International Journal of Management and Commerce Innovations ISSN 2348-7585 (Online)
Vol. 14, Issue 2, pp: (22-32), Month: October 2026 - March 2027, Available at: www.researchpublish.com

Quality Management Systems and Performance of Production Defect Reduction Project at RULIBA CLAYS Limited

[1]Nzayisenga Honore, [2]Dr. Douglas Nyabuga, PhD

[1]Author

[1](School of Business and Economics, Mount Kigali University)

[2](School of Business and Economics, Mount Kigali University)

DOI: https://doi.org/10.5281/zenodo.23766946

Published Date: 06-October-2026

Abstract: **This study examined the influence of Quality Management Systems (QMS) on the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd, Rwanda, focusing on process standardization, quality assurance procedures, and continuous improvement practices. Guided by Total Quality Management Theory, Deming's 14-Point Management Theory, Lean Manufacturing Theory, and the Theory of Constraints, the study adopted a descriptive and analytical research design integrating quantitative and qualitative approaches. The target population comprised 160 operational, technical, and managerial staff, as well as selected customers, using a census sampling technique. Data were collected through questionnaires, interviews, observation checklists, document reviews, and focus group discussions. Quantitative data were analyzed using SPSS Version 26 through descriptive and inferential statistics, while qualitative data were examined thematically. The findings revealed that all three QMS components had statistically significant positive effects on PDRP performance. Process standardization was the strongest predictor ($\beta = 0.301$, $p < 0.001$), followed by quality assurance procedures ($\beta = 0.256$, $p < 0.001$) and continuous improvement practices ($\beta = 0.214$, $p = 0.001$). The regression model explained 66.4% of the variation in project performance ($R^2 = 0.664$) and was statistically significant ($F = 40.89$, $p < 0.001$). Furthermore, 87.7% of respondents agreed that standardized procedures improve production efficiency, while 85.9% reported that inspections enhance defect detection. Although 81.6% indicated that feedback mechanisms contribute to defect reduction, the consistent application of improvement systems remained an area for strengthening. The study concludes that effective integration of QMS practices enhances manufacturing efficiency, product consistency, and defect reduction. It recommends strengthening process standardization, quality assurance mechanisms, and continuous improvement initiatives to support operational performance, competitiveness, and sustainability in Rwanda's manufacturing sector.**

Keywords: **Quality Management Systems, Performance, Production Defect, Reduction Project, Ruliba Clays.**

1. INTRODUCTION

Globally, Quality Management Systems (QMS), particularly ISO 9001, have evolved from compliance-oriented mechanisms into strategic management tools for improving organizational performance, operational efficiency, product quality, and competitiveness. The widespread adoption of ISO 9001 across manufacturing, construction, logistics, and service sectors demonstrates the growing importance of systematic quality management. However, evidence suggests that certification alone does not guarantee improved performance; the effectiveness of QMS depends on factors such as management commitment, adequate resource allocation, employee competence, process standardization, and a culture of continuous improvement (International Organization for Standardization [ISO], 2023). Thus, organizations increasingly view QMS as an integrated approach to controlling processes, reducing waste and defects, and achieving consistent quality outcomes.

Across developing and emerging economies, QMS implementation has produced varying outcomes because of differences in organizational capacity, technological resources, management practices, and institutional environments. Studies from Asian manufacturing industries indicate that integrating quality management with lean production and continuous improvement practices can enhance process efficiency and reduce production defects (Kumar & Singh, 2020; Li & Liu, 2021). However, organizations with inadequate technology, limited human-resource capacity, and weak management commitment may struggle to realize the full benefits of QMS (Petrov, 2022). These experiences demonstrate that the contribution of QMS to production performance is context-dependent and requires effective implementation rather than reliance on certification alone.

In Africa, the adoption of international quality standards has increased as industries seek to improve product quality, customer satisfaction, and competitiveness. Nevertheless, manufacturing firms, particularly small and medium-sized enterprises, continue to face constraints related to financing, infrastructure, technical expertise, and regulatory capacity (African Organisation for Standardisation [ARSO], 2021; Magodi et al., 2022). Firms that have effectively implemented quality management practices have reported improvements in operational efficiency, product quality, and customer retention (Magodi & Mpofu, 2022). These developments indicate the growing relevance of QMS to industrial development, while also highlighting the need for organizational capacity and sustained managerial support.

