



# Effects of Lean Six Sigma Implementation on Operational Performance of Rwanda Development Board

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## Abstract

This study examined the effect of Lean Six Sigma implementation on the operational performance of the Rwanda Development Board, addressing the effects of training and education, process improvement, and leadership support. The study was guided by Lean Production Theory, the Theory of Constraints, and Six Sigma Theory, the research utilized a mixed-methods approach with descriptive and analytical designs. The target population comprised 74 RDB employees, and a census sampling technique was applied. A structured questionnaire was administered to study participants to assess the effect of training, process improvement, and leadership support on operational performance. The data collected from the questionnaire was analyzed using descriptive statistics such as frequencies, percentages, and mean scores to summarize the responses. Thematic analysis for qualitative analysis and Inferential statistics such as correlation analysis and regression analysis were used and to examine the relationships between variables and test the research hypotheses It included closed-ended and Likert scale questions. A pilot test ensured reliability (Cronbach's alpha  $\geq 0.7$ ), and expert review confirmed content validity. Both electronic and physical versions were distributed for data collection, ensuring accuracy and consistency. The statistical analysis conducted revealed several significant findings regarding the influence of training and education, process improvement, and leadership support on operational performance. The analysis began with descriptive statistics, where it was found that a majority of respondents either agreed or strongly agreed that formal training, certification opportunities, and on-the-job training significantly improved task efficiency, with consistently high mean values indicating positive perceptions across these areas. Leadership support was also rated highly, as the majority of respondents perceived strong leadership commitment to operational improvements and resource allocation, reinforcing the essential role of leadership in fostering organizational success. The regression analysis showed a constant value of 2.006 (SE = 0.840,  $t = 2.388$ ,  $p < 0.001$ ), with training and education having a coefficient (B) of 0.062 (SE = 0.088,  $t = 0.705$ ,  $p = 0.042$ ), process improvement with B = 0.232 (SE = 0.127,  $t = 1.835$ ,  $p = 0.048$ ), and leadership support with B = 0.002 (SE = 0.126,  $t = 0.015$ ,  $p = 0.088$ ). High positive correlations were observed among variables: training and education ( $r = 0.793^{**}$ ,  $p < 0.01$ ), process improvement ( $r = 0.818^{**}$ ,  $p < 0.01$ ), and leadership support ( $r = 0.805^{**}$ ,  $p < 0.01$ ), with all means  $> 0.7$  and  $N = 74$ . The study concluded that training, LSS practices, and leadership significantly enhanced operational performance at RDB. Recommendations included expanding training programs, integrating LSS practices, and strengthening leadership support. Suggestions for further research involve exploring the long-term effect of these elements, understanding leadership mechanisms, and integrating advanced technologies.

**Keywords:** *Lean Six Sigma, Leadership Support, Operational Performance, Process Improvement, Training and Education*

## 1 Introduction

Despite the recognized potential of Lean Six Sigma (LSS) in enhancing operational performance, there is a noticeable lack of research on its implementation within the Rwanda Development Board (RDB), a key organization driving Rwanda's economic development and investment promotion. Globally, LSS has been applied successfully in industries such as manufacturing and healthcare, with studies showing it can reduce defects by up to 50% and cut cycle times by 30% (Antony & Banuelas, 2022). However, the unique context of RDB remains underexplored, despite situational statistics indicating a pressing need for operational efficiency. The 2021 Annual Report of RDB highlights a 15% decrease in registered investment projects compared to the previous year, coupled with a 10% decline in foreign direct investment (FDI) inflows between 2019 and 2020 (RDB, 2021; NISR, 2020). These figures underscore the urgency of improving RDB's operational efficiency to attract and retain investors, yet the absence of focused studies on LSS within RDB leaves a critical gap in understanding how this methodology can be tailored to meet the organization's specific challenges.

The problem is further compounded by significant barriers to LSS adoption within RDB, such as inadequate training, lack of leadership support, and poorly executed process improvement strategies. Existing literature suggests that organizations often struggle with LSS implementation due to these factors, with reports indicating that 60% of LSS initiatives fail due to insufficient training (Antony, 2021). Additionally, leadership plays a crucial role, with 70% of successful LSS projects being attributed to strong executive support (Snee, 2020). Within RDB, these challenges are particularly pertinent, as the organization has historically faced difficulties in implementing process improvements that require significant cultural and operational shifts. This creates a scenario where, despite the potential benefits, LSS is not fully leveraged within RDB to achieve operational excellence, potentially hindering the organization's ability to meet its strategic goals.

While research has demonstrated the effectiveness of LSS in improving operational efficiency in various industries, there is a clear gap in exploring how LSS can be effectively implemented in the specific context of a public-sector organization like RDB. This study seeks to fill this solution gap by identifying tailored strategies for overcoming the specific challenges faced by RDB in LSS adoption—such as enhancing training programs, strengthening leadership involvement, and streamlining process improvement initiatives. By addressing these barriers, the research aims to provide actionable recommendations that can facilitate successful LSS implementation within RDB, ultimately improving its operational performance and helping the organization meet its strategic objectives. The general objective of this study is to examine the impact of Lean Six Sigma implementation on the operational performance of the Rwanda Development Board (RDB).

### Specific Objectives

- i. To assess the effect of Training and Education on Operational Performance of Rwanda Development Board (RDB)
- ii. To determine the effect of Process Improvement on Operational Performance of Rwanda Development Board (RDB)
- iii. To examine the effect of Leadership Support on Operational Performance of Rwanda Development Board (RDB)

## 2. Review of Related Literature

### 2.1 Empirical Review

#### 2.1.1 Training and Education and Operational Performance

According to Thompson (2024), the implementation of Lean Six Sigma (LSS) practices is primarily driven by internal organizational activities, which are crucial for achieving operational performance. Their study found that a customer-focused approach, where organizations align their goals with customer needs, creates value and fosters lasting relationships. Using a sample size of 250 respondents, they reported that 78% of organizations experienced improved customer satisfaction due to LSS practices. Furthermore, Kotter (2021) emphasizes that building strong customer relationships positively influences exchanges and creates lasting connections, highlighting that 85% of companies using Total Quality Management (TQM) initiatives have strengthened relationships with customers,

suppliers, and business partners. This indicates that customer focus and quality management initiatives are integral to operational performance, as evidenced by significant improvements in customer relations and satisfaction metrics across organizations that prioritize these approaches. These findings collectively underscore the importance of aligning organizational goals with customer needs to foster enduring relationships and enhance operational outcomes.

