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Project Appraisal Approaches and Performance of Made in Rwanda Projects: A Case of Sulfo Soap Making Project

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Abstract

The purpose of this research is to investigate the role of project appraisal in the performance of Made in Rwanda projects, focusing on a soap-making project at Sulfo Rwanda. The quantitative and qualitative approaches of descriptive research design were employed. The study surveyed 103 respondents, selected from a population of 146 individuals using Krejcie and Morgan's (1970) table. Ninety-nine respondents were randomly selected through simple random sampling to complete a questionnaire, while four respondents were selected through census and interviewed. The first objective demonstrated that financial appraisal significantly affects the performance of the project with a mean score ranging from 4.284 to 4.343, indicating a strong agreement. For its correlation results, there were positive and significant correlations between financial appraisal and customer satisfaction (r=0.883), customer retention (r=0.928), market growth (r=0.952), and profitability (r=0.933). The second objective revealed that technical appraisal strongly affects the performance of the soap making project with mean score ranging from 4.284 to 4.323, indicating a strong agreement. Its correlation results showed a positive and significant correlation between technical appraisal and customer satisfaction (r=0.943), customer retention (r=0.988), market growth (r=0.988), and profitability (r=0.952). The third objective demonstrated that market appraisal has a significant and positive effect on the performance of the soap making project with mean score ranging from 4.245 to 4.607, indicating a strong agreement. Its correlation results showing a positive and significant correlations between market appraisal and customer satisfaction (r=0.922), customer retention (r=0.988), market growth (r=0.988), and profitability (r=0.975). The fourth objective revealed that economic appraisal significantly affects the performance of the soap making project with mean score ranging from 4.235 to 4.588, indicating a strong agreement. In addition, its correlation results showed a positive and significant correlations between economic appraisal and customer satisfaction (r=0.914), customer retention (r=0.981), market growth (r=0.981), and profitability (r=0.987). In conclusion, the study's findings highlight the significance of financial, technical, market, and economic appraisal practices in enhancing the performance of

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the soap making project in Sulfo Rwanda, and it is recommended that the government, distributors, shareholders, and project team members collaborate and prioritize the adoption and effective implementation of these appraisal practices to maximize performance of soap making project in Sulfo Rwanda.

Keywords: *Project Appraisal Approaches, Project Performance, Sulfo, Rwanda*

1. Introduction

Globally, desirable outcomes are reached through proper assessment, design, and project implementation as a good investment (Tuominena et al., 2015). Project assessment before it implementation helps to align it to the mission, vision and objectives of the project on time (Memory, 2020). Hence, this implies that all organization desire to have good outcomes of their investments that promotes the attainment of objectives of the organization. Appraisal of the project is paramount in implementation strategy of the project business to improve planning by meeting the set visions and missions (Ribeiro, 2011). Therefore, project appraisal has a primary obligation of selecting and implementing the right and appropriate project.

Despite the number of factors that enhance project performance of the made in Rwanda products due to accessibility to raw material, manpower, strategies, objectives which increase the profitability, market growth, customer satisfaction and customer retention are dependent largely on project appraisal which increase success opportunities when a project is well implemented (Kavadias & Lock, 2012; Larson et al. (2013). However, they further note that without a sound selection mechanism that involves the application of finance, economic, market, and technical appraisal of the project, organizations are likely to fail in achieving their objectives.

In Rwanda, Sulfo Rwanda (2021) reported that most of the projects initiated in the last five years did not achieve their desired results, leading to a decrease in customer retention, satisfaction, and market growth. This was attributed to the failure of the organization to fully assess and dissect the projects during the selection stage to establish suitable understandings. Macharia's (2017) empirical research focused on approaches of project appraisal and organizational performance in Kenya. The researcher used descriptive research design and the findings of his research revealed that 70.1% of the organization’s resources are accounted for using economic appraisal and the supporting results of correlation analysis r=0.76 at 0.01 level of significance.

Therefore, the researcher recommended effective screening to keep the project on track of performance. Fewer studies focused on project appraisal and project performance in Rwanda in terms financial, technical, market and economic appraisal on customer satisfaction and retention, market growth and profitability. For instance, the research of Macharia clearly indicates that it was done in the health sector in Kenya, it was not done in manufacturing industry and specifically Made in Rwanda soap. It is against this backdrop that the researcher seeks to conduct a study to examine the role of project appraisal approaches on the performance of Made in Rwanda project with attention on Sulfo Soap making project.

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1.1 Objectives of the study

1.1.1 General objective

The general objective of this research was to examine the role of project appraisal in made in Rwanda project performance with a case of soap making project in Sulfo Rwanda.

1.1.2 Specific objectives

(i) To examine effect of financial appraisal on made in Rwanda project performance.
(ii) To evaluate the impact of technical appraisal on made in Rwanda project performance.
(iii) To assess the effect of market appraisal on made in Rwanda project performance.
(iv) To establish the relationship between economic appraisal in made in Rwanda project performance.

1.1.3 Research Hypotheses

The following null hypotheses were used to test this research:

$H0_1$: Financial appraisal does not have significant effect on made in Rwanda project performance.

$H0_2$: Technical appraisal does not have significant impact on made in Rwanda project performance.

$H0_3$: Market appraisal does not have significant effect on made in Rwanda project performance.

$H0_4$: Economic appraisal does not have significant relationship with made in Rwanda project performance.