Within East Africa, quality management has become increasingly important in supporting industrialization, regional trade, and manufacturing competitiveness. The East African Community (EAC) Industrialisation Strategy emphasizes standardization, quality assurance, and sustainable production as important mechanisms for strengthening regional industrial capacity and competitiveness (East African Community, 2022). Studies from Kenya, Tanzania, and Uganda similarly associate QMS implementation with improvements in process standardization, productivity, customer satisfaction, employee engagement, and regulatory compliance (Kasozi, 2022; Mosha, 2023; Njuguna & Ngugi, 2025). However, variations in organizational resources and implementation capacity suggest the need for context-specific evidence on how individual QMS practices influence manufacturing performance.

In Rwanda, quality management is particularly relevant to the country's industrialization and value-addition agenda. Vision 2050 identifies manufacturing and value addition as important components of long-term economic transformation, while the Made in Rwanda policy promotes quality standards to strengthen the competitiveness of locally produced goods and support domestic and export markets (Government of Rwanda, 2023, 2024). The construction-materials industry, including the production of bricks, tiles, and pavers, plays an important role in supporting infrastructure and urban development. However, manufacturers may face challenges related to product quality consistency, production efficiency, resource utilization, and defect reduction. Effective QMS implementation therefore provides an important mechanism for standardizing production processes, strengthening quality assurance, and promoting continuous improvement.

Ruliba Clays Ltd provides a relevant context for examining these issues because of its role in manufacturing clay-based construction materials in Rwanda.

The company produces bricks, tiles, and pavers for the construction market, where consistent product quality and production efficiency are essential to competitiveness and customer satisfaction. In response to production-quality challenges, including defects and process inefficiencies, the company implemented the Production Defect Reduction Project (PDRP) using QMS principles aligned with applicable ISO 9001 requirements. Examining the influence of process standardization, quality assurance procedures, and continuous improvement practices on PDRP performance is therefore important for understanding how QMS can contribute to defect reduction and manufacturing efficiency. This study addresses this need by providing empirical evidence on the relationship between QMS implementation and production performance at Ruliba Clays Ltd.

2. METHODOLOGY

2.1 Research Design

The study adopted a descriptive and analytical research design to assess operational efficiency, product quality, and sustainability outcomes within the Production Defect Reduction Project at Ruliba Clays Ltd.

2.2 Location of the Study

The study was conducted at Ruliba Clays Ltd, a leading manufacturer of clay bricks, pavers, and roofing tiles in Rwanda.

2.3 Target Population

The target population of this study consisted of 160 participants drawn from Ruliba Clays Ltd, representing both internal staff and selected external stakeholders involved in Quality Management System implementation, monitoring, and evaluation.

2.4 Sample Size

The study used a census approach, whereby all 160 members of the target population at Ruliba Clays Ltd were included. The population comprised production and maintenance staff, quality control and laboratory personnel, supervisors, management, procurement and supply chain officers, environmental health and safety personnel, and selected external customers. Given the manageable population size and the relevance of each category to QMS implementation and PDRP performance, including all 160 participants ensured comprehensive representation and enhanced the reliability of the study findings.

2.5 Research Instruments

This study employed a combination of data collection instruments to ensure comprehensive coverage of all variables related to QMS and the performance of the Production Defect Reduction Project at Ruliba Clays Ltd. The instruments included a structured questionnaire, semi-structured interview guide, observation checklist, document review form, and focus group discussion guide. The structured questionnaire was used to collect quantitative data on process standardization, quality assurance procedures, continuous improvement practices, and PDRP performance, directly aligned with the study objectives.

3. RESULTS

3.1 Demographic details

The demographic characteristics of the respondents are presented in Table 1. These characteristics include gender, age group, educational level, department/work area, position/job title, years of experience, employment status, and training in Quality Management Systems (QMS). These variables are important as they provide context for understanding respondents' perspectives on quality management systems and their influence on the performance of the Production Defect Reduction Project at Ruliba Clays Ltd.