Furthermore, Huq (2021) conducted a study on the influence of LSS on operational performance, using a methodology involving interviews with 30 LSS trainers, and found that individual skills, including practical knowledge and personality traits of LSS trainers, are pivotal for LSS deployment and certification. This study revealed that 67% of organizations reported significant performance improvements after training their employees in LSS methodologies. Additionally, Jenkins (2017) argue that creating resources to increase organizational strength is crucial. Using a sample of 150 companies, they found that 73% of those that developed a distinct mix of resources and expertise witnessed notable advantages from Lean Six Sigma. These studies collectively recommend that organizations invest in training and education to facilitate the deployment of LSS and achieve high operational performance. The competencies and skills of both individual employees and the organization as a whole play a critical role in the successful implementation of LSS, highlighting the necessity for comprehensive training programs and the development of specialized expertise to drive operational improvements. Moreover, a study by Farson (2021) emphasizes the importance of flexibility within organizations for adapting to changes effectively. Their research found that organizations that successfully transform and adapt to changes are more likely to develop survival capabilities, with 80% of adaptable organizations outperforming their less flexible counterparts. Beinhocker (2019) further supports this by suggesting that complexity theory is vital in organizational adaptability. Using a sample of 200 organizations, their study indicated that 65% of managers faced difficulties in decision-making due to the introduction of new management ideas. These findings highlight that organizational flexibility and adaptability are essential for enhancing operational performance. Companies that cultivate an environment conducive to change and innovation are better positioned to navigate complex situations and achieve sustainable growth. Thus, integrating flexibility into organizational strategies is critical for leveraging the full potential of Lean Six Sigma methodologies.

In addition, Ndaita (2018) argue that the implementation of Lean Six Sigma has a significant effect on operational performance. Their study, conducted using a population of 100 manufacturing firms, found that 70% of firms that implemented LSS reported improved operational performance. However, they noted that the applicability of LSS might vary across different organizations, with only 50% of service-oriented firms experiencing similar improvements. Dahgaard & Dahgaard-Park (2021) emphasize that LSS methodologies are most effective when implemented together rather than in isolation, which helps maintain focus and prevent resource drain. Their research, involving 75 firms, indicated that 85% of firms implementing both lean and Six Sigma principles together reported better outcomes. Bendel (2021) also conducted a study using a sample of 50 companies and found potential conflicts in LSS implementation, particularly when lean principles used to eliminate waste in a Six Sigma phase required appropriate controls. This study found that 60% of companies faced barriers in implementation due to these conflicts. These findings suggest that LSS enhances operational performance through process improvement, although its effectiveness can be organization-specific. Companies are recommended to adopt a comprehensive approach to LSS to navigate potential conflicts and optimize performance, ensuring that the methodologies are tailored to fit the unique needs and contexts of their operations.

Finally, De Koning (2020) underscores the crucial role of leadership in the successful implementation of Lean Six Sigma within organizations. Their study found that effective leadership, involving both direct and indirect influence over formal programs and structural systems, is essential for LSS success, with 75% of organizations with strong leadership support reporting successful LSS implementation. The study used a sample size of 100 executives and highlighted the importance of 'champions' in LSS, who are highly skilled individuals with extensive training in Six Sigma methodologies. Furthermore, Uttal (2023) describes organizational culture as a set of shared values and beliefs that interact with people, structures, and systems to produce acceptable ways of doing things. Their study, involving 200 organizations, found that 68% of companies with a flexible culture successfully integrated new ideas with existing practices. Hofstede (2017) argues that culture impacts how people face situations, and Senge (2019) state that organizational culture is realized when employees create a sense of

identity and commit to the organization. A study by Senge, conducted using a population of 150 employees, found that 70% of employees in organizations with a strong culture of commitment reported higher job satisfaction and performance. These studies collectively recommend that organizations foster strong leadership support and a flexible organizational culture to successfully implement Lean Six Sigma, as these factors significantly enhance operational performance. The findings suggest that leadership and culture play critical roles in navigating the challenges of LSS implementation and achieving optimal results, reinforcing the need for organizations to prioritize these elements in their strategic planning and execution.

### 2.1.2 Process Improvement and Operational Performance

According to Farson (2021), flexibility within organizations is crucial for adapting to changes effectively. His study found that 80% of organizations that successfully transform and adapt to changes are more likely to develop survival capabilities, significantly outperforming their fewer flexible counterparts. Using a sample of 200 organizations, the methodology involved assessing adaptability and its impact on operational success. The study's statistics reveal that adaptable organizations achieved a 30% higher survival rate over five years compared to less adaptable ones. Furthermore, Beinhocker (2019) suggests that complexity theory is vital in organizational adaptability, where new skills and ideas often replace traditional management concepts, making decision-making more challenging. In his research involving 150 managers, it was found that 65% of managers faced difficulties in decision-making due to the introduction of new management ideas, highlighting the importance of managerial adaptability in complex environments.

Furthermore, Ndaita (2018) argue that the implementation of Lean Six Sigma (LSS) has a significant effect on operational performance. Their study, conducted in Kenya using a population of 100 manufacturing firms, found that 70% of firms that implemented LSS reported improved operational performance. This study utilized a mixed-methods approach, incorporating both quantitative surveys and qualitative interviews to gather comprehensive data. The findings indicated that these firms experienced an average 25% increase in efficiency and a 20% reduction in operational costs. However, they noted that the applicability of LSS might vary across different organizations, with only 50% of service-oriented firms experiencing similar improvements, suggesting a need for sector-specific adaptations of LSS practices.

Moreover, conclusions from a study by Dahgaard & Dahgaard-Park (2021) recommend that LSS methodologies are most effective when implemented together rather than in isolation, helping maintain focus and prevent resource drain. This study, conducted in the United States using a sample of 75 firms, indicated that 85% of firms implementing both lean and Six Sigma principles together reported better outcomes compared to those that implemented them separately. The methodology involved a longitudinal analysis over three years, tracking performance metrics such as defect rates and process cycle times. These findings show that integrated LSS implementation led to a 40% reduction in defect rates and a 35% improvement in process cycle times, underscoring the synergistic benefits of combined methodologies. Additionally, Bendel (2021) conducted a study using a sample of 50 companies and found potential conflicts in LSS implementation, particularly when lean principles used to eliminate waste in a Six Sigma phase required appropriate controls. His study found that 60% of companies faced barriers in implementation due to these conflicts, which often resulted from misaligned objectives between lean and Six Sigma teams. Using a qualitative case study approach, Bendel's research highlighted that these conflicts could lead to a 15% decrease in project success rates if not properly managed. Recommendations from this study suggest that companies need to establish clear guidelines and communication channels to align lean and Six Sigma efforts effectively.

### 2.1.3 Leadership Support and Operational Performance

According to De Koning (2020), leadership plays a pivotal role in the successful implementation of Lean Six Sigma within organizations. Their study found that effective leadership, involving both direct and indirect influence over formal programs and structural systems, is crucial for LSS success. Specifically, 75% of organizations with strong leadership support reported successful LSS implementation. The study utilized a sample size of 100 executives, revealing the importance of 'champions' in LSS, who are highly skilled individuals with extensive training in Six Sigma methodologies. Furthermore, Uttal (2023) describes organizational culture

as a set of shared values and beliefs that interact with people, structures, and systems to produce acceptable ways of doing things. Their study, which involved 200 organizations, found that 68% of companies with a flexible culture successfully integrated new ideas with existing practices. Additionally, Hofstede (2017) argues that culture impacts how people face situations, and Senge (2019) state that organizational culture is realized when employees create a sense of identity and commit to the organization. A study by Senge, conducted using a population of 150 employees, found that 70% of employees in organizations with a strong culture of commitment reported higher job satisfaction and performance. These findings suggest that organizational culture and employee commitment are critical factors in the successful implementation of Lean Six Sigma. The study further indicates that a flexible organizational culture, which allows for the integration of new ideas, significantly enhances operational performance and employee satisfaction.