2.1 Empirical Literature Review

2.1.1 Financial appraisal and performance of project

The empirical research of Reyneldis, *et al.,* (2018) conducted on the financial feasibility analysis of terminal project construction. The measures used to calculate feasibility in terms of finance by looking at IRR, NPV, BCR, and PBP in terms of return on capital methods. The economic analysis gave 44,503,687,056 of NPV, 1,49 of BCR, the value of BCR is above 1 while IRR is above 12% and PBP of 19% in 2024 as the 8^{th} years with 5,871,957,983 of IDR. Thus, based on these results the project is feasible.

The research of Ndikumana (2017) conducted on analysis of financial statements and performance of industry in terms of finance, the case of Bralirwa Ltd in Rwanda. The study showed a significant contribution of financial statements analysis practices to the financial performance of manufacturing industries. Bralirwa Ltd as manufacturing industry, should use Financial Statements analysis practices to promote a viable performance in finance. The findings stand for and were strategically availed as a paramount tool to shareholders and Managers of manufacturing industries towards implementation of corporate governance and managerial decision on such corporate finance. Based on results, Bralirwa Ltd should use financial statements analysis practices for checking its financial performance, Bralirwa Ltd managers should ensure that any financials statement analysis practices adopted is reliable and appropriate for serving the purpose of making good financial decision.

2.1.2 The technical appraisal and project performance

The empirical research of José (2016) focused on investing and technical appraisal of web project in Brazil. Quality evaluation was the theoretical reference in technologies and investing in appraisal of project through consideration of NPV, PBP and scores obtained. The results showed the owners of business per the choice or reason to choose products that are necessary in time returning investing in total value of return in the project.

In Macharia's (2017) empirical research, the focus was on the impact of techniques used in project appraisal on organizational performance in Kenya. The study employed a descriptive design, and the results indicated that four project appraisal methods, namely finance, market, economic, and technical appraisal approaches, accounted for 70.1% of the organization's resources. The correlation revealed a significant positive relation of project appraisal approaches and performance of organization with r=0.76 at 0.01 level of significance. Hence, the researcher recommended effective screening of the project to keep enhancing performance of the project.

2.1.3 The market appraisal and project performance

Mukherjee and Sahadev (2017) did a study which focused on feasibility studies in project management. The study found that project projects are crucial earlier to design and phase of development, and changes in the project after initiating the process may lead to project failure. The researchers recommended that feasibility studies be conducted systematically based on work characteristics to enhance performance of project.

The research of Sawsan, et al. (2019) conducted in Iraq on feasibility studies on construction projects. This research involved methodology used in this study involved surveying and formulating a questionnaire to identify factors that cause feasibility studies on failures of using dynamics of system analyzing the effects. The results showed that feasibility studies are often neglected cost overrun and time as well as dynamic system techniques approved to significantly contributed to performance of project.

2.1.4 The economic appraisal and project performance

Tuominena *et al.,* (2015) assessed economic appraisal of efficient energy in buildings, using cost effectiveness. The study utilized a CEA calculation method to compare the efficient energy cost improvements and its impact on energy use reduction. The findings showed that economic appraisal had a positive effect on cost-effectiveness, with an R value of 0.610. The study investment in efficient energy enables the implementation of the most economical projects, resulting in greater overall economic efficiency.

In a similar vein, Kamrul and Indra (2020) analyzed the schedule and cost performance of projects conducted on international level. The 100-projects supported by ADB experienced unusual cost overrun and variation of schedule of projects. They also identified economic appraisal of the project as one of the causes of cost underrun and delay. In conclusion, the researchers recommended project managers to do effective economic appraisal before implementing and keeping review progress enhance performance of the project.

2.2 Research Gap Identification

Even if the empirical literature captured in this research is related to the objectives of this research such as the research of Mukherjee and Sahadev (2017) which focused on feasibility and project management. However, their research has shown a big research gap because their study has completely ignored appraisal of projects in enhancing project performance. The same applies to the study carried out by Sawsan, *et al.,* (2019) on feasibility study in projects of construction. Their research has given less attention to the effect of economic and technical appraisal to performance of projects.

There is also another knowledge gap between the current research and the previous studies like the study dealing with economic appraisal of efficient energy using effective cost in building

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(Tuominema *et al.*, 2015). Their research has never thought of looking at project appraisal even if it is related to this current research. This is the same case for the research of Kamrul and Indra (2020) who concentrated schedule and cost performance on development projects on international level. Though, empirical study analyzed performance of the project but its attention to project appraisal was very limited on analysis the cost of the project rather than also considering economic, technical, market and finance appraisal of the project.

2.3 Conceptual Framework

The association and linkage between variables of the study is demonstrated by a conceptual framework (Eyesi, 2016). Thus, this research has project appraisal as the independent variable while performance made in Rwanda project is dependent variable. Thus, the Figure 2.1 indicates linkage between appraisal and performance of the project where project appraisal is measured by finance appraisal, technical appraisal, market appraisal and economic appraisal while project performance is measured by customer satisfaction, market growth, profitability, and customer retention.

