forecasting, contingency planning, cost monitoring, and financial risk responses into project management practices.

In Rwanda, exchange rate volatility is an important consideration for projects that depend on foreign financing, imported goods, international procurement, and foreign-denominated contractual obligations. Movements in the exchange rate between the Rwandan Franc and major currencies such as the US dollar can influence the local-currency value of project funds and the cost of goods and services purchased from international markets. According to the National Bank of Rwanda (2025), the Rwandan Franc experienced substantial depreciation against the US dollar during the period considered, reaching approximately RWF 1,448.54 per US dollar by August 2025. Such movements can create budgetary pressures for projects whose funding is denominated in foreign currency while implementation expenditure is made in Rwandan Francs. Therefore, effective project financial management in Rwanda requires project teams to monitor exchange rate movements, assess currency exposure, maintain realistic cost estimates, and incorporate appropriate financial risk-management measures into project budgets.

The Sustainable Teaching and Learning in Rwandan Schools (STELIR) Project, implemented during the 2022–2025 period, provides an important context for examining the relationship between exchange rate volatility and project budget performance in Rwanda. The project operates within an environment where international funding may be denominated in US dollars while many project expenditures are incurred in Rwandan Francs. Consequently, fluctuations in the exchange rate can influence the purchasing power of project funds and affect the cost of training materials, procurement, consultancy services, transportation, and other implementation activities. From a project management perspective, exchange rate movements may therefore contribute to budget variances, cost escalation, resource reallocation, and adjustments to implementation plans. Examining this relationship can provide useful evidence on how project managers can integrate foreign exchange risk into project budgeting, cost control, procurement planning, and financial monitoring.

1.2 Statement of the Problem

International donor-funded educational projects in Rwanda frequently operate within a financial environment where funding may be committed in stable foreign currencies while project expenditures are made in the domestic currency. The Sustainable Teaching and Learning in Rwandan Schools (STELIR) Project (2022–2025) provides an example of this situation. Where project funding is denominated in US dollars while operational expenditures

are incurred in Rwandan Francs, depreciation of the local currency can increase the Rwandan Franc value of project expenditures. According to the National Bank of Rwanda (2025), the Rwandan Franc experienced substantial depreciation against the US dollar during the period under consideration, reaching RWF 1,448.54 per US dollar by August 2025. Such exchange rate movements can create differences between originally approved project budgets and actual expenditures, increase procurement costs, and place pressure on project cost-control mechanisms.

Despite the potential financial implications of exchange rate movements, there is limited empirical evidence on how exchange rate volatility affects the budget performance of donor-funded educational projects in Rwanda. Existing evidence from Sub-Saharan Africa suggests that currency-related fluctuations can contribute to budget deviations and financial pressures in projects operating in economies exposed to exchange rate instability (Ndung'u & Ngugi, 2022). However, limited research has examined how project teams in Rwanda respond to these fluctuations, particularly in terms of budget monitoring, cost control, resource allocation, procurement decisions, and adjustment of implementation plans. This creates a knowledge gap concerning the practical mechanisms used by project managers to manage exchange rate-related budget risks.

The consequences of exchange rate-related budget instability can extend beyond financial performance and affect the implementation of educational projects. Unexpected increases in the local-currency cost of project inputs may require project managers to reallocate resources, revise procurement plans, reduce planned activities, or seek additional financial resources. Such adjustments may affect the quantity and quality of training materials, the number of beneficiaries reached, the timing of capacity-building activities, and the achievement of planned project outputs. For an educational initiative such as STELIR, maintaining effective budget performance is therefore important for ensuring that available financial resources are translated into the planned teaching and learning interventions.

Rwanda's Vision 2050 places strong emphasis on developing a knowledge-based economy in which education and human capital development play an important role (MINEDUC, 2024). The successful implementation of donor-funded educational projects contributes to these broader national development objectives. However, the ability of such projects to achieve their intended outputs depends partly on effective financial planning and control throughout the project life cycle. Where exchange rate volatility creates unexpected budget pressures, project managers may face difficulties maintaining approved expenditure plans while simultaneously meeting project scope, schedule, quality, and beneficiary requirements.

Therefore, there is a need for empirical research examining the effect of exchange rate volatility on the budget performance of the STELIR Project in Rwanda. Understanding the extent to which exchange rate fluctuations influence budget variances, cost control, cost overruns, and adherence to approved budgets can provide evidence for improving financial risk management within donor-funded educational projects. This study will address this gap by examining the effect of exchange rate volatility on the budget performance of the STELIR Project from a project management perspective, with the aim of contributing to improved financial planning, risk response, resource allocation, and cost-control practices in similar projects in Rwanda.

1.3.2. Specific Objectives

Specifically, the study attempted:

- i. To effect of Exchange Rate Volatility on Budget of the Stelir Project in Rwanda: A Project Management Perspective (2022-2025).

2. Literature Review

Exchange rate volatility is positioned as a significant external shock that undermines project budget stability. Fluctuations in the RWF/USD rate generate cost overruns, procurement inefficiencies, and reporting inconsistencies. Within Rwanda's donor-funded education initiatives, such as the STELIR Project, these dynamics expose cross-border financing arrangements to considerable currency risks. Consequently, the review underscores the importance of mitigation strategies, hedging, contingency planning, and adaptive budgeting, to safeguard project performance against exchange rate instability.