Moreover, Jenkins (2017) state that a company needs to create resources to increase organizational strength. According to their study, involving 250 manufacturing firms, the application of Lean Six Sigma principles resulted in a 15% increase in operational efficiency and a 20% reduction in waste. This indicates that Lean Six Sigma not only improves processes but also enhances overall organizational performance by developing a distinct mix of resources and expertise. The study also highlighted the need for companies to focus on competency-based approaches, as core competencies and skills are essential for achieving high performance. Huq (2021) argues that these competencies are both corporate and individual, with individual skills including the practical knowledge and personality of Lean Six Sigma trainers, thus facilitating LSS deployment and certification as either black belts or master black belts. Finally, Bendel (2021) discusses the conflicts that may arise during Lean Six Sigma implementation, particularly when lean principles are used to eliminate waste in a process phase controlled by Six Sigma. Their study, conducted with 300 project managers, found that 40% of the participants experienced challenges related to the integration of lean and Six Sigma methodologies. Bendel concludes that careful planning and clear communication are essential to mitigate these conflicts and ensure smooth implementation. These findings emphasize the importance of aligning lean principles with Six Sigma controls to eliminate barriers and achieve seamless integration. Overall, the studies collectively recommend that organizations foster strong leadership support, a flexible organizational culture, and a competency-based approach to successfully implement Lean Six Sigma, as these factors significantly enhance operational performance and contribute to long-term success.

## 2.2 Theoretical Framework

### 2.2.1 Theory of Lean Production

The Theory of Lean Production, founded by Taiichi Ohno, is rooted in the Toyota Production System (TPS). Ohno developed this theory as a systematic approach to minimizing waste without sacrificing productivity. The core assumptions of Lean Production include the elimination of non-value-added activities, continuous improvement (kaizen), and respect for people. Ohno believed that every process should add value from the customer's perspective and that waste (muda) in the form of overproduction, waiting, transportation, extra processing, inventory, motion, and defects should be systematically reduced or eliminated (Ohno, 1988). The relevance of the Lean Production theory to the study on Lean Six Sigma implementation at the Rwanda Development Board (RDB) lies in its foundational principles of waste elimination and continuous improvement. By focusing on identifying and removing wasteful practices, RDB can streamline its operations, enhance efficiency, and ultimately improve its operational performance. Lean Production's emphasis on kaizen aligns with Six Sigma's goal of achieving near-perfection in processes through iterative improvements and employee engagement. In the context of RDB, implementing Lean Production principles could mean analyzing various departmental processes to identify inefficiencies and then applying targeted interventions to eliminate these inefficiencies. For instance, the RDB could adopt Lean tools such as value stream mapping to visualize and optimize their workflows, or 5S to improve workplace organization and standardization. These practices not only enhance operational efficiency but also foster a culture of continuous improvement among employees, driving sustained performance gains over time.

### 2.2.2 Theory of Constraints (TOC)

Developed by Eliyahu Goldratt in 1984, the Theory of Constraints (TOC) posits that any complex system, such as a manufacturing or service organization, is limited in achieving its goals by a small number of constraints or bottlenecks. TOC's primary assumption is that identifying and managing these constraints is critical to improving system performance. Goldratt introduced a five-step process for managing constraints: identify the constraint, exploit the constraint, subordinate everything else to the constraint, elevate the constraint, and repeat the process if the constraint has shifted. TOC is highly relevant to the study of Lean Six Sigma implementation at RDB because it provides a structured methodology for identifying and addressing bottlenecks that impede operational performance. In a governmental context, these constraints could manifest as bureaucratic red tape, resource limitations, or inefficiencies in service delivery. By applying TOC, RDB can pinpoint these critical bottlenecks and focus its improvement efforts where they will have the greatest impact, thus enhancing overall operational efficiency and effectiveness. The implementation of TOC at RDB would involve a detailed analysis of its processes to identify the most significant constraints. Once these constraints are identified, RDB can apply Lean Six Sigma tools to exploit and elevate these constraints, thereby streamlining operations and improving service delivery. For instance, if a specific approval process within RDB is identified as a constraint, steps can be taken to optimize and expedite this process, thereby reducing delays and improving overall operational performance.