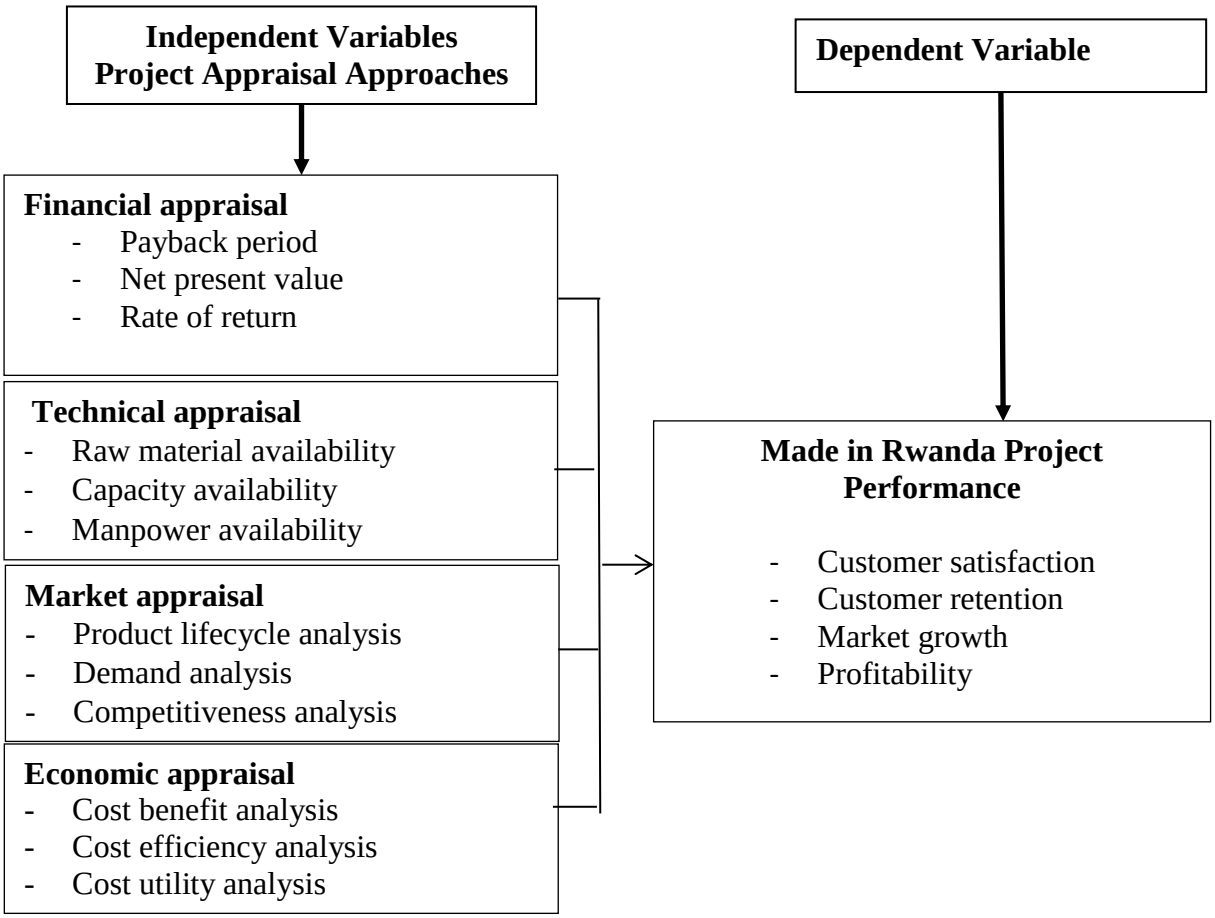

Figure 1: Conceptual Framework

Researcher, 2023

The conceptual framework in figure 2.1 shows project appraisal as IV and performance of Made in Rwanda as DV. Thus, project appraisal is measured by finance, technical, market and economic appraisal while project performance of made in Rwanda is measured by customer satisfaction, customer retention, market growth and profitability. The finance appraisal has metrics like PBP, NPV and RR, the technical appraisal has metrics such as raw materials

availability, capacity availability and manpower availability while market appraisal has metrics like product lifecycle analysis, demand analysis and competitiveness analysis and economic appraisal has metrics such as CBA, CEA and CUA.

3. Materials and Methods

The research methodology used in this study aimed to collect and analyze data from a selected sample to gain insights into the soap-making project in Sulfo Rwanda. The research design employed both qualitative and quantitative methods to analyze descriptive and inferential data, as well as thematic analysis for qualitative aspects.

The target population consisted of 146 individuals involved in the soap-making project. The sample design ensured representativeness and accuracy of the findings. The sample size of 103 respondents was determined using the Krejcie and Morgan table (1970), with different sampling techniques employed. Simple random sampling was used for project team members, stakeholders, and potential distributors, while census sampling was utilized for management.

Data collection methods included the use of questionnaires and semi-structured interviews. The questionnaires consisted of sections related to socio-demographic characteristics, finance appraisal, technical appraisal, market appraisal, and economic appraisal. The Likert scale was employed in the questionnaire to measure responses. The semi-structured interview guide allowed for detailed information gathering and flexibility during the data collection process.

To ensure the reliability and validity of the research instruments, pilot studies were conducted among 15 respondents in three rounds. The collected data were analyzed using Cronbach Alpha to assess content validity. If the content validity index exceeded the standard of 0.7, the instruments were deemed valid. The reliability of the instruments was evaluated by assessing consistency and repeatability.

Data were collected through the distribution of questionnaires over a period of two weeks. Additional time was provided for participants who were unable to fill out the questionnaires within the initial timeframe. Four participants were selected for interviews to provide qualitative data that complemented the quantitative findings. Data analysis involved the use of descriptive and inferential statistics, as well as regression analysis to examine the relationship between project appraisal and the independent variables of finance appraisal, technical appraisal, market appraisal, and economic appraisal.