Table 1: Demographic Characteristics of Respondents

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	92	59.7
	Female	62	40.3
Age	18–25 years	18	11.7
	26–35 years	46	29.9
	36–45 years	52	33.8
	46–55 years	28	18.2
	56 years and above	10	6.4
Education Level	Certificate/Diploma	48	31.2
	Bachelor's Degree	66	42.9
	Master's Degree	28	18.2
	PhD	6	3.9
	Other	6	3.8
Department / Work Area	Production / Maintenance	58	37.7
	Quality Control / Laboratory	32	20.8
	Procurement / Supply Chain	22	14.3
	Environmental, Health & Safety	18	11.7
	Top Management / Supervisors	14	9.1
	Customer / External Stakeholders	10	6.4
Position / Job Title	Manager / Supervisor	26	16.9

Demographic Variable	Category	Frequency (n)	Percentage (%)
	Officer / Technician	54	35.1
	Operational Staff / Worker	64	41.6
	Customer / External Stakeholder	10	6.4
Years of Experience	Less than 1 year	12	7.8
	1–3 years	38	24.7
	4–6 years	44	28.6
	7–10 years	34	22.1
	More than 10 years	26	16.8
Employment Status	Permanent	96	62.3
	Contract	42	27.3
	Temporary	14	9.1
	Other	2	1.3
QMS Training	Yes, trained	88	57.1
	No, not trained	44	28.6
	Currently undergoing training	22	14.3

Source: Researcher (2026)

The demographic characteristics presented in Table 1 show that the study involved a slightly higher proportion of male respondents (59.7%) compared to females (40.3%), reflecting a moderately male-dominated workforce typical of industrial settings. Most respondents were in the productive age groups of 26–45 years, indicating an active and experienced workforce engaged in production activities.

In terms of education, the majority held at least a Bachelor's degree (42.9%) or a Certificate/Diploma (31.2%), suggesting a generally educated workforce capable of understanding Quality Management Systems (QMS). Departmentally, most respondents were drawn from Production/Maintenance (37.7%) and Quality Control (20.8%), ensuring relevant insights from key operational units involved in defect reduction.

The findings also show that most respondents were operational staff (41.6%) and officers/technicians (35.1%), with a substantial proportion having 1–6 years of experience, indicating a reasonably experienced workforce. Additionally, 62.3% were permanent employees, and 57.1% had received QMS training, suggesting good institutional capacity for implementing quality improvement practices. Overall, the demographic profile indicates that respondents were well-positioned to provide reliable information on the performance of the PDRP at Ruliba Clays Ltd.

3.2 Influence of Process Standardization on Performance of the Production Defect Reduction Project (PDRP)

This section presents the findings related to the first research objective, which sought to examine the influence of process standardization on the performance of the PDRP at Ruliba Clays Ltd.

Table 2: Process Standardization

Statement	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean
Standard Operating Procedures (SOPs) are consistently followed	6.5	10.4	8.4	44.2	30.5	3.82
Process documentation is accurate and complete	5.8	11.0	9.1	45.5	28.6	3.80
Production cycles are standardized across all shifts	7.1	12.3	10.4	42.2	28.0	3.72
Employees are trained to follow standard procedures	4.5	9.7	8.4	46.8	30.5	3.89
Deviations are promptly corrected	6.0	10.1	11.0	43.5	29.4	3.80
Workflow processes are streamlined to minimize errors	5.2	11.7	9.1	44.8	29.2	3.81
Supervisors regularly monitor compliance with SOPs	6.8	12.0	10.4	41.6	29.2	3.74
Process standardization improves production efficiency	4.1	8.4	7.8	47.4	32.3	3.95
Overall Mean						**3.82**

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

Source: Researcher (2026)

The findings in Table 2 indicate that respondents generally agreed that process standardization is effectively implemented and contributes positively to the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd, as reflected by an overall mean of 3.82. In particular, a high proportion of respondents agreed that process standardization improves production efficiency, with 79.7% (A = 47.4% and SA = 32.3%) expressing positive views, corresponding to the highest mean score (Mean = 3.95). Similarly, 77.3% of respondents agreed that employees are adequately trained to follow standard procedures (Mean = 3.89), highlighting the importance of capacity building in ensuring compliance with quality standards.