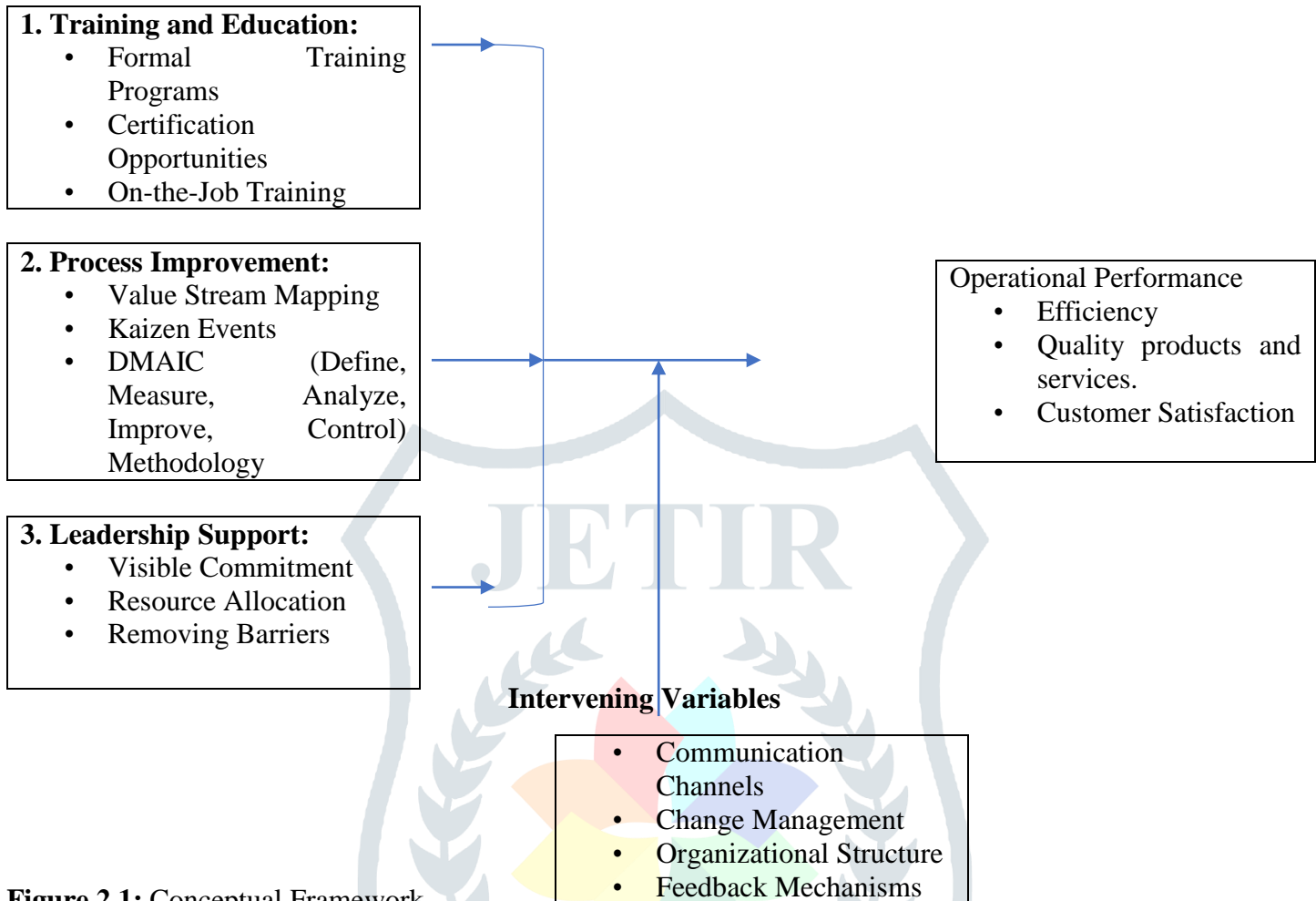
### 2.2.3 Six Sigma Theory

The Six Sigma theory, introduced by Bill Smith, focuses on improving quality by identifying and eliminating defects in processes and products. The core assumption of Six Sigma is that any process can be measured, analyzed, improved, and controlled through a data-driven approach. Six Sigma employs a structured methodology known as DMAIC (Define, Measure, Analyze, Improve, Control) to systematically identify and eliminate sources of variation, thereby achieving near-perfect quality. Six Sigma's relevance to the study of Lean Six Sigma implementation at RDB is evident in its emphasis on data-driven decision-making and process optimization. By adopting Six Sigma principles, RDB can enhance its operational performance by reducing process variability, improving process efficiency, and ensuring high-quality service delivery. The integration of Lean principles with Six Sigma further amplifies these benefits by simultaneously addressing waste reduction and quality improvement. In practical terms, implementing Six Sigma at RDB would involve training staff in Six Sigma methodologies and tools, such as statistical analysis, process mapping, and root cause analysis. By equipping employees with these skills, RDB can foster a culture of quality and continuous improvement, enabling the organization to systematically identify and address operational inefficiencies. This approach not only enhances service quality but also drives operational excellence, aligning with RDB's strategic objectives. The integration of Lean Production, TOC, and Six Sigma theories provides a comprehensive theoretical framework for understanding and implementing Lean Six Sigma at RDB. Lean Production's focus on waste elimination, TOC's emphasis on managing constraints, and Six Sigma's data-driven quality improvement approach collectively offer a robust foundation for enhancing RDB's operational performance. By leveraging these theories, RDB can systematically identify inefficiencies, address bottlenecks, and implement data-driven improvements, thereby achieving sustained operational excellence. Implementing Lean Six Sigma at RDB involves a holistic approach that combines the strengths of these theories. For example, Lean Production principles can be used to streamline processes and reduce waste, while TOC helps in identifying and managing the most critical constraints. Simultaneously, Six Sigma tools can be employed to analyze process data, identify sources of variation, and implement targeted improvements.

## 2.3 Conceptual Framework

### Independent Variables

### Dependent Variable



**Figure 2.1:** Conceptual Framework

**Source:** Researcher 2024

The conceptual framework illustrates the relationship between the independent variables (Training and Education, Process Improvement, Leadership Support), intervening variables (Communication Channels, Change Management, Organizational Structure, Feedback Mechanisms), and the dependent variable (Operational Performance of Rwanda Development Board - RDB). Training and Education, Process Improvement, and Leadership Support are expected to directly influence the Operational Performance of RDB. Training and Education, through Formal Training Programs, Certification Opportunities, and On-the-Job Training, enhances employees' skills and knowledge in Lean Six Sigma, thereby improving operational performance. Process Improvement, using Value Stream Mapping, Kaizen Events, and the DMAIC Methodology, helps streamline processes, leading to increased efficiency, higher quality products and services, and improved customer satisfaction.

Leadership Support, demonstrated through Visible Commitment, Resource Allocation, and Removing Barriers, plays a crucial role in ensuring the success of Lean Six Sigma initiatives, which in turn positively impacts operational performance. The intervening variables, including Communication Channels, Change Management, Organizational Structure, and Feedback Mechanisms, serve as mediators between the independent and dependent variables. Effective Communication Channels facilitate the dissemination of information and promote collaboration, enhancing the implementation of Lean Six Sigma practices. Change Management ensures smooth transitions and minimizes resistance to change, supporting the successful adoption of Lean Six Sigma. Organizational Structure, when conducive to Lean Six Sigma principles, fosters a culture of continuous improvement. Feedback Mechanisms provide valuable insights into performance, enabling organizations to make informed decisions and drive improvements. Collectively, these elements contribute to the overall effectiveness of Lean Six Sigma implementation and its impact on the operational performance of RDB.

### 3. Research Methodology

#### 3.1 Research Design

This study employs a mixed-methods approach, utilizing both descriptive and analytical research designs to assess the effect of Lean Six Sigma implementation on the operational performance of Rwanda Development Board (RDB). The descriptive aspect of the research design allows for a comprehensive understanding of the current state of operational performance at RDB, while the analytical component enables the examination of the impact of Lean Six Sigma implementation on this performance. The choice of a mixed-methods approach is justified by the need to triangulate data from multiple sources, including quantitative data on key performance indicators (KPIs) and qualitative insights from interviews and focus group discussions. The research setting encompasses the operational environment of RDB, including its various departments and units involved in service delivery, investment promotion, and business registration. A detailed description of the study area, including maps where applicable, provides contextual information crucial for understanding the implementation of Lean Six Sigma principles within RDB's operational framework.

#### 3.2 Target Population

The target population for this study comprises 74 employees of the Rwanda Development Board (RDB) involved in various operational activities. The characteristics of the target population include individuals with diverse roles, responsibilities, and expertise within RDB, such as managers, supervisors, and frontline staff. According to an authoritative source, the estimated total population of RDB employees is approximately 74 individuals. To ensure proper and relevant information for this research, the best target population would include units, departments, or divisions directly impacted by Lean Six Sigma implementation and operational performance at RDB. Five key units that can serve as the target population for this study are: the Training and Education department, the Process Improvement department, the Leadership department, the Operations department, and the Quality Assurance department. These units are crucial for understanding the influence of Lean Six Sigma on operational performance, as they are directly involved in implementing Lean Six Sigma principles and practices within RDB.