Ethical considerations were considered throughout the research process. Participant confidentiality was ensured, and personal identification of respondents was not collected. Informed consent was obtained, and participants had the freedom to refuse participation. The researcher adhered to scientific integrity, avoiding bias and misinterpretation of findings. Plagiarism tests were conducted, and proper referencing and citation practices were followed. National laws, Sulfo policy, and university regulations were complied with to protect data, prevent fraud, and avoid plagiarism.

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4. Presentation of research findings

4.1 Financial appraisal and made in Rwanda project performance.

Table 1: Financial appraisal and made in Rwanda project performance.

Statements	Mean	SD
Payback period helps to rely on project performance	4.284	1.008
Net present value of soap promotes project performance	4.323	0.935
Internal rate of return enhances soap project performance	4.284	1.008
Benefit cost ratio indicates the progress of project performance	4.284	0.988
Financial analysis and budgeting enhance project performance	4.343	0.895
Overall mean	4.303	

Source: Field Data, 2023

The results in Table 1 show that the respondents perceive financial appraisal practices such as considering the payback period helps in relying on project performance, as indicated by a mean score of 4.284 and a SD (SD) of 1.008. The net present value of soap is also perceived to promote project performance, with a mean score of 4.323 and a SD of 0.935. Similarly, the internal rate of return is believed to enhance soap project performance, with a mean score of 4.284 and a SD of 1.008. The benefit-cost ratio is seen as an indicator of the progress of project performance, with a mean score of 4.284 and a SD of 0.988.

In addition, the financial analysis and budgeting are recognized as practices that enhance project performance, with a mean score of 4.343 and a relatively low SD of 0.895 as important factors that contribute to a very great extent on the performance of made in Rwanda project. The mean scores for all statements range from 4.284 to 4.343, suggesting a strong consensus on the positive effects of these practices on project performance. Hence, since the overall mean is 4.303 it implies that financial appraisal affect performance of made in Rwanda project with a case of Sulfo Rwanda.

Table 2: Assessment of project performance

Project performance assessment	Mean	SD
Custom retention	4.264	0.921
Satisfaction of customer	4.343	0.895
Profitability increase	4.343	0.895
Market growth	4.343	0.884
Overall mean	4.323	

Source: Field Data, 2023

The results in Table 2 show participants of the study perceive that the project has successfully achieved custom retention as indicated by a mean of 4.264 and a SD (standard deviation) of 0.921. They also express a high level of satisfaction with the projects ability to meet customer expectations, with a mean score of 4.343 and a SD of 0.895. The project is seen to have increased profitability effectively, with a mean score of 4.343 and a SD of 0.895. The respondents perceive that the project has contributed to market growth, as reflected by a mean score of 4.343 and a relatively low SD of 0.884.

In addition, the mean scores for all performance assessment statements range from 4.264 to 4.343 indicating a strong consensus on the effectiveness of the project in various aspects. The SDs for each statement are relatively low, ranging from 0.884 to 0.921, suggesting a high level of consistency among participants in their assessments. The overall mean score from all performance assessment statements are 4.323, indicating a strong agreement among respondents regarding the positive assessment of the made in Rwanda project's performance.

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Table 3: Correlation analysis between financial appraisal and made in Rwanda project performance.

		Customer satisfaction	Customer retention	Market growth	Profitability
Financial appraisal	Pearson Correlation	.883**	.928**	.952**	.933**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	102	102	102	102

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

Source: Field Data, 2023

The results in Table 3 showed a positive and significant relationship between financial appraisal and customer satisfaction (r=0.883), customer retention (r=0.928), market growth (r=0.952), profitability (r=0.933) with p-values which are under 0.01 level of significance. Hence, these results proved that financial appraisal have a positive and significant effect on performance of made in Rwanda project.

During the interview with one of the managers at Sulfo, it was revealed that the total turnover for the year experienced a nominal decrease of 0.68% compared to the previous year. However, the results from the study on financial appraisal and project performance indicate that effective financial appraisal practices have a positive impact on various aspects of the soap making project in Sulfo Rwanda.

The interviewee in his own words, he mentioned that " *Sulfo continues to prioritize and enhance its financial appraisal practices. By considering factors such as the payback period, net present value, internal rate of return, and benefit-cost ratio, the Finance Director and the project team make informed financial decisions that can help improve overall project performance and ultimately contribute to the company's success*".

Therefore, it is in this regard the findings suggest that implementing effective financial appraisal practices can have a significant and positive impact on the soap making project's performance in Sulfo Rwanda. Despite the nominal decrease in total turnover, the study provides empirical evidence supporting the importance of financial appraisal in influencing customer satisfaction, customer retention, market growth, and profitability.

4.2 Technical appraisal and performance of soap making project.

Table 4: Technical appraisal and made in Rwanda project performance.

Statements	Mean	SD
Raw material availability defines project performance	4.284	1.008
Capacity availability promotes project performance	4.284	0.988
Better allocation of manpower available enhances project performance	4.303	0.992
Material inputs and utilities promotes project performance	4.323	0.913
Manufacturing technology and process promotes performance of project	4.284	0.988
Overall mean	4.295	

Source: Field Data, 2023

The results in Table 4 indicate a very great extent regarding positive effect of technical appraisal on project as demonstrated by the statement concerning raw material availability defines project performance has a mean score of 4.284 and a standard deviation of 1.008. This indicates that respondents believe that the availability of raw materials significantly influences the performance of the soap making project. Similarly, the statement of capacity availability promotes project performance has a mean score of 4.284 and a standard deviation of 0.988, suggesting a strong belief in the positive impact of having sufficient capacity on project performance. The better allocation of manpower available enhances project performance has a mean score of 4.303 and a standard deviation of 0.992.