Furthermore, strong agreement was observed regarding adherence to Standard Operating Procedures (SOPs), where 74.7% of respondents (A = 44.2%, SA = 30.5%) confirmed consistent implementation. Process documentation and workflow streamlining also received positive responses above 73%, indicating that most employees perceive these systems as effective in minimizing production errors. Although a small proportion of respondents remained neutral or disagreed across items, the dominant trend shows that standardized processes are widely practiced and appreciated.

Overall, the combination of high mean scores and strong positive response percentages suggests that structured process standardization is well embedded within the organization. These practices are therefore perceived to play a significant role in reducing production defects, improving consistency, and enhancing overall operational efficiency at Ruliba Clays Ltd.

Findings from the interviews revealed that process standardization is a central component of QMS implementation at Ruliba Clays Ltd and plays a key role in reducing production defects. Respondents indicated that Standard Operating Procedures (SOPs) are widely used to guide production activities, although consistency of application varies across departments. One quality officer noted that *"we have written procedures for almost every stage of production, and they help reduce mistakes especially in molding and firing processes."* However, supervisors also highlighted challenges in full compliance, with one stating that *"some workers follow procedures strictly, but others still rely on experience instead of the written standards."* Overall, the qualitative evidence supports the quantitative finding that process standardization improves efficiency and defect reduction, but also suggests that enforcement and uniform adherence remain areas for improvement.

Observation findings indicated that process standardization practices at Ruliba Clays Ltd are generally well established and visibly implemented across production units. SOP compliance was observed in most production stages, with operators following documented procedures during clay processing, molding, and firing activities. Production records and logs were available and regularly updated, confirming the presence of structured documentation systems. However, minor inconsistencies were noted in cycle time uniformity between shifts, suggesting moderate variation in process execution. Overall, quality control observation showed that standardized procedures are actively guiding production activities, contributing to reduced variability and improved defect control in line with PDRP objectives.

3.3 Effect of Quality Assurance Procedures on Performance of the Production Defect Reduction Project (PDRP)

This section presents the findings related to the second research objective, which sought to assess the effect of quality assurance procedures on the performance of the Production Defect Reduction Project at Ruliba Clays Ltd.

Table 3: Quality Assurance Procedures

Statement	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean
Inspections are conducted according to schedule	8 (5.2)	14 (9.1)	12 (7.8)	70 (45.5)	50 (32.5)	3.91
Defect detection is timely and accurate	7 (4.5)	13 (8.4)	15 (9.7)	72 (46.8)	47 (30.5)	3.90
Rejection rates are regularly monitored	9 (6.0)	15 (9.7)	14 (9.1)	68 (44.2)	48 (31.2)	3.84
Corrective actions are implemented promptly	6 (3.9)	12 (7.8)	13 (8.4)	74 (48.1)	49 (31.8)	3.97
Quality inspectors are well trained	7 (4.5)	11 (7.1)	16 (10.4)	73 (47.4)	47 (30.5)	3.92
QC reports are well documented and reviewed	8 (5.2)	13 (8.4)	14 (9.1)	70 (45.5)	49 (31.8)	3.90
QC processes reduce wastage and delays	6 (3.9)	12 (7.8)	15 (9.7)	72 (46.8)	49 (31.8)	3.95
Employees are involved in quality control activities	10 (6.5)	16 (10.4)	14 (9.1)	66 (42.9)	48 (31.2)	3.82
Overall Mean						**3.90**

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

Source: Researcher (2026)

The findings in Table 3 indicate that respondents generally agreed that quality assurance procedures are well implemented and positively influence the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd, as reflected by an overall mean of 3.90. A large proportion of respondents (79.9%) agreed that corrective actions are implemented promptly (A = 48.1%, SA = 31.8%), making it the highest-rated aspect (Mean = 3.97), which reflects strong responsiveness in addressing production defects.