2.1.1 Exchange Rate Volatility

Exchange rate volatility refers to unpredictable and significant fluctuations in the value of one currency relative to another over a given period. According to Adedoyin *et al.* (2021), exchange rate volatility represents currency instability that creates uncertainty for economic planning, investment decisions, and financial management. It is commonly measured using statistical techniques such as variance, standard deviation, and coefficient of variation, which capture the degree of currency fluctuations over time.

From a project management perspective, exchange rate volatility represents an external financial risk that can affect cost estimation, procurement planning, and budget control. Kerzner (2022) argues that successful project implementation depends on accurate cost forecasting and

effective risk management; however, unpredictable currency movements make financial planning more complex, especially in projects financed through foreign currencies. In donor-funded projects, the common situation involves receiving funds in currencies such as the United States Dollar (USD) while paying local expenses in Rwandan Francs (RWF). This currency mismatch exposes projects to losses when the local currency depreciates against the funding currency.

2.1.3. Project Implementation

The budget of the Sustainable Teaching and Learning in Rwandan Schools (STELIR) Project provided the financial framework for implementing activities aimed at improving English language proficiency and teaching practices among lower-secondary teachers in Rwanda. The project included face-to-face training, online learning, live speaking sessions, and school-based continuing professional development, which required financial resources for training delivery, learning materials, digital learning, teacher support, monitoring, and other operational activities (British Council, 2024). STELIR was implemented by the British Council in partnership with the Rwanda Basic Education Board and the Mastercard Foundation and operated from 2022 to 2025 (British Council, 2026). Effective budget management was therefore important for ensuring that planned activities were implemented according to approved priorities and within the available financial resources.

The budget performance of the STELIR Project can also be considered in relation to its exposure to exchange rate movements and the wider financial environment in Rwanda. Where project funds are received or committed in foreign currency while expenditures are incurred in Rwandan Francs, exchange-rate movements can affect the local-currency value of available resources and the cost of project activities. Such changes may influence expenditure on training, learning materials, transportation, consultancy, digital services, and other project requirements. Effective project financial management therefore requires regular budget monitoring, expenditure forecasting, cost control, and assessment of financial risks (Ministry of Finance and Economic Planning [MINECOFIN], 2026). This makes exchange-rate management particularly relevant to maintaining the budget performance and successful implementation of donor-supported educational projects such as STELIR.

2.2. Theoretical Review

The theoretical review presents the theories that provide the foundation for understanding the relationship between exchange rate fluctuations and project financial

performance. It explains the main concepts of the selected theory and shows how the theory relates to the objectives of the study. In this study, Transaction Exposure Theory is used to explain how RWF/USD exchange rate fluctuations can affect budget variations during the implementation of the STELIR Project.

2.2.1 Transaction Exposure Theory

Transaction Exposure Theory is rooted in the broader foreign exchange risk framework developed by Eiteman, Stonehill, and Moffett (1992), who explained that organizations involved in international transactions are exposed to financial losses or gains when exchange rates change between the time a transaction is initiated and the time it is settled. The theory focuses on the effect of exchange-rate movements on the domestic-currency value of foreign-currency receivables, payables, and other contractual commitments. When exchange rates fluctuate, the amount of domestic currency required to settle a foreign-currency obligation may differ from the amount originally estimated. This creates uncertainty in financial planning and can lead to differences between budgeted and actual expenditure.

The theory is relevant to this study because the STELIR Project may receive or manage funds denominated in USD while implementing activities and making expenditures in RWF. Changes in the RWF/USD exchange rate can therefore affect the local-currency value of project funds and the cost of foreign-currency-related transactions. For example, depreciation of the RWF against the USD may increase the RWF cost of USD-denominated goods, equipment, services, or contractual obligations, thereby creating budget variations. Transaction Exposure Theory consequently provides a suitable theoretical basis for assessing how RWF/USD exchange-rate fluctuations may contribute to differences between planned and actual project expenditure during the implementation of the STELIR Project.

2.3. Empirical Literature

Globally, budgetary variations have been recognized as an important factor influencing project implementation because differences between planned and actual costs can affect the ability of projects to achieve their objectives within the approved time, cost, and quality requirements. A study by Harrison and Khan (2024) involving 200 development projects across five continents employed a mixed-method approach using questionnaires and interviews. The study found that projects experiencing significant variations between approved budgets and actual expenditures were more likely to experience delays in procurement and implementation. The research emphasized that effective budget monitoring, realistic cost

estimation, and timely financial adjustments are important for maintaining project implementation within approved plans. However, the study highlighted a research gap concerning the specific causes of budgetary variations in projects operating in developing countries, particularly those exposed to foreign exchange fluctuations.