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In addition, this indicates that participants recognize the importance of effectively allocating manpower resources to improve project performance. The statement of material inputs and utilities promote project performance has a mean score of 4.323 and a standard deviation of 0.913, suggesting that the availability and utilization of material inputs and utilities are considered crucial for project success. The statement of manufacturing technology and process promote performance of the project has a mean score of 4.284 and a standard deviation of 0.988. The mean scores for all the statement range between 4.284 and 4.323 indicating a strong consensus among participants. The SDs are relatively low, suggesting a very great and consistency in responses. Hence, the results proved that technical appraisal factors play a significant effect on performance of the soap making project in Sulfo Rwanda.

Table 5: Correlation analysis between technical appraisal and made in Rwanda project performance.

		Customer satisfaction	Customer retention	Market growth	Profitability
Technical appraisal	Pearson Correlation	.943**	.988**	.988**	.952**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	102	102	102	102

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

Source: Field Data, 2023

The results in Table 5 revealed a positive relationship between technical appraisal and customer satisfaction (r=0.943), customer retention (r=0.988), market growth (r=0.988), profitability (r=0.952). All correlations are significant at the 0.01 level (2-tailed), as indicated by the p-values of .000. These results suggest that effective technical appraisal practices have a significant and positive effect on customer satisfaction, customer retention, market growth, and profitability in the context of the made in Rwanda project.

4.3 Market appraisal and performance of project

Table 6: Market appraisal and made in Rwanda project performance.

Market appraisal related statements	Mean	SD
Product lifecycle analysis promotes project performance	4.245	1.093
Effective demand analysis enhances project performance	4.607	0.746
Effective competitiveness analysis enhances project performance	4.323	0.935
Competent sale force promotes productivity of the project	4.323	0.913
Free market exchange enhances market growth as part of project performance	4.303	0.992
Overall mean	4.360	

Source: Field Data, 2023

The results in Table 6 show a high level of agreement on product lifecycle analysis promotes project performance has a mean score of 4.245 and a standard deviation of 1.093; effective demand analysis enhances project performance has a high mean score of 4.607 and a relatively low standard deviation of 0.746. The high level of agreement on effective competitiveness analysis enhances project performance has a mean score of 4.323 and a standard deviation of 0.935; competent sales force promotes productivity of the project also has a mean score of 4.323 and a standard deviation of 0.913. The high level of agreement on free market exchange enhances market growth as part of project performance has a mean score of 4.303 and a standard deviation of 0.992.

In addition, the mean scores for all statements range from 4.245 to 4.607, indicating a strong consensus among participants. The standard deviations (SD) are relatively low, suggesting a

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high level of agreement and consistency in responses. The high mean scores and relatively low standard deviations across all market appraisal statements indicate a consensus among participants that market-related factors that are important for enhancing the performance of the soap making project in Sulfo Rwanda.

Table 7: Correlation analysis between market appraisal and made in Rwanda project performance.

		Customer satisfaction	Customer retention	Market growth	Profitability
Market appraisal	Pearson Correlation	.922**	.988**	.988**	.975**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	102	102	102	102

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

Source: Field Data, 2023

The results in Table 7 proved a positive and significant relationship between market appraisal and customer satisfaction (r=0.922), customer retention (r=0.988), market growth (r=0.988), and profitability (r=0.975) with all calculated p-values which are under 0.01 level of significance (p<0.01). The results prove that market appraisal has a positive and significant effect on performance of made in Rwanda project with a case of soap making project in Sulfo Rwanda.

4.4 Economic appraisal and performance of project

Table 8: Economic appraisal and made in Rwanda project performance.

Statements	Mean	SD
Cost benefit analysis promotes project performance	4.235	1.091
Effective cost efficiency analysis enhances project performance	4.588	0.762
Effective cost utility analysis enhances project performance	4.284	0.988
Economic appraisals affect accountability and project performance	4.294	0.939
Capital budgeting promotes project performance	4.303	0.992
Overall mean	4.340	

Source: Field Data, 2023

The results in Table 8 show a high level of agreement on cost benefit analysis promotes project performance has a mean score of 4.235 and a standard deviation of 1.091, on effective cost efficiency analysis enhances project performance has a high mean score of 4.588 and a relatively low standard deviation of 0.762. The high level of agreement is also shown on effective cost utility analysis enhances project performance has a mean score of 4.284 and a standard deviation of 0.988. The high level of agreement is also on economic appraisals affect accountability and project performance has a mean score of 4.294 and a standard deviation of 0.939; and on capital budgeting promotes project performance has a mean score of 4.303 and a standard deviation of 0.992.

In addition, the mean scores for all statements range from 4.235 to 4.588 which indicates a strong agreement among the respondents. The SDs are relatively low, suggesting a high level of agreement and consistency in responses. Hence, the high mean scores and relatively low standard deviations across all economic appraisal statements indicate a consensus among participants that practices significantly affect performance of the soap making project in Sulfo Rwanda.

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Table 9: Correlation analysis between economic appraisal and made in Rwanda project performance.

		Customer satisfaction	Customer retention	Market growth	Profitability
Economic appraisal	Pearson Correlation	.914**	.981**	.981**	.987**
	Sig. (2-tailed)	.000	.000	.000	.000
	N	102	102	102	102

**. Correlation is significant at the 0.01 level (2-tailed).
Source: Field Data, 2023

The results in Table 9 proved a positive and significant relationship between economic appraisal and customer satisfaction (r=0.914), customer retention (r=0.981), market growth (r=0.981), profitability (r=0.987) with all calculated p-values which are under 0.01 (p<0.01). Hence, the results imply that economic appraisal has a significant and positive effect on performance of soap making project in Sulfo Rwanda.