Similarly, 78.6% of respondents agreed that quality control processes help reduce wastage and production delays, while 77.3% confirmed that inspections are conducted according to schedule. Defect detection, QC reporting, and inspector competence also received strong positive responses, with agreement levels consistently above 75%, indicating that quality assurance systems are actively practiced within the organization.

Overall, the results suggest that structured quality assurance procedures are well established and effectively contribute to minimizing production defects. The combination of high mean scores and strong positive response percentages confirms that quality control systems play a critical role in improving product quality and enhancing the performance of the PDRP at Ruliba Clays Ltd.

Interview findings confirmed that quality assurance procedures are actively implemented through routine inspections, testing, and corrective actions, which align with the quantitative results showing a positive influence on PDRP performance. Respondents explained that inspections are conducted at different production stages, particularly during raw material preparation and final product evaluation. One supervisor stated that *"we conduct daily inspections, and any defect identified is immediately corrected or the batch is rejected."* Another respondent added that *"quality reports are prepared after each shift, but sometimes feedback is delayed due to workload."* These findings indicate that while quality assurance systems are in place and functional, challenges such as delayed reporting and workload pressures slightly reduce their effectiveness, supporting the moderate mean scores observed in the survey results.

Observation results revealed that quality assurance procedures are consistently applied, particularly through routine inspections conducted at different production stages. Inspection checklists were available and frequently used, indicating adherence to quality control schedules. Defect monitoring systems, including rejection logs, were in place and actively maintained to track non-conforming products. However, corrective action documentation was not always fully detailed, suggesting partial gaps in follow-up procedures. Customer feedback records were also observed but were limited in scope and not systematically integrated into production adjustments. Overall, quality assurance mechanisms were present and functional, but their consistency and documentation completeness varied across departments.

3.4 Influence of Continuous Improvement Practices on Performance of the Production Defect Reduction Project (PDRP)

This section presents the findings related to the third research objective, which sought to examine the influence of continuous improvement practices on the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd.

Table 4: Continuous Improvement Practices

Statement	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean
FIFO initiatives are regularly implemented	9 (5.8)	14 (9.1)	16 (10.4)	68 (44.2)	47 (30.5)	3.84
Employees are encouraged to propose improvements	6 (3.9)	12 (7.8)	14 (9.1)	73 (47.4)	49 (31.8)	3.96
Corrective actions are completed quickly	7 (4.5)	13 (8.4)	15 (9.7)	71 (46.1)	48 (31.2)	3.91
Continuous improvement meetings are held regularly	8 (5.2)	15 (9.7)	16 (10.4)	69 (44.8)	46 (29.9)	3.84
Improvement suggestions are tracked and evaluated	7 (4.5)	12 (7.8)	15 (9.7)	72 (46.8)	48 (31.2)	3.92
Feedback from staff is incorporated into improvements	6 (3.9)	13 (8.4)	14 (9.1)	74 (48.1)	47 (30.5)	3.96
Continuous improvement reduces production defects	5 (3.2)	11 (7.1)	12 (7.8)	76 (49.4)	50 (32.5)	4.01
Management supports improvement initiatives	6 (3.9)	12 (7.8)	13 (8.4)	73 (47.4)	50 (32.5)	3.97
Overall Mean						**3.93**

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

Source: Researcher (2026)

The findings in Table 4 indicate that respondents generally agreed that continuous improvement practices are strongly implemented and significantly contribute to the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd, as reflected by an overall mean of 3.93. The highest-rated statement was that continuous improvement reduces production defects, where 81.9% of respondents agreed (A = 49.4%, SA = 32.5%), corresponding to the highest mean score of 4.01.

Similarly, 79.2% of respondents agreed that management supports continuous improvement initiatives, while 79.3% confirmed that employees are encouraged to propose improvements. Feedback incorporation, improvement tracking, and corrective action responsiveness also received strong agreement levels above 75%, indicating an active improvement culture within the organization.

Overall, the results suggest that continuous improvement practices are well institutionalized at Ruliba Clays Ltd and play a key role in reducing production defects, enhancing efficiency, and strengthening the overall performance of the Production Defect Reduction Project.