In developed countries, systematic financial planning and budget control mechanisms are commonly used to minimize the effects of budgetary variations on project implementation. A study by Moreau and Dupont (2024) involving 50 infrastructure projects in Europe revealed that projects with effective budget monitoring and cost-control systems experienced fewer significant deviations between planned and actual expenditure. The findings underscored the importance of continuous financial monitoring, accurate forecasting, and effective resource allocation in supporting successful project implementation. However, the study mainly focused on projects operating within relatively stable financial and institutional environments, creating a gap in understanding how budgetary variations affect projects implemented in economies where exchange-rate movements may significantly influence project costs.

In Asia, budgetary variations have also been associated with challenges in project implementation, particularly where projects depend on imported materials and foreign-currency-denominated contracts. Ali and Petrov (2025) conducted a mixed-method study involving 30 infrastructure projects in Japan and found that variations between estimated and actual project costs affected procurement decisions, resource allocation, and implementation schedules. The study emphasized that effective budget forecasting and financial risk management can help project managers respond to unexpected cost changes. However, the researchers identified limited evidence concerning projects in developing economies where exchange-rate fluctuations may have a stronger influence on the local cost of foreign-funded project activities. This gap is relevant to the present study because the STELIR Project operates within an environment where USD and RWF transactions may influence project budgeting.

In East Africa, budgetary variations have been observed to influence project implementation through changes in procurement costs, resource requirements, and implementation schedules. Bukuru and Mwangi (2024) conducted a mixed-method study involving 15 development projects in Kenya, Tanzania, and Uganda. The study found that projects experiencing substantial budget variations faced difficulties in maintaining planned implementation schedules and controlling procurement expenditures. The researchers emphasized the importance of budget monitoring, cost forecasting, and financial risk

management in reducing the effects of unexpected financial changes. Despite these findings, the study did not specifically examine the contribution of RWF/USD exchange-rate fluctuations to budgetary variations, creating a contextual and variable gap that the present study seeks to address in Rwanda.

In Rwanda, budgetary variations have increasingly attracted attention because development projects often involve foreign financing, imported inputs, and expenditures made in Rwandan Francs. A study by Kamanzi (2025) involving 20 development projects in Rwanda used questionnaires and semi-structured interviews to examine financial management and project implementation. The study found that differences between planned and actual expenditures affected procurement planning, resource allocation, and the timely implementation of project activities. It further emphasized the importance of monitoring exchange-rate movements where project financing is denominated in foreign currencies. However, the study did not specifically assess how RWF/USD exchange-rate fluctuations contribute to budgetary variations during project implementation. This gap provides justification for the present study, which will assess budget variations arising from RWF/USD exchange-rate fluctuations during the implementation of the STELIR Project

3. Methodology

This study employed a case study research design to examine the effect of RWF/USD exchange rate fluctuations on budget variations during the implementation of the STELIR Project in Rwanda. The case study design provided a structured framework for examining the study phenomenon within its real-life project context. The study also adopted a mixed-methods approach, integrating quantitative and qualitative data to provide measurable evidence and a deeper understanding of how exchange rate fluctuations affected project budget performance. The quantitative approach was used to measure exchange rate volatility and budget variations, while the qualitative approach was used to obtain detailed information from project stakeholders concerning financial planning, budget adjustments, procurement decisions, and responses to exchange rate changes.

The target population consisted of 38 project staff directly involved in the financial management, implementation, procurement, monitoring, and decision-making activities of the STELIR Project. These participants were selected because they possessed relevant knowledge and experience concerning project budgeting, expenditure management, procurement, and implementation. Specifically, the population comprised 4 financial specialists, 4 operations

managers, 6 support staff, and 24 technical staff, giving a total population of 38 respondents. In addition, the qualitative component involved 20 key informants selected from the British Council, Mastercard Foundation, Rwanda Basic Education Board (REB), and the STELIR Project Management Team.

The sample design provided a systematic approach to selecting participants with relevant knowledge of the financial and operational aspects of the STELIR Project. A census approach was used for the 38-project staff because the population was relatively small and manageable. Therefore, all 38 eligible project staff members were included in the quantitative component of the study. For the qualitative component, purposive sampling was used to select 20 key informants, with 5 informants selected from each of the British Council, Mastercard Foundation, REB, and the STELIR Project Management Team. The selection of key informants was based on their knowledge and experience in project financial management, implementation, procurement, and decision-making.

The study employed census and purposive sampling techniques. Census sampling was used to include all 38-project staff in the quantitative study, while purposive sampling was used to select key informants with specific knowledge concerning the financial and operational management of the project. Both primary and secondary data were used. Primary data were collected through structured questionnaires and semi-structured interviews with project staff and selected key informants. Secondary data were obtained through documentary reviews, including approved project budgets, quarterly expenditure reports, procurement records, financial statements, supplier invoices, and budget revision documents covering the period from 2022 to 2025. Historical RWF/USD exchange rate data were also obtained from the National Bank of Rwanda.

Three main data collection instruments were used: questionnaires, interview guides, and documentary review. Structured questionnaires were administered to the project staff to collect quantitative information concerning exchange rate fluctuations, budget management, and budget variations. Semi-structured interviews were conducted with selected key informants to obtain detailed information concerning budget adjustments, operational responses, procurement decisions, and financial risk-management strategies related to exchange rate movements. Documentary review was used to examine approved budgets, expenditure reports, procurement records, supplier invoices, financial statements, and budget revision documents. Historical RWF/USD exchange rate records were also reviewed to establish patterns of exchange rate movements during the study period. These

instruments enabled the researcher to obtain quantitative and qualitative information and compare information obtained from different sources.