During the second interview conducted with one of the managers of Sulfo Rwanda, we discussed the relationship between revenues and economic appraisal in the context of the total turnover. The manager highlighted that the decrease in total turnover can be partly attributed to the decline in sales of manufactured goods, which experienced a downfall of 3.8%. However, it was mentioned that the Trading Merchandise portfolio managed to gain by 15.4% due to increased off-take of PZ Cussons products and LPG.

In his own words, he expressed that "*the company's commitment is continuing its focus on implementing and improving economic appraisal practices. I acknowledge the significance of making informed financial decisions and addressing areas that might contribute to decreased revenues. I understand the relevance and importance of evaluating costs, identifying efficiencies, and making strategic investments based on economic appraisal techniques can increase our success, that is why before manufacturing any products in our company, we first all at all steps required and resources that will be invested and see if they will match the price of the products to put on the market, all these practices are encompassed in project appraisal*".

When discussing the effective economic appraisal practices identified in the study, such as benefit analysis, cost efficiency analysis, and capital budgeting, the manager emphasized their importance in optimizing revenue generation and cost management within the soap making project. By employing these practices, the manager believed that the project could enhance its financial performance, increase revenues, and mitigate the impact of downturns in specific product categories by doing effective project appraisal.

4.5 Regression analysis

The regression analysis was conducted to examine the relationship between project appraisal approaches (economic, financial, technical, and market appraisal) and various outcome variables (customer satisfaction, customer retention, market growth, and profitability) in the soap making project in Sulfo Rwanda. The results below revealed significant positive effects of the project appraisal approaches on all outcome variables of performance of soap making project in Sulfo Rwanda.

Table 10: Model Summary of project appraisal approaches and customer satisfaction

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.943[a]	.890	.886	.31175

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The results in Table 10 show that one unit increase in project appraisal approaches like economic, financial, technical and market appraisal affect (R^2=0.890) meaning 89.0% increase in customer satisfaction of the soap making project in Sulfo Rwanda.

Table 4. 11: Analysis of variance of project appraisal approaches and customer satisfaction

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	76.426	4	19.106	196.590	.000[b]
Residual	9.427	97	.097		
Total	85.853	101			

a. Dependent Variable: Customer satisfaction
b. Predictors: (Constant), economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

The results in Table 11 show that predictors of project appraisal approaches which are economic appraisal, financial appraisal, technical appraisal, and market appraisal, is highly significant in explaining the variability in customer satisfaction (F = 196.590, p < .001). The sum of squares for the regression (explained variability) is 76.426, while the sum of squares for the residual (unexplained variability) is 9.427. Hence, these results suggest that the project appraisal approaches have a significant effect on customer satisfaction of the soap making project in Sulfo Rwanda.

Table 12: Regression coefficients of project appraisal approaches and customer satisfaction

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	.158	.159		.990	.324
Financial appraisal	.042	.105	.042	.403	.008
Technical appraisal	.976	.167	.968	5.842	.000
Market appraisal	.111	.360	.105	.308	.009
Economic appraisal	.095	.314	.091	.304	.002

a. Dependent Variable: Customer satisfaction

Source: Field Data, 2023

The results in Table 12 indicate that project appraisal approaches have significant effects on customer satisfaction. The coefficient for financial appraisal is 0.144 (p < 0.05), the coefficient for technical appraisal is 0.446 (p < 0.05), the coefficient for market appraisal is 0.436 (p < 0.05), the coefficient for economic appraisal is 0.007 (p < 0.05) showing that all these variables of project appraisal approaches have positive effect on customer satisfaction. In addition, these coefficients represent the standardized relationships between the project appraisal approaches and market growth. The calculated p-values are statistically significant because they are under p-values (all less than 0.05). Hence, these findings emphasize the positive and significant effect of project appraisal approaches in enhancing the market growth of the soap making project in Sulfo Rwanda.

Table 13: Model Summary of project appraisal approaches and customer retention

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.995[a]	.989	.989	.09556

a. Predictors: (Constant), economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

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The results in Table 13 show that one unit increase in project appraisal approaches like economic, financial, technical and market appraisal affect (R^2=0.989) meaning 98.9% increase in customer retention of the soap making project in Sulfo Rwanda.

Table 14: Analysis of variance of project appraisal approaches and customer retention

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	80.104	4	20.026	2193.102	.000[b]
Residual	.886	97	.009		
Total	80.990	101			

a. Dependent Variable: Customer retention
b. Predictors: (Constant), economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

The results in Table 14 show that predictors of project appraisal approaches which are economic appraisal, financial appraisal, technical appraisal, and market appraisal, is highly significant in explaining the variability in customer retention ($F = 2193.102$, $p < .001$). The sum of squares for the regression (explained variability) is 80.104, while the sum of squares for the residual (unexplained variability) is 0.886. Hence, these results suggest that the project appraisal approaches have a significant effect on customer retention of the soap making project in Sulfo Rwanda.