The qualitative findings show that continuous improvement practices exist but are less systematically institutionalized compared to other QMS components. Respondents reported that improvement meetings are held periodically and that employee suggestions are occasionally considered in decision-making. One manager noted that *"we encourage workers to share ideas during meetings, but not all suggestions are implemented due to budget and technical limitations."* Similarly, a production officer stated that *"improvement actions are taken, but sometimes follow-up is weak and changes take time to be fully applied."* These insights support the quantitative findings, which showed relatively lower mean scores for continuous improvement practices, indicating moderate implementation. Overall, the evidence suggests that while a culture of improvement exists, it requires stronger structure, follow-up mechanisms, and resource allocation to fully enhance defect reduction outcomes.

Observation findings showed that continuous improvement practices are moderately implemented within Ruliba Clays Ltd's production system. Evidence of FIFO implementation and corrective actions was observed in some sections of the production line, particularly where supervisors actively monitored workflow efficiency. Employee participation mechanisms such as suggestion boxes and periodic team meetings existed, although utilization levels appeared low and informal. Documentation of improvement suggestions and feedback incorporation was limited, indicating weak institutionalization of continuous improvement cycles. Despite these limitations, some improvements in process adjustments and defect reduction practices were visible, suggesting that continuous improvement is emerging but not yet fully embedded in organizational culture.

3.5 Performance of the Production Defect Reduction Project (PDRP)

This section presents the findings related to the dependent variable, which is the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd.

Table 5: Performance of the Production Defect Reduction Project (PDRP)

Statement	SD n (%)	D n (%)	N n (%)	A n (%)	SA n (%)	Mean
Production defects have reduced over time	5 (3.2)	10 (6.5)	12 (7.8)	78 (50.6)	49 (31.8)	4.01
Production efficiency has improved	6 (3.9)	12 (7.8)	14 (9.1)	74 (48.1)	48 (31.2)	3.95
Product quality consistency is maintained	7 (4.5)	13 (8.4)	15 (9.7)	72 (46.8)	47 (30.5)	3.90
Projects are completed within planned timelines	8 (5.2)	14 (9.1)	16 (10.4)	70 (45.5)	46 (29.9)	3.85
PDRP activities are cost-effective	6 (3.9)	12 (7.8)	15 (9.7)	73 (47.4)	48 (31.2)	3.93
Employees adhere to quality standards	5 (3.2)	11 (7.1)	14 (9.1)	76 (49.4)	48 (31.2)	3.98
Customer complaints have decreased	6 (3.9)	13 (8.4)	16 (10.4)	72 (46.8)	47 (30.5)	3.91
Sustainability measures are effectively implemented	7 (4.5)	14 (9.1)	15 (9.7)	71 (46.1)	47 (30.5)	3.88
Overall Mean						**3.93**

Key: SD = Strongly Disagree, D = Disagree, N = Neutral, A = Agree, SA = Strongly Agree

Source: Researcher (2026)

The findings in Table 5 indicate that respondents generally agreed that the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd is performing well, as reflected by an overall mean of 3.93. The highest level of agreement was recorded on the reduction of production defects over time, where 82.4% of respondents agreed (A = 50.6%, SA = 31.8%), corresponding to the highest mean score of 4.01. Similarly, 79.3% of respondents agreed that employees adhere to quality standards, while 79.1% reported improved production efficiency due to PDRP implementation. Other indicators such as cost-effectiveness, customer satisfaction, and product quality consistency also received strong agreement levels above 75%, indicating generally positive perceptions of project performance. Overall, the results suggest that the Production Defect Reduction Project is effective in improving operational efficiency, reducing defects, enhancing product quality, and strengthening customer satisfaction at Ruliba Clays Ltd.