The independent variable, RWF/USD exchange rate volatility, was measured using the standard deviation of monthly RWF/USD exchange rates during the period from 2022 to 2025. Monthly exchange rate movements were examined to identify fluctuations in the value of the Rwandan Franc against the United States Dollar. The dependent variable, budget variations, was measured using the budget variance ratio, calculated as the difference between actual expenditure and planned budget divided by the planned budget and multiplied by 100. A positive variance represented a cost overrun, while a negative variance represented underspending. Budget variations were assessed quarterly across different project cost categories to determine the extent to which actual expenditure differed from planned expenditure.

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to summarize information relating to exchange rate fluctuations and project budget performance. Pearson's correlation coefficient was used to assess the strength and direction of the relationship between RWF/USD exchange rate volatility and budget variations. Simple linear regression analysis was used to assess the effect of exchange rate volatility on project budget performance using the model $Y = \beta_0 + \beta_1 X + \varepsilon$, where Y represented budget performance, X represented RWF/USD exchange rate volatility, β_0 represented the intercept, β_1 represented the regression coefficient, and ε represented the error term. The coefficient of determination (R^2) was used to establish the proportion of variation in budget performance explained by exchange rate volatility, while the F-statistic was used to assess the overall significance of the regression model. A p-value of 0.05 or below was considered statistically significant.

Qualitative data obtained from interviews were analyzed using thematic analysis following the approach of Braun and Clarke (2006). The analysis focused on themes related to operational adjustments, budgeting flexibility, procurement decisions, contingency planning, and financial risk-management strategies in response to exchange rate fluctuations. The quantitative and qualitative findings were integrated through triangulation to provide a more comprehensive understanding of the relationship between exchange rate fluctuations and budget variations in the STELIR Project. Ethical considerations included voluntary participation, informed consent, confidentiality, anonymity, the right to withdraw, and the protection of participants from harm. Permission to conduct the study was obtained from the relevant authorities, participants

were informed about the purpose of the study, and collected information was treated confidentially and used strictly for academic purposes.

4. Results and Discussion

This section presents, analyzes, and interprets the findings of the study on budget variations arising from RWF/USD exchange rate fluctuations during the implementation of the STELIR Project. The analysis examines how RWF/USD exchange rate volatility affected the budget performance of the STELIR Project from a project management standpoint. Through a combination of descriptive statistics, inferential analysis, and thematic qualitative coding, this section isolates how currency shifts

altered forecasting accuracy, cost control, and project delivery.

4.1.1. Profile of Key Informants by Institutional Affiliation (N = 20)

The qualitative strand of the study drew on 20 key informants, purposively selected for their institutional expertise and direct involvement in funding, overseeing, or implementing the STELIR Project. These informants held strategic administrative, financial, and technical positions within their respective institutions, placing them well to speak to how exchange rate volatility affected the project's budget performance. Table 1 shows how the informants were distributed across institutions, with identifier codes used in place of names to preserve confidentiality.

Table 1: Key Informants by Institutional Affiliation

Institution	Identifier Codes	Number of Informants	Percentage
British Council	BC-1 to BC-5	5	25%
Mastercard Foundation	MF-1 to MF-5	5	25%
Rwanda Basic Education Board	RE-1 to RE-5	5	25%
STELIR Project Team	PT-1 to PT-5	5	25%
Total		38	100%

Source: Survey Data, Researcher (2026)

As illustrated in Table1, the qualitative sample was evenly distributed across the The four institutions central to the STELIR Project's funding, governance, and implementation were represented equally in the qualitative sample, each contributing five informants. This even spread meant the study could draw on perspectives from every major stakeholder group involved in strategic decision-making, financial oversight, and day-to-day project execution an arrangement that broadens the range and credibility of the qualitative findings on exchange rate volatility, budget planning, and financial risk management within the project.

4.1.2 Descriptive Analysis of RWF/USD Exchange Rate Volatility Trends

The STELIR Project operated under a multi-year master budget of USD 10,000,000 for the 2022–2025 period, yet

its day-to-day operations, procurement, staff compensation, and engagement with local institutions, were carried out largely in RWF. This dual-currency arrangement left the project exposed to exchange rate risk throughout its implementation. Table 4.3 lays the empirical groundwork for examining this exposure, tracking quarterly movements in the RWF/USD exchange rate alongside key indicators of budget performance over the study period. By bringing together the quarterly average exchange rate, its standard deviation, the depreciation rate, and the extent of RWF exposure, the table captures both the general level and the volatility of currency movements and relates these to variance ratios reflecting the gap between planned and actual expenditure. Read together, these figures help explain how external currency pressures interacted with the project's internal financial management processes to shape its overall financial performance and operational efficiency.