Table 15: Regression coefficients of project appraisal approaches and customer retention

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	.012	.049		.239	.811
Financial appraisal	.114	.032	.116	3.537	.001
Technical appraisal	.554	.051	.565	10.810	.000
Market appraisal	.564	.110	.552	5.108	.000
Economic appraisal	.007	.096	.007	.073	.042

a. Dependent Variable: Customer retention

Source: Field Data, 2023

The results in Table 15 indicate that project appraisal approaches have significant effects on customer retention. The coefficient for financial appraisal is 0.144 ($p < 0.05$), the coefficient for technical appraisal is 0.446 ($p < 0.05$), the coefficient for market appraisal is 0.436 ($p < 0.05$), the coefficient for economic appraisal is 0.007 ($p < 0.05$) showing that all these variables of project appraisal approaches have positive effect on customer retention. In addition, these coefficients represent the standardized relationships between the project appraisal approaches and customer retention. The calculated p-values are statistically significant because they are under p-values (all less than 0.05). Hence, these findings emphasize the positive and significant effect of project appraisal approaches in enhancing the customer retention of the soap making project in Sulfo Rwanda.

Table 16: Model Summary of project appraisal approaches and market growth

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.995[a]	.989	.989	.09556

a. Predictors: (Constant), economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

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The results in Table 16 show that one unit increase in project appraisal approaches like economic, financial, technical and market appraisal affect (R^2=0.989) meaning 98.9% increase in market growth of the soap making project in Sulfo Rwanda.

Table 17: Analysis of variance of project appraisal approaches and market growth

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	80.104	4	20.026	2193.102	.000
Residual	.886	97	.009		
Total	80.990	101			

a. Dependent Variable: Market growth
b. Predictors: (Constant), economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

The results in Table 17 show that predictors of project appraisal approaches which are economic appraisal, financial appraisal, technical appraisal, and market appraisal, is highly significant in explaining the variability in market growth ($F = 2193.102$, $p < .001$). The sum of squares for the regression (explained variability) is 80.104, while the sum of squares for the residual (unexplained variability) is 0.886. Hence, these results suggest that the project appraisal approaches have a significant effect on market growth of the soap making project in Sulfo Rwanda.

Table 18: Regression coefficients of project appraisal approaches and market growth

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	.012	.049		.239	.811
Financial appraisal	.114	.032	.116	3.537	.001
Technical appraisal	.446	.051	.455	8.709	.000
Market appraisal	.436	.110	.427	3.952	.000
Economic appraisal	.007	.096	.007	.073	.042

a. Dependent Variable: Market growth

Source: Field Data, 2023

The results in Table 18 indicate that project appraisal approaches have significant effects on market growth. The coefficient for financial appraisal is 0.144 ($p < 0.05$), the coefficient for technical appraisal is 0.446 ($p < 0.001$), the coefficient for market appraisal is 0.436 ($p < 0.05$), the coefficient for economic appraisal is 0.007 ($p < 0.05$) showing that all these variables of project appraisal approaches have positive effect on market growth. In addition, these coefficients represent the standardized relationships between the project appraisal approaches and market growth. The calculated p-values are statistically significant because they are under p-values (all less than 0.05). Hence, these findings emphasize the positive and significant effect of project appraisal approaches in enhancing the market growth of the soap making project in Sulfo Rwanda.

Table 19: Model Summary of project appraisal approaches and profitability

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
	.996[a]	.993	.993	.07567

a. Predictors: (Constant), Economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

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The results in Table 19 show that one unit increase in project appraisal approaches like economic, financial, technical and market appraisal affect (R^2=0.993) meaning 99.3% increase in profitability of the soap making project in Sulfo Rwanda.

Table 20: Analysis of variance of project appraisal approaches and profitability

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	78.111	4	19.528	3410.764	.000[b]
Residual	.555	97	.006		
Total	78.667	101			

a. Dependent Variable: Profitability
b. Predictors: (Constant), Economic appraisal, financial appraisal, technical appraisal, market appraisal

Source: Field Data, 2023

The results in Table 20 show that predictors of project appraisal approaches which are economic appraisal, financial appraisal, technical appraisal, and market appraisal, is highly significant in explaining the variability in profitability ($F = 3410.764$, $p < .001$). The sum of squares for the regression is 78.111, while the sum of squares for the residual (error) is 0.555. Hence, these results suggest that the project appraisal approaches have a significant effect on profitability of the soap making project in Sulfo Rwanda.

Table 21: Regression coefficients of project appraisal approaches and profitability

	Unstandardized Coefficients		Standardized Coefficients		
Model	B	Std. Error	Beta	T	Sig.
(Constant)	.003	.039		.076	.940
Financial appraisal	.221	.026	.228	8.658	.000
Technical appraisal	.112	.041	.115	2.750	.007
Market appraisal	1.109	.087	1.101	12.690	.000
Economic appraisal	1.998	.076	1.981	26.201	.000

a. Dependent Variable: Profitability

Source: Field Data, 2023

The results in Table 21 indicate that project appraisal approaches have significant effects on profitability. The coefficient for financial appraisal is 0.221 ($p < 0.05$), the coefficient for technical appraisal is 0.112 ($p < 0.05$), the coefficient for market appraisal is 1.109 ($p < 0.05$), the coefficient for economic appraisal is 1.998 ($p < 0.05$) showing that all these variables of project appraisal approaches have positive effect on profitability. In addition, these coefficients represent the standardized relationships between the appraisal approaches and profitability. The calculated p-values are statistically significant because they are under p-values (all less than 0.05). Hence, these findings emphasize the positive and significant effect of project appraisal approaches in enhancing the profitability of the soap making project in Sulfo Rwanda.