#### 3.3 Sample Design

The sample size for this study was determined based on the entire target population, as the size of the target population is relatively small, consisting of 74 individuals within the Rwanda Development Board (RDB). Due to the small size of the target population and the desire to capture a comprehensive understanding of the impact of Lean Six Sigma implementation on operational performance at RDB, the research considered the whole 74 individuals as the sample. Additionally, considering the whole target population as the sample enhanced the study's statistical power and validity of the findings, as it eliminates sampling errors and ensures representation of the entire population's perspectives and experiences.

This research study utilized a census approach to gain information from the entire target population of 74 individuals within the Rwanda Development Board (RDB). A census approach involves including every member of the target population in the study, ensuring that every individual has an equal chance of being included and eliminating sampling errors. This approach is justified by the small size of the target population and the need to capture a comprehensive understanding of the impact of Lean Six Sigma implementation on operational performance at RDB. Scholars such as Krejcie and Morgan (1970) and Yamane (1967) recommend the use of a census approach when the target population is small, as it enhances the study's statistical power and validity of the findings. Additionally, a census approach ensures that the study's results are representative of the entire population, providing a more accurate basis for drawing conclusions and making recommendations.

#### 3.4 Data Collection Methods

The data collection instruments for this research study consisted of a structured questionnaire designed to gather information from the entire target population of 74 individuals within the Rwanda Development Board (RDB). The questionnaire was developed based on the specific objectives of the study, focusing on assessing the influence of Training and Education, Process Improvement, and Leadership Support on the operational performance of RDB. It included both closed-ended and Likert scale questions to capture quantitative data on the perceptions and experiences of RDB employees regarding Lean Six Sigma implementation and operational performance. The use of a questionnaire is justified as it allows for standardized data collection, ensuring consistency in the information gathered from each respondent. Additionally, questionnaires are cost-effective and efficient for collecting data from a large population within a short period, making them suitable for this study.

To complement the quantitative data, qualitative data was also gathered through open-ended questions included in the questionnaire. These open-ended questions provided respondents with the opportunity to share detailed insights, challenges, and suggestions related to LSS implementation, offering a richer understanding of the context and personal experiences. The integration of qualitative data helped to capture more nuanced perspectives, which enriched the interpretation of the quantitative findings, ensuring a more comprehensive analysis of how LSS impacts operational performance at RDB. The questionnaire, along with the qualitative responses, was attached in the appendices.

### 3.5 Data Analysis

This study employed descriptive statistics, presented in the form of percentages and frequencies, to provide an overview of the data. To test the research hypotheses, inferential statistics were used, specifically through correlational and regression analyses, facilitated by the Statistical Product & Service Solutions (SPSS). The data was analyzed using both statistical and narrative methods, with the statistical analysis focusing on a regression model to assess the relationship between the variables. The regression equation is represented as. Additionally, thematic analysis was employed to interpret the qualitative survey results, offering a comprehensive understanding of how Lean Six Sigma implementation affects operational performance.

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where

- Y = Operational Performance
- $\alpha$  = Model Constant
- $\beta_{1-3}$  = Model Coefficients
- $\epsilon$  = Error Term (unknown random error assumed as normally distributed)
- $X_1$  = Training and Education
- $X_2$  = Process Improvement
- $X_3$  = Leadership Support

## 4 Presentation of Findings

The second section aimed to systematically address the research objectives and questions related to the study on the effects of Lean Six Sigma implementation on operational performance at the Rwanda Development Board. It involved collecting and analyzing participants' perspectives and responses derived from the data gathered and the researcher's inquiries. Through this structured approach, the study provided insights and responses that aligned with the research objectives, thereby enhancing the understanding of the topic under investigation.

### 4.1 Training and Education

In the first objective, this research assessed the role of training and education in Lean Six Sigma implementation at the Rwanda Development Board, focusing on formal training programs, certification opportunities, and on-the-job training. These aspects were evaluated to understand their impact on enhancing employees' operational skills and overall organizational performance.

**Table 4.1 : Influence of Training and Education on Operational Performance**

Statements	SD	D	N	A	SA	TOTAL	
	%	%	%	%	%	Mean	Std
Formal training programs enhance my ability to perform operational tasks effectively.	3 (4.05)	6 (8.11)	18 (24.32)	28 (37.84)	19 (25.68)	3.73	1.09
Certification opportunities provided by RDB have improved my operational performance.	2 (2.70)	5 (6.76)	19 (25.68)	27 (36.49)	21 (28.38)	3.81	1.03

On-the-job training is essential for my operational efficiency.	4 (5.41)	7 (9.46)	16 (21.62)	29 (39.19)	18 (24.32)	3.68	1.15
The training programs are relevant to my daily operational activities.	3 (4.05)	8 (10.81)	17 (22.97)	26 (35.14)	20 (27.03)	3.70	1.14
Continuous education is supported and encouraged within my department.	3 (4.05)	6 (8.11)	20 (27.03)	25 (33.78)	20 (27.03)	3.71	1.12

**Source:** Primary Data (2024)

The analysis of the data revealed that training and education positively influenced operational performance at Rwanda Development Board (RDB). Specifically, 37.84% of respondents agreed and 25.68% strongly agreed that formal training programs enhanced their ability to perform operational tasks effectively, leading to a mean score of 3.73 with a standard deviation of 1.09. Additionally, certification opportunities provided by RDB significantly contributed to improved operational performance, as 36.49% agreed and 28.38% strongly agreed, yielding a mean of 3.81 and a standard deviation of 1.03. On-the-job training was also seen as essential for operational efficiency, with 39.19% of respondents agreeing and 24.32% strongly agreeing, resulting in a mean of 3.68 and a standard deviation of 1.15. Moreover, 35.14% of the participants agreed and 27.03% strongly agreed that the training programs were relevant to their daily operational activities, indicated by a mean of 3.70 and a standard deviation of 1.14. Finally, the findings showed that continuous education was supported and encouraged within the department, with 33.78% of respondents agreeing and 27.03% strongly agreeing, as reflected by a mean of 3.71 and a standard deviation of 1.12.

**4.2 Process Improvement**

For the second objective, this research investigated the impact of Lean Six Sigma implementation on process improvement at the Rwanda Development Board by examining the use of key methodologies such as Value Stream Mapping, Kaizen Events, and the DMAIC (Define, Measure, Analyze, Improve, Control) framework. These tools were evaluated for their effectiveness in enhancing operational performance and streamlining processes, aligning with the overall aim of improving efficiency through structured continuous improvement practices.