Table 2: RWF/USD Exchange Rate Volatility Metrics and Associated STELIR Project

Financial Year	Quarter	Planned Budget (USD)	Actual Expenditure			Standard Deviation (σ)	Depreciation Rate (%)
			USD-Denominated	RWF-Denominated	Total (USD)		
2022	Q1	130,280	62,919	66,209	129,128	2.98	-0.88
	Q2	243,359	120,803	120,405	241,208	1.86	-0.88
	Q3	1,198,045	108,160	1,078,441	1,186,601	6	-0.96
	Q4	1,230,038	127,742	1,093,187	1,220,929	9.42	-0.74
2023	Q1	649,501	234,667	390,158	624,825	9.65	-0.8
	Q2	1,151,135	329,242	777,936	1,107,178	18.48	-3.82
	Q3	458,652	119,500	321,523	441,023	15.05	-3.84
	Q4	1,514,748	178,273	1,278,858	1,457,131	15.94	-3.8
2024	Q1	421,478	130,342	259,344	389,686	7.92	-7.54
	Q2	768,746	115,086	595,438	710,524	7.06	-7.57
	Q3	403,526	147,718	225,365	373,083	12.82	-7.54
	Q4	616,387	131,769	428,099	569,868	12.35	-7.55
2025	Q1	303,297	87,074	209,130	296,204	11.34	-2.34
	Q2	424,847	121,993	340,091	462,084	5.59	8.76
	Q3	303,297	87,074	296,160	383,234	4.76	26.36
	Q4	182,664	52,508	199,884	252,392	1.67	38.17
Total		10,000,000	2,154,870	7,690,228	9,845,098		

Source: Survey Data, Researcher (2026)

The findings in Table 2 indicate that RWF/USD exchange rate volatility had a notable effect on the financial performance and budget execution of the STELIR Project. In 2022, exchange rate volatility was relatively low, with standard deviation ranging from $\sigma = 1.86$ to $\sigma = 9.42$ and depreciation rates remaining below 1%, allowing actual expenditures to remain close to planned budgets. For example, in Q2 2022, the project spent USD 241,208 against a planned USD 243,359, a relatively small variance of 0.88%. However, exchange rate instability increased substantially in 2023, particularly in Q2 when standard deviation reached $\sigma = 18.48$ and depreciation increased to -3.82%, while in 2024 depreciation remained consistently high at approximately -7.5% per quarter. This period was associated with persistent differences between planned and actual expenditures, suggesting increased difficulty in maintaining the purchasing power and predictability of project budgets. By 2025, although standard deviation declined to $\sigma = 1.67$ in Q4, the effects of earlier currency depreciation were reflected in significant expenditure overruns, particularly in Q3 and Q4, where actual expenditure exceeded planned budgets by 26.36% and 38.17%, respectively. Overall, the project spent USD 9,845,098 out of the authorized USD 10,000,000, indicating that it remained within the overall budget; however, the substantial quarterly variations demonstrate

that exchange rate movements affected expenditure timing, cost predictability, and budget control, highlighting the importance of exchange rate risk management in projects financed in foreign currency

4.1.2.1 Survey-Based Quantitative Evidence on Influence of Exchange Rate Volatility to Project Budget Performance Variations

Primary quantitative data were collected from core project staff using a five-point Likert scale to assess their perceptions of the extent to which RWF/USD exchange rate volatility contributed to budget performance variations within the STELIR Project. This perception-based approach captures operational-level experiences, particularly how currency volatility translated into practical budgeting challenges and financial management risks. Table 4.4 presents the mean scores and standard deviations for each statement, offering a structured summary of respondents' levels of agreement on the influence of RWF/USD exchange rate volatility on budget performance variations. These perceptions complement secondary financial data by adding an operational dimension, thereby strengthening the overall assessment of exchange rate volatility effects within the project.

Table 3: Respondents' views on Exchange Rate Volatility and Budgetary Variations (N=38)

Survey Item Statement	Mean (μ)	Std (σ)
Fluctuations in the RWF/USD exchange rate generated significant discrepancies between projected and actual project expenditures.	4.21	0.72
Observed budgetary variances were predominantly driven by shifts in the RWF/USD currency valuation.	4.08	0.81
The structural depreciation of the Rwandan Franc (RWF) escalated the aggregate cost of project execution.	4.34	0.65
Macroeconomic instability regarding future exchange rate trajectories compromised the efficacy of fiscal planning and financial control mechanisms.	4.18	0.76
Foreign exchange volatility constituted the primary catalyst for budgetary variations, overshadowing competing macroeconomic factors.	3.97	0.88
Overall Mean	4.16	0.76

Source: Survey Data, Researcher (2026)

The findings in Table 3 indicate that respondents generally perceived exchange rate volatility as a major contributor to budgetary variations in the STELIR Project, as shown by the high overall mean of 4.16 and a standard deviation of 0.76. The highest-rated statement was that the structural depreciation of the Rwandan Franc escalated the aggregate cost of project execution, with a mean of 4.34 and a standard deviation of 0.65, suggesting strong agreement and relatively consistent responses among respondents. This was followed by the view that fluctuations in the RWF/USD exchange rate generated significant discrepancies between projected and actual project expenditures ($M = 4.21$, $SD = 0.72$) and that macroeconomic instability regarding future exchange rate movements compromised fiscal planning and financial control ($M = 4.18$, $SD = 0.76$). Respondents also agreed that observed budgetary variances were predominantly driven by changes in currency valuation ($M = 4.08$, $SD = 0.81$). Although the statement that foreign exchange volatility was the primary catalyst for budgetary variations received the lowest mean ($M = 3.97$, $SD = 0.88$), it still indicates general agreement. Overall, the results suggest that respondents considered RWF/USD exchange rate movements, particularly depreciation of the Rwandan Franc, to have substantially increased project costs, created differences between planned and actual expenditures, and weakened the predictability of financial planning and budgetary control.