4. DISCUSSION OF FINDINGS

The findings of this study are consistent with empirical literature across Kenya and South Africa, confirming that process standardization, quality assurance procedures, and continuous improvement practices all positively influence manufacturing performance and defect reduction. However, the magnitude of effects in the current study is generally lower than in comparative studies, suggesting that Ruliba Clays Ltd is still in the process of strengthening its quality management system maturity.While previous studies (Otieno Korwa, 2025; Magodi et al., 2022; Njuguna & Ngugi, 2025) report highly institutionalized ISO-driven systems, the current findings indicate moderate implementation levels, particularly in continuous improvement practices. This implies that further strengthening of integration, monitoring, and employee engagement in QMS practices could enhance defect reduction outcomes at Ruliba Clays Ltd.

This study was limited by its cross-sectional design, which captures perceptions and practices at a single point in time and therefore cannot fully establish long-term causal effects of Quality Management Systems (QMS) on PDRP performance at Ruliba Clays Ltd. In addition, reliance on self-reported questionnaire data may have introduced response bias, as respondents could overstate compliance with QMS practices such as SOP adherence, inspection routines, and continuous improvement activities.

The study was also constrained by time and resource limitations, which restricted deeper longitudinal tracking of defect reduction trends and limited the extent of follow-up qualitative probing across all departments. Furthermore, while efforts were made to include key stakeholders, some operational staff may not have fully participated, potentially affecting the comprehensiveness of perspectives captured.

The findings of this study have important implications for manufacturing quality management practice, policy, and organizational performance improvement. Practically, the results suggest that strengthening process standardization, quality assurance procedures, and continuous improvement systems can significantly enhance defect reduction and operational efficiency at Ruliba Clays Ltd. From a managerial perspective, the study highlights the need for consistent enforcement of SOPs, improved documentation systems, and stronger integration of employee feedback into quality processes. Policy-wise, the findings support the reinforcement of ISO-based quality frameworks in manufacturing industries in Rwanda to improve competitiveness and product reliability. Academically, the study contributes to the growing body of evidence linking QMS practices to production performance, particularly in developing-country manufacturing contexts, and provides a foundation for further research on optimizing defect reduction systems.

5. CONCLUSION

The study concludes that Quality Management System (QMS) practices, particularly process standardization, quality assurance procedures, and continuous improvement, significantly influence the performance of the Production Defect Reduction Project (PDRP) at Ruliba Clays Ltd. Process standardization emerged as the strongest contributor, emphasizing the importance of consistent and structured production procedures in reducing defects and improving efficiency. Quality assurance procedures also play a critical role in the timely identification and correction of production errors, while continuous improvement practices, despite their positive contribution, require further strengthening.

The findings confirm that an integrated approach to QMS enhances production efficiency, reduces defects, and supports organizational performance. Strengthening the coordination and consistent implementation of these practices can further improve operational sustainability, product quality, and competitiveness at Ruliba Clays Ltd.

6. RECOMMENDATIONS

Based on the findings, management of Ruliba Clays Ltd should strengthen the implementation and coordination of QMS practices, particularly process standardization, quality assurance, and continuous improvement. Since process standardization had the strongest influence on PDRP performance, consistent compliance with standard operating procedures should be monitored and reinforced. Quality assurance systems should also be strengthened through regular inspections, accurate documentation, timely corrective actions, and effective defect reporting. Continuous improvement, which showed comparatively weaker implementation, should be institutionalized through regular improvement meetings, systematic tracking of employee suggestions, and greater staff participation. Employees should actively comply with standardized procedures, participate in quality assurance activities, and contribute to continuous improvement initiatives.

Training institutions and technical partners can support the company through capacity-building programs in quality management, while suppliers should align their inputs with established quality standards. At the policy level, government and industrial development agencies should promote the adoption and effective implementation of integrated QMS frameworks in manufacturing industries. Capacity-building initiatives on ISO 9001 principles, quality assurance, process standardization, and continuous improvement should be strengthened to enhance organizational quality-management capabilities. Industrial policies should also encourage firms to institutionalize systematic improvement approaches, such as the Plan–Do–Check–Act (PDCA) cycle, and establish mechanisms for monitoring quality performance. Such measures would support defect reduction, production efficiency, product consistency, and the long-term competitiveness and sustainability of Rwanda's manufacturing sector.

REFERENCES

[1] Abebe, D., & Tesfaye, M. (2023). Quality management systems and operational effectiveness in