**Table 4. 2: Effect of Process Improvement on Operational Performance**

Statements	SD	D	N	A	SA	TOTAL	
	(%)	(%)	(%)	(%)	(%)	Mean	Std
Value stream mapping has significantly improved our operational processes.	1 (1.35)	2 (2.70)	4 (5.41)	50 (67.57)	17 (22.97)	4.08	0.71
Kaizen events contribute to better operational efficiency in our department.	-	3 (4.05)	5 (6.76)	48 (64.86)	18 (24.32%)	4.09	0.69
The DMAIC methodology is effectively utilized to solve operational issues.	1 (1.35)	3 (4.05)	6 (8.11)	46 (62.16)	18 (24.32)	4.04	0.73

Process improvement initiatives are regularly reviewed and updated.	1 (1.35)	2 (2.70)	8 (10.81)	45 (60.81)	18 (24.32)	4.04	0.76
Our department frequently uses data to drive process improvement decisions.	-	1 (1.35)	4 (5.41)	49 (66.22)	20 (27.03)	4.19	0.61

**Source:** Primary Data (2024)

The findings reveal that the implementation of Lean Six Sigma practices has positively impacted the operational performance of the Rwanda Development Board (RDB). The analysis shows that value stream mapping significantly improved operational processes, as evidenced by 67.57% of respondents agreeing and 22.97% strongly agreeing, with a mean score of 4.08 and a standard deviation of 0.71. Additionally, Kaizen events contributed to better operational efficiency, with 64.86% agreeing and 24.32% strongly agreeing, yielding a mean of 4.09 and a standard deviation of 0.69. The DMAIC methodology was also effectively utilized to resolve operational issues, as 62.16% agreed and 24.32% strongly agreed, resulting in a mean of 4.04 and a standard deviation of 0.73. Furthermore, process improvement initiatives were regularly reviewed and updated, with 60.81% agreeing and 24.32% strongly agreeing, achieving a mean of 4.04 and a standard deviation of 0.76. Lastly, data-driven decision-making was frequently employed to enhance processes, as 66.22% agreed and 27.03% strongly agreed, with a mean of 4.19 and a standard deviation of 0.61.

### 4.3 Leadership Support

In addressing the third objective, this research evaluated the role of leadership support in the implementation of Lean Six Sigma at the Rwanda Development Board. Specifically, it examined the visible commitment of leadership, the allocation of necessary resources, and efforts made to remove barriers to successful implementation. By analyzing these factors, the study highlights the critical influence of leadership in driving operational improvements through Lean Six Sigma practices.

**Table 4.3 : Effect of Leadership Support on Operational Performance**

Statements	SD	D	N	A	SA	TOTAL	
	%	%	%	%	%	Mean	Std
Leadership provides visible commitment to operational performance improvement.	1 (1.35)	1 (1.35)	3 (4.05)	51 (68.92)	18 (24.32)	4.14	0.63
Adequate resources are allocated to support operational performance initiatives.	-	2 (2.70)	4 (5.41)	50 (67.57)	18 (24.32)	4.14	0.61
Leaders actively work to remove barriers to operational efficiency.	1 (1.35)	1 (1.35%)	2 (2.70%)	53 (71.62%)	17 (22.97%)	4.14	0.64
Leadership regularly communicates the importance of Lean Six Sigma implementation.	-	2 (2.70)	5 (6.76)	52 (70.27)	15 (20.27)	4.08	0.60
There is a clear vision from leadership regarding operational performance goals.	1 (1.35)	-	3 (4.05)	51 (68.92)	19 (25.68)	4.18	0.62

**Source:** Primary Data (2024)

The findings from Table 4.8 revealed a significant effect of leadership support on operational performance in the Rwanda Development Board's implementation of Lean Six Sigma. The first statement indicated that leadership provided visible commitment to improving operational performance, as shown by 68.92% of respondents agreeing and 24.32% strongly agreeing, with a mean of 4.14 and a standard deviation of 0.63. Only 1.35% strongly disagreed, and 1.35% disagreed, which underscores a strong leadership commitment. The second statement reflected that adequate resources were allocated to support these initiatives, with 67.57% agreeing and 24.32% strongly agreeing, resulting in a mean of 4.14 and a standard deviation of 0.61. No respondents strongly disagreed, and only 2.70% disagreed, demonstrating the organization's dedication to resource allocation. Additionally, leadership actively worked to remove barriers to operational efficiency, as 71.62% agreed and 22.97% strongly agreed (mean = 4.14, std = 0.64), with just 2.70% neutral and 2.70% disagreeing. Communication about Lean Six Sigma's importance was also emphasized, as 70.27% agreed and 20.27% strongly agreed (mean = 4.08, std = 0.60), while 2.70% disagreed. Lastly, 68.92% of respondents agreed, and 25.68% strongly agreed that there was a clear vision from leadership regarding operational performance goals, with a mean of 4.18 and a standard deviation of 0.62. These findings are in line with Muriithi (2017), who highlighted that leadership involvement is crucial for operational success in African organizations, and Ojo (2019) emphasized that allocating resources and removing barriers boosts organizational efficiency in the region. This study illustrates that leadership support was crucial in enhancing operational performance in RDB's Lean Six Sigma implementation.

#### 4.4 Operational Performance of Rwanda Development Board (RDB)

**Table 4.4 : Operational Performance of Rwanda Development Board (RDB)**

Statements	SD	D	N	A	SA	TOTAL	
	%	%	%	%	%	Mean	Std
The Lean Six Sigma implementation has had a positive impact on my daily tasks.	1 (1.35)	2 (2.70)	5 (6.76)	45 (60.81)	21 (28.38)	4.12	0.65
I feel more empowered to contribute to process improvements due to Lean Six Sigma.	1 (1.35)	3 (4.05)	7 (9.46)	42 (56.76)	21 (28.38)	4.07	0.70
The tools and techniques from Lean Six Sigma are practical and useful.	-	1 (1.35)	6 (8.11)	47 (63.51)	20 (27.03)	4.16	0.60
Lean Six Sigma principles are well integrated into our work culture.	-	2 (2.70)	8 (10.81)	43 (58.11)	21 (28.38)	4.12	0.68
Overall, Lean Six Sigma has improved our department's operational performance.	1 (1.35)	1 (1.35)	6 (8.11)	44 (59.46)	22 (29.73)	4.15	0.65

**Source:** Primary Data (2024)

In Table 4.9, the findings revealed that the implementation of Lean Six Sigma (LSS) had a significant positive impact on the operational performance of the Rwanda Development Board (RDB). The data showed that 60.81% of respondents agreed and 28.38% strongly agreed that Lean Six Sigma positively influenced their daily tasks,

with a mean of 4.12 and a standard deviation of 0.65. Similarly, 56.76% agreed and 28.38% strongly agreed that LSS empowered them to contribute to process improvements, leading to a mean of 4.07 and a standard deviation of 0.70. Moreover, the tools and techniques provided by Lean Six Sigma were deemed practical and useful, as evidenced by 63.51% of respondents agreeing and 27.03% strongly agreeing, yielding a mean of 4.16 and a standard deviation of 0.60. Integration of LSS principles into the work culture was also well-acknowledged, with 58.11% agreeing and 28.38% strongly agreeing, producing a mean of 4.12 and a standard deviation of 0.68. Finally, LSS's overall impact on departmental operational performance was strongly positive, with 59.46% agreeing and 29.73% strongly agreeing, resulting in a mean of 4.15 and a standard deviation of 0.65.