Interviews with key informants identified three main ways in which RWF/USD exchange rate volatility affected the STELIR Project's budget performance: erosion of the cost

baseline, increased budget revisions, and uneven effects across expenditure lines. One financial officer explained that depreciation made initial cost estimates outdated, requiring emergency budget revisions (PT-2), while an oversight manager noted that the project was "repricing the entire activity plan" almost every quarter (BC-1). Respondents also indicated that depreciation directly increased the cost of internationally sourced items, with one noting that a 10% depreciation could result in a similar increase in affected budget lines (RE-4). Overall, the interview findings are consistent with the financial records and survey results (overall mean = 4.16), showing that exchange rate volatility was an important factor affecting budget predictability, expenditure control, and project implementation during 2022–2025.

4.1.3. Pearson Correlation and Simple Linear Regression

Pearson's product-moment correlation coefficient and simple linear regression were applied to the dataset to model the interaction between the primary variables. Budget performance (Y) serves as the dependent variable, operationalized as the quarterly budget variance ratio extracted from the project's internal financial records. Exchange rate volatility (X) represents the independent variable, measured as the quarterly standard deviation of the daily RWF/USD exchange rate. The analysis relies on sixteen paired quarterly observations spanning Q1 2022 to Q4 2025, satisfying the sample criteria for parametric testing. The empirical outputs are summarized in Table 4.

Table 4: Pearson Correlation, Regression Coefficients, and Model Summary Results

Source: Survey Data, Researcher (2026)

Variable	<i>r</i>	B	SE(B)	β	t-value	p-value
Constant (β_0)		13.502	5.809		2.324	0.036
Exchange Rate Volatility (σ)	-0.538	-1.358	0.569	-0.538	-2.386	0.32
Model Summary: R = 0.538 R ² = 0.289 Adjusted R ² = 0.238 F(1, 14) = 5.692, <i>p</i> < 0.05						

Note: *r* = Pearson correlation coefficient; B = Unstandardized coefficient; SE(B) = Standard error of B; β = Standardized regression coefficient

The correlation result ($r = -0.538$, $p < 0.05$) reveals a moderate but significant negative link between exchange rate volatility and budget performance. In simple terms, when exchange rates fluctuated more sharply, project budgets tended to perform worse. This pattern was consistent across sixteen quarters, suggesting that the effect is real and not just random accounting variation. For project leadership, this finding lends empirical weight to what had, until now, been more of an operational impression: currency instability was not simply a background irritant but a factor with a measurable bearing on the project's financial outcomes.

The regression estimates refine this picture further. For every one-unit increase in RWF/USD volatility, the project's budget performance ratio declined by 1.358 units ($B = -1.358$, $t = -2.386$, $p < 0.05$), a relationship unlikely to have arisen by chance. The coefficient of determination ($R^2 = 0.289$) indicates that exchange rate volatility alone accounts for approximately 29 percent of the variation observed in budget performance. The remaining 71 percent falls within the domain of internal project management, procurement choices, cost control practices, scheduling decisions, and similar factors. This distinction carries real weight from a governance standpoint: it identifies a portion of budget risk that sits largely beyond the project team's direct control, and which therefore cannot be resolved through internal discipline alone. It has to be anticipated and planned for at the design stage, not addressed after the fact.

Taken together, the model fit ($F(1, 14) = 5.692$, $p < 0.05$) supports the conclusion that the STELIR Project's budget baseline was genuinely exposed to the currency fluctuations recorded between 2022 and 2025. Given that external volatility alone explains close to a third of the variance in budget outcomes, conventional cost contingency margins are unlikely to provide adequate protection on their own. This points to the value of building mechanisms such as financial hedging arrangements, multi-currency budgeting, or a dedicated currency reserve into project planning from the outset, rather than introducing them reactively once variances have already emerged.

To complement the inferential statistical analysis, survey data were collected from project staff to assess their perceptions regarding the influence of exchange rate volatility on STELIR Project budget performance. Respondents rated a series of statements using a five-point Likert scale, capturing the extent to which currency fluctuations affected expenditure control, budget forecasting, and overall financial management. The results presented in Table 5 provide additional empirical support for the statistical findings, demonstrating a consistent perception among respondents that RWF/USD exchange rate volatility negatively affected budget predictability, weakened financial control mechanisms, and increased challenges in maintaining accurate cost forecasts throughout the project implementation period.

Table 5: Staff Perceptions of the Relationship Between Exchange Rate Volatility and Project

Survey Item Statement	Mean (μ)	Std. Dev. (σ)
Higher currency volatility directly correlated with expanding divergence between projected and actual project expenditures.	4.29	0.68
Exchange rate fluctuations structurally compromised aggregate budgetary performance throughout the project lifecycle.	4.18	0.74
Interludes of currency stability fostered rigorous alignment with baseline financial allocations.	4.11	0.79
Unpredictable exchange rate movements systematically degraded the statistical precision of long-term fiscal forecasting models.	4.24	0.71
Continuous oversight of foreign exchange exposure is imperative for optimizing project budgetary control and variance mitigation.	4.42	0.63
Overall Mean	4.25	0.71

Source: Survey Data, Researcher (2026)

The overall mean of 4.25 ($\sigma=0.71$) suggests that staff experienced currency instability as a recurring disruption to financial control rather than as an occasional accounting anomaly, a view consistent with the statistical relationship ($R^2 = 0.289$, $p < 0.05$) established earlier. This alignment between the perceptual and statistical evidence supports the interpretation that the budget deviations recorded across the project's life reflected genuine macroeconomic pressure rather than shortcomings in internal management.

Respondents strongly linked currency fluctuations to gaps between planned and actual spending ($\mu=4.29$, $\sigma=0.68$) and to weaker forecasting reliability ($\mu=4.24$, $\sigma=0.71$), suggesting that unpredictable currency movements pushed management toward a reactive posture that made it harder to apply standard variance analysis with any confidence. These disruptions extended into procurement and contracting staff noted that currency spikes drove up variance in quarterly budgets ($\mu=4.18$, $\sigma=0.74$), while calmer periods made it easier to stay within budget ($\mu=4.11$, $\sigma=0.79$). This pattern is consistent with what one would expect in a donor-funded project like STELIR, where sudden currency movements can inflate local-currency costs and disrupt vendor payment schedules, leaving fixed budget lines unable to cover what was originally planned.

The item receiving the strongest agreement of all called for systematic monitoring and reporting of exchange rate movements ($\mu=4.42$, $\sigma=0.63$) a fitting conclusion given that external market forces accounted for close to 29% of budget variance. This suggests that passive contingency planning is not enough on its own, and that project governance may need to shift toward more active risk tracking, including real-time exchange rate logs and flexible multi-currency budgeting built in from the planning stage. The combined survey and interview findings demonstrate that exchange rate volatility generated broad operational consequences beyond direct

budgetary effects. It increased procurement costs, reduced the purchasing capacity of local-currency allocations, and required continuous adjustments through activity rescheduling, budget reallocations, and scope prioritization. The evidence therefore confirms that currency fluctuations influenced both cost management practices and implementation decisions throughout the project lifecycle, transforming financial management from a planned process into a continuous adaptive exercise.

4.1.3.1 Thematic Insights from Qualitative Data

Analysis of the interview transcripts reveals distinct thematic patterns regarding the administrative friction caused by currency fluctuations. The primary theme centers on the widening divergence between projected allocations and actual expenditures. Key informants consistently reported that sudden, steep depreciations of the Rwandan Franc against the US Dollar directly caused recurrent budgetary overruns, reinforcing the trends observed in the financial data. As one procurement officer observed, “in every quarter where the RWF depreciated sharply, actual expenditure exceeded the approved budget, there was no ambiguity” (PT-3). This localized perspective highlights how intense currency volatility undercuts internal cost-control mechanisms and weakens adherence to baseline financial planning.

A secondary theme emerged around the degradation of fiscal forecasting reliability. Project managers emphasized that baseline budgets lost operational utility almost immediately when macroeconomic shifts occurred mid-quarter. This instability forced administrative teams to pivot from strategic execution to crisis management. A managing coordinator articulated this shift, noting that “by mid-quarter, the cost baseline had already shifted, and we were managing deviations rather than managing the plan” (MC-2). This experience explains why currency volatility accounted for a substantial portion of the project's

performance variance, as traditional static budgets proved poorly equipped to absorb rapid changes in purchasing power.

Finally, the qualitative data reveals a strong consensus among stakeholders regarding the structural limitations of conventional project monitoring frameworks. Informants uniformly argued that standard, fixed contingency reserves are structurally inadequate for mitigating systemic currency risks. Instead, the evidence points toward a clear administrative requirement for institutionalizing dynamic risk management practices. One budget controller summarized this position, asserting that “every project of this nature should have real-time currency monitoring embedded into its reporting cycle” (BC-4). Collectively, these insights demonstrate that safeguarding internationally funded development initiatives requires a transition away from rigid fiscal planning toward flexible budgeting models and continuous currency risk assessment.

The findings from correlation analysis, regression results, survey responses, and interview evidence collectively establish that RWF/USD exchange rate volatility had a statistically significant relationship with STELIR Project budget performance. The negative correlation ($r = -0.538$, $p < 0.05$) and regression results ($R^2 = 0.289$) indicate that higher volatility was associated with weaker budget performance and accounted for approximately 29% of observed budget variations. Although other internal project management factors contributed to the remaining variation, the consistent agreement among quantitative and qualitative evidence confirms that currency volatility represented a significant determinant of financial performance requiring deliberate risk-management interventions.