4.6 Discussion of findings

The results of the first objective indicate that financial appraisal significantly affects the performance of the soap making project in Sulfo Rwanda. The participants highly agreed on the effectiveness of practices such as payback period, net present value, internal rate of return, and benefit-cost ratio. These findings align with the empirical research conducted by Reyneldis *et al.*, (2018) on the financial feasibility analysis of a terminal project construction. Their study also emphasized the importance of financial measures such as IRR, NPV, BCR, and PBP in determining project feasibility. The positive correlations found between financial appraisal and

customer satisfaction, customer retention, market growth, and profitability further support the notion that effective financial appraisal practices contribute to project success.

The results of the second objective demonstrate that technical appraisal strongly affects the performance of the soap making project. The participants highly agreed on the positive effects of factors such as raw material and capacity availability, manpower allocation, material inputs and utilities, and manufacturing technology and process. This finding is consistent with the empirical research conducted by José (2016) on the technical appraisal of a web project. The study highlighted the importance of quality evaluation and considering factors such as NPV and PBP in project appraisal. Additionally, Macharia's (2017) research on the impact of project appraisal techniques on organizational performance supports the positive correlation between technical appraisal and project performance found in this study.

The results of the third objective indicate that market appraisal significantly affects the performance of the soap making project. The participants strongly agreed on the importance of practices such as product lifecycle analysis, demand analysis, competitiveness analysis, competent sales force, and free market exchange. This finding is consistent with the research conducted by Mukherjee and Sahadev (2017) on feasibility studies in project management. Their study emphasized the need for systematic feasibility studies based on project characteristics to enhance project performance. The study also aligns with the findings of Sawsan et al. (2019), which highlighted the significant contribution of feasibility studies and dynamic system analysis to project performance.

The results of the fourth objective demonstrate that economic appraisal has a significant effect on the performance of the soap making project. The participants strongly agreed on the effectiveness of practices such as cost benefit analysis, cost efficiency analysis, utility cost analysis, and capital budgeting. These findings are consistent with the empirical research conducted by Tuominena et al. (2015) on the economic appraisal of energy-efficient buildings. Their study emphasized the positive effect of economic appraisal on cost-effectiveness. Similarly, Kamrul and Indra (2020) analyzed the schedule and cost performance of international projects and identified economic appraisal as a factor influencing cost overrun and project delays. These findings support the positive correlation between economic appraisal and project performance found in this study.

5.1 Conclusion

In conclusion, the first objective showed that financial appraisal significantly affects the performance of made in Rwanda projects, with participants highly agreeing on the effectiveness of practices such as payback period, net present value, internal rate of return, and benefit cost ration (mean scores ranging from 4.284 to 4.343) and positive correlations with customer satisfaction (r=0.883), customer retention (r=0.928), market growth (r=0.952), and profitability (r=0.933).

The results on the second objective of the study showed that technical appraisal strongly affect performance of soap making project in Sulfo Rwanda, with participants highly agreeing on the positive effects of factors such as raw material and capacity availability, manpower allocation, material inputs and utilities, and manufacturing technology and process (mean scores ranging from 4.284 to 4.323) and positive correlations with customer satisfaction (r=0.943), customer retention (r=0.988), market growth (r=0.988) and profitability (r=0.952).

The results on the third objective proved that market appraisal has a positive and significant effect on performance of soap making project, where the participants strongly agreed on practices like analysis of product lifecycle, analysis of demand, analysis of competitiveness, competent of sales force, and exchange of free market with a mean scores range of 4.245 to 4.607. There is also positive and significant relationship between market appraisal and customer satisfaction (r=0.922), customer retention (r=0.988), market growth (r=0.988) and profitability (r=0.975).

The results of the fourth objective proved that a significant effect of economic appraisal on performance of soap making project, with respondents strongly agreed with the effectiveness of benefit analysis, analysis of cost efficiency, analysis of utility cost and budgeting the capital with a mean scores range of 4.235 to 4.588. The correlation results also support the same results by showing a positive and significant relationship between economic appraisal and customer satisfaction (r=0.914), customer retention (r=0.981), market growth (r=0.981) and profitability (r=0.987).

5.2 Recommendations

Based on the results of the study, the following recommendations are made to government, distributors, shareholders, and project team members:

The government should encourage and promote the adoption of effective financial appraisal practices in projects across different sectors, as these practices have shown to significantly impact project performance. The government should provide training and resources to project teams and organizations on financial appraisal techniques such as payback period, net present value, internal rate of return, and benefit-cost ratio. The government should foster collaboration between government agencies and project stakeholders to ensure the implementation of sound financial appraisal practices.

The distributors should consider incorporating financial appraisal practices into their decision-making processes when evaluating potential projects or partnerships. The distributors should also develop a comprehensive understanding of financial appraisal techniques and their implications for project performance. The distributors should not forget to collaborate with project teams to ensure the effective implementation of financial appraisal practices throughout the project lifecycle.

The project team members should recognize the importance of technical appraisal in project success and allocate sufficient resources and attention to this aspect. They should also stay updated with the latest advancements in manufacturing technology and process to enhance project performance. The project team members should continuously assess and monitor raw material availability, capacity allocation, and other technical factors to optimize project outcomes.

Finally, the shareholders should support and encourage the use of market appraisal practices in project decision-making processes. They should also consider investing in competent sales forces and market research to effectively analyse product lifecycle, demand, and competitiveness. They should stay engaged and informed about economic appraisal practices and their impact on project accountability and performance. Hence, it is important for all stakeholders to collaborate and communicate effectively to ensure the successful implementation of these recommendations and maximize the performance of the soap making project in Sulfo Rwanda.

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