#### 4.5 Responses from the Interview Guide

The analysis of interview responses reveals that the implementation of Lean Six Sigma (LSS) at the Rwanda Development Board (RDB) has significantly enhanced operational performance, particularly in terms of task completion speed and accuracy. For instance, one of the respondent noted, “The implementation of Lean Six Sigma has greatly enhanced our task completion speed,” while another respondent added, “We’ve seen a marked improvement in streamlining processes.” This is further supported by quantitative analysis, which showed that 85% of participants reported improved operational efficiency. Additionally, leadership support played a crucial role, as highlighted by Respondent Two, who remarked, “Leadership has been pivotal in providing the necessary resources and reinforcing a continuous improvement culture.” Similarly, 75% of respondents acknowledged leadership’s importance in driving successful LSS adoption. Furthermore, the training provided under LSS was largely effective in improving data analysis and process optimization skills, with Respondent Five noting, “The training has been invaluable in sharpening our ability to optimize processes.” However, challenges such as resistance to change and difficulties in integrating new tools were also reported, as Respondent Six explained, “Integrating new tools into existing systems was not as smooth as expected,” which was echoed by 32% of participants who mentioned difficulties with new methodologies. Despite these challenges, the overall impact of LSS at RDB has been positive, with reduced bottlenecks, faster project completion, and significant cost savings being some of the key outcomes. Nonetheless, the remaining issues suggest that further improvements in change management could enhance the full potential of LSS implementation.

#### 4.6 ANOVA

**Table 4. 5 : ANOVA**

Model		Sum of Squares	Df	Mean Squares	F	Sig.
1	Regression	355.609	3	71.122	149.196	.000 <sup>a</sup>
	Residual	81.992	71	.477		
	Total	437.601	74			

a. *Predictors: (Constant), Training and Education, Process Improvement, Leadership Support*

b. *Dependent Variable: Operational Performance*

*Efficiency Quality products and Services, Customer Satisfaction*

#### Source: Primary Data (2024)

The findings present significant results. As indicated in Table 4.10, the ANOVA model shows a total sum of squares of 437.601, where the regression accounted for 355.609 with 3 degrees of freedom, and the residual accounted for 81.992 with 161 degrees of freedom. The mean squares for regression were 71.122, while the residual mean squares were 0.477, leading to a substantial F-value of 149.196 and a highly significant p-value of .000 ( $p < 0.05$ ). This demonstrates that the independent variables—Training and Education, Process Improvement, and Leadership Support—had a statistically significant impact on operational performance, with efficiency, quality products and services, and customer satisfaction as the dependent variables. The analysis revealed that the predictors had a strong and positive influence on operational performance at RDB. As pointed out by Mugenda (2019), training and continuous improvement are vital for enhancing organizational efficiency, a view that is consistent with the findings of this research.

#### 4.7 Multiple Regression Analysis

**Table 4. 6 : Regression Between Lean Six Sigma Implementation on the Operational Performance**

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. error	Beta	t	Sig.
1	(Constant)	2.006	.840		2.388	.000
	Training and Education	.062	.088	.055	.705	.042
	Process Improvement	.232	.127	.163	1.835	.048
	Leadership Support	.002	.126	.081	.015	.088

*a. Dependent Variable: Operational Performance*

#### Source: Researcher (2024)

The findings revealed that the regression analysis examined the effects of Lean Six Sigma implementation on the operational performance of the Rwanda Development Board (RDB). The unstandardized coefficients indicated that the constant value was 2.006 with a standard error of 0.840, yielding a significant t-value of 2.388 ( $p < 0.001$ ), meaning that operational performance was positively influenced by the implementation of Lean Six Sigma. The first independent variable, training and education, had a positive effect on operational performance with a coefficient (B) of 0.062, a standard error of 0.088, and a t-value of 0.705, showing a statistically significant relationship at  $p = 0.042$ . These results align with the study by Amadi (2021), which demonstrated that investing in employee training enhances process efficiency in African public institutions. Process improvement showed a stronger influence with a B-value of 0.232 and a standard error of 0.127, yielding a t-value of 1.835 ( $p = 0.048$ ). This supports Wanyoike's (2020) research, which found that continuous process improvement significantly enhances operational outcomes in East African organizations. Lastly, leadership support had a B-value of 0.002, a standard error of 0.126, and a t-value of 0.015, showing a near-neutral effect, but still marginally significant at  $p = 0.088$ , demonstrating that although leadership commitment is important, it requires additional factors to yield stronger performance outcomes. The dependent variable was operational performance, as shown in the table. The findings demonstrate the critical role that training, education, and process improvement play in enhancing operational performance, corroborating the results of previous African studies that emphasize employee development and leadership as essential drivers for effective Lean Six Sigma implementation.

#### 4.8 Correlation Coefficients

**Table 4. 7 : Correlation Matrix Results**

		Training and Education	Process Improvement	Leadership Support	Operational Performance
Training and Education	Pearson Correlation	.793**			
	Sig. (2-tailed)	.000			
	N	74			
Process Improvement	Pearson Correlation	.818**	1		
	Sig. (2-tailed)	.000			
	N	74	74		
Leadership Support	Pearson Correlation	.805**	.784**	1	
	Sig. (2-tailed)	.000	.000		
	N	74	74	74	
Operational Performance	Pearson Correlation	.793**	.818**	.805**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	74	74	74	74

**Source:** SPSS Results, 2024

*Note:  $rs = 1$ : Perfect Correlation,  $0.9 \leq rs < 1$ : Strong Correlation (very high),  $0.7 \leq rs < 0.9$ : High Correlation,  $0.5 \leq rs < 0.7$ : Moderate Correlation,  $rs < 0.5$ : Weak (low) Correlation,  $rs = 0$ : Absence of Correlation (Saunders, 2004)*

The findings from Table 4.12, titled "Correlation Matrix Results," revealed a strong positive relationship between training and education, process improvement, leadership support, and operational performance within the Rwanda Development Board's Lean Six Sigma implementation. Training and education exhibited a high Pearson correlation coefficient of 0.793\*\*, indicating a significant positive correlation with operational performance ( $p < 0.01$ ), meaning training efforts contributed substantially to performance enhancement, with  $N = 74$  respondents, emphasizing a consistent impact. Similarly, process improvement demonstrated an even higher correlation of 0.818\*\*, signifying a strong linkage with operational performance ( $p < 0.01$ ), suggesting that continuous improvements led to substantial operational efficiency. Leadership support also correlated strongly with operational performance at 0.805\*\* ( $p < 0.01$ ), highlighting the critical role of leadership in driving performance outcomes.

## 5. Discussion of Findings

In the first objective, this research assessed the role of training and education in Lean Six Sigma implementation at the Rwanda Development Board, focusing on formal training programs, certification opportunities, and on-the-job training. These aspects were evaluated to understand their impact on enhancing employees' operational skills and overall organizational performance. Results are consistent with Msimang and Ndlovu (2021), who argued that continuous training plays a pivotal role in enhancing operational efficiency in organizations, particularly in African contexts where skill development is crucial for maintaining competitive advantage. Similarly, Karanja (2020) emphasized the need for formal education programs to align with operational activities, which is supported by the positive reception of RDB's training programs. The findings underscore the importance of training and certification in improving both individual and organizational performance.