4.2. Discussion of Findings

The findings indicate that exchange rate fluctuations were an important financial factor affecting the implementation of the STELIR Project. Changes in the RWF/USD exchange rate created differences between the financial assumptions made during planning and the financial conditions experienced during implementation. This situation was particularly relevant because the project operated with USD-denominated funding while many project activities and expenditures were undertaken in Rwandan Francs. Such a currency arrangement exposed the project to changes in the local-currency value of project resources.

The findings further indicate that exchange rate movements affected the stability of the project budget. When the Rwandan Franc depreciated against the US Dollar, the

local-currency cost of project activities could change, making some expenditure estimates less predictable. This required project management to make financial adjustments during implementation. The findings therefore suggest that maintaining a fixed budget in an environment of changing exchange rates can create difficulties for cost control and expenditure planning. The effect was also evident in procurement and operational activities. Exchange rate movements could increase the cost of goods, equipment, services, and other inputs connected to foreign-currency transactions. As a result, project managers had to reconsider procurement timing, expenditure priorities, and budget allocations. The qualitative evidence particularly highlighted the erosion of the original cost baseline and the additional administrative burden associated with budget and activity adjustments.

The findings also demonstrate that exchange rate volatility affected financial forecasting and budget control. When currency conditions changed unexpectedly, financial plans prepared using earlier exchange-rate assumptions became less reliable. Project managers therefore had to respond to changing financial conditions rather than relying entirely on the original budget estimates. This finding is important from a project management perspective because effective cost management depends on realistic forecasting, continuous monitoring, and timely response to financial risks.

The findings are consistent with the empirical evidence presented in the study. Harrison and Khan (2024) found that significant differences between approved budgets and actual expenditures could contribute to procurement and implementation delays. Similarly, Moreau and Dupont (2024) emphasized the importance of continuous financial monitoring, accurate forecasting, and effective cost-control systems in reducing budget deviations. These studies support the view that maintaining effective financial control requires project managers to continuously monitor factors that can influence project costs.

The findings are also comparable with evidence from developing and emerging economies. Ali and Petrov (2025) observed that differences between estimated and actual project costs could influence procurement decisions, resource allocation, and implementation schedules. This is relevant to the STELIR Project because exchange rate movements created conditions in which previously estimated costs could change during implementation. The present findings therefore reinforce the importance of flexible financial planning where projects depend on foreign-currency financing or foreign-currency-related transactions.

In the East African context, the findings are consistent with Bukuru and Mwangi (2024), who found that substantial budget variations created difficulties in maintaining planned implementation schedules and controlling procurement expenditures. Their study emphasized budget monitoring, cost forecasting, and financial risk management as important mechanisms for reducing the effects of unexpected financial changes. The present study similarly indicates that exchange-rate-related financial changes require continuous monitoring and appropriate management responses. The findings are also related to the Rwandan context discussed by Kamanzi (2025), who reported that differences between planned and actual expenditures affected procurement planning, resource allocation, and timely implementation of development projects. The present study extends this evidence by focusing specifically on RWF/USD exchange rate fluctuations within the STELIR Project. This provides a more specific understanding of how currency movements can contribute to budgetary challenges in a foreign-funded project in Rwanda.

From a theoretical perspective, the findings support Transaction Exposure Theory. The theory explains that organizations involved in foreign-currency transactions may experience financial gains or losses when exchange rates change between the time a transaction is planned and the time it is settled. In the STELIR Project, the use of USD funding alongside RWF expenditure created a situation in which exchange rate movements could change the domestic-currency value of financial resources and project-related transactions. The findings therefore demonstrate the practical relevance of the theory to project budget management.

5. Conclusion and Recommendations

5.1. Conclusion

In conclusion, the findings indicate that RWF/USD exchange rate fluctuations contributed to budget variations during the implementation of the STELIR Project. Changes in the exchange rate affected the predictability of project costs, procurement activities, financial planning, and the alignment between planned and actual expenditure. The findings further show that the currency mismatch between USD-denominated funding and RWF-based expenditure exposed the project to financial risks that required continuous budget monitoring and adjustment. Therefore, effective exchange rate monitoring, flexible budgeting, and appropriate financial risk-management measures are important for maintaining budget control and supporting successful implementation of donor-funded projects

5.2. Recommendations

Based on the study findings on the effect of RWF/USD exchange rate volatility on budget variations during the implementation of the STELIR Project, the following three main recommendations are proposed:

- 1) The STELIR Project management team should strengthen exchange rate monitoring and financial forecasting. Regular monitoring of RWF/USD exchange rate movements should be integrated into financial reviews to enable timely identification of currency risks and adjustment of budget estimates.
- 2) The project management team should adopt flexible budgeting and currency contingency provisions. This would allow the project to respond to significant exchange rate changes without major disruption to planned activities and help reduce unexpected differences between planned and actual expenditure.
- 3) The STELIR Project and its funding partners should strengthen exchange rate risk-management mechanisms. Appropriate procedures for managing currency exposure should be established, including timely budget revisions, coordination between finance and procurement teams, and consideration of exchange rate risks when planning major project expenditures

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