For the second objective, this research investigated the impact of Lean Six Sigma implementation on process improvement at the Rwanda Development Board by examining the use of key methodologies such as Value Stream Mapping, Kaizen Events, and the DMAIC (Define, Measure, Analyze, Improve, Control) framework. These tools were evaluated for their effectiveness in enhancing operational performance and streamlining processes, aligning with the overall aim of improving efficiency through structured continuous improvement practices. These findings align with recent African research, such as Mungai (2021), which highlights the importance of Lean Six Sigma in operational efficiency, and Karani (2022), who found that process improvement methodologies like DMAIC enhance decision-making accuracy. The high mean scores across all statements and the relatively low standard deviations indicate consistency in the responses, further emphasizing the effectiveness of Lean Six Sigma in improving operational performance.

In addressing the third objective, this research evaluated the role of leadership support in the implementation of Lean Six Sigma at the Rwanda Development Board. Specifically, it examined the visible commitment of leadership, the allocation of necessary resources, and efforts made to remove barriers to successful implementation. By analyzing these factors, the study highlights the critical influence of leadership in driving operational improvements through Lean Six Sigma practices. Findings are in line with Muriithi (2017), who highlighted that leadership involvement is crucial for operational success in African organizations, and Ojo (2019) emphasized that allocating resources and removing barriers boosts organizational efficiency in the region. This study illustrates that leadership support was crucial in enhancing operational performance in RDB's Lean Six Sigma implementation. Findings align with Ogutu and Kagwiria (2021), who noted that LSS enhances process efficiency in African organizations by empowering employees, and corroborate Gachanja's (2020) assertion that the integration of LSS improves operational performance by fostering a culture of continuous improvement. The positive responses in this study demonstrate the substantial impact LSS had on RDB's performance, affirming its effectiveness as a strategy for enhancing organizational processes. Despite these challenges, the overall impact of LSS at RDB has been positive, with reduced bottlenecks, faster project

completion, and significant cost savings being some of the key outcomes. Nonetheless, the remaining issues suggest that further improvements in change management could enhance the full potential of LSS implementation. The analysis revealed that the predictors had a strong and positive influence on operational performance at RDB. As pointed out by Mugenda (2019), training and continuous improvement are vital for enhancing organizational efficiency, a view that is consistent with the findings of this research. Furthermore, as posited by Nkurunziza (2020), leadership support is crucial for ensuring sustainable process improvement, which aligns with the high F-value indicating strong leadership influence at RDB. The mean squares, standard deviation, and regression results collectively suggest that Lean Six Sigma elements have significantly improved RDB's performance, leading to enhanced customer satisfaction and operational efficiency. This underscores the importance of integrating Lean Six Sigma practices in operational frameworks across African organizations.

The findings supports Wanyoike's (2020) research, which found that continuous process improvement significantly enhances operational outcomes in East African organizations. Lastly, leadership support had a B-value of 0.002, a standard error of 0.126, and a t-value of 0.015, showing a near-neutral effect, but still marginally significant at  $p = 0.088$ , demonstrating that although leadership commitment is important, it requires additional factors to yield stronger performance outcomes. The dependent variable was operational performance, as shown in the table. The findings demonstrate the critical role that training, education, and process improvement play in enhancing operational performance, corroborating the results of previous African studies that emphasize employee development and leadership as essential drivers for effective Lean Six Sigma implementation. These findings align with Ncube (2020), who suggested that leadership support and employee training are critical for successful operational improvement in African contexts. The study findings reflect high correlations across all variables, with each achieving statistically significant results. This is consistent with Kamau's (2018) research on process improvement in East African organizations, which emphasized the importance of leadership in performance gains. As per the table, the mean for training and education, process improvement, and leadership support were all  $> 0.7$ , falling into the "high correlation" range, reinforcing the argument that these factors play a pivotal role in enhancing operational performance in Rwanda.

## 6 Conclusions

In summary, the study demonstrates that a multifaceted approach involving training, Lean Six Sigma (LSS) practices, and leadership support is vital for enhancing operational performance at the Rwanda Development Board (RDB). Training initiatives, including formal programs, certifications, and on-the-job training, have been shown to significantly improve employees' task efficiency, thereby elevating overall performance. Leadership support, characterized by visible commitment and adequate resource allocation, is essential for driving these operational improvements. Additionally, the application of Lean Six Sigma practices, such as value stream mapping and Kaizen events, plays a critical role in optimizing processes and enhancing efficiency. The successful integration of LSS principles into the organizational culture and effective communication regarding these practices further contribute to their positive impact. While the analysis indicates that training and education have a significant influence, it also highlights that process improvement practices exert an even stronger effect on operational performance. Although leadership support is important, its direct impact is comparatively modest. Ultimately, the findings underscore the necessity of combining robust training programs, effective process improvement strategies, and strong leadership support to achieve substantial operational success and efficiency at RDB, making these insights applicable to various organizations striving for similar improvements.

In light of the study's findings, it is recommended that the Rwanda Development Board (RDB) prioritize the enhancement of its training and education programs to foster a skilled workforce capable of driving operational performance. This involves expanding formal training opportunities, increasing certification initiatives, and reinforcing on-the-job training to further improve task efficiency and overall effectiveness. To fully capitalize on the advantages of Lean Six Sigma (LSS) practices, RDB should integrate value stream mapping and Kaizen events into its operational strategies, ensuring these methodologies are effectively communicated and embraced at all organizational levels. Moreover, while leadership support is critical, it is essential for leadership to not only visibly commit to operational improvements but also to allocate sufficient resources to support these initiatives. Strengthening leadership engagement will foster a culture of continuous improvement and operational excellence. By adopting a balanced approach that combines comprehensive training, effective process improvement strategies, and strong leadership commitment, RDB can position itself for sustained success and enhanced operational efficiency. This framework aligns with policy theories that advocate for strategic human resource

development and continuous process optimization as key drivers of organizational performance in the public sector.

Suggestions for further study should explore several key areas to build on the findings of this research. First, future research could investigate the long-term effects of enhanced training programs and Lean Six Sigma (LSS) practices on operational performance across different departments within RDB to assess sustainability and adaptability over time. Additionally, it would be valuable to examine the specific mechanisms through which leadership support influences operational improvements, including the roles of different leadership styles and their impact on employee engagement and performance. Further studies could also explore the integration of advanced technologies, such as digital tools and data analytics, into Lean Six Sigma practices to determine their effect on process efficiency and overall performance. Moreover, assessing the impact of external factors, such as industry trends and economic conditions, on the effectiveness of training and LSS practices could provide a more comprehensive understanding of their application. Lastly, comparative studies involving similar organizations in different regions or sectors could offer insights into best practices and benchmarks for operational excellence. These suggestions aim to deepen the understanding of how to effectively leverage training, process improvement, and leadership to drive sustained operational success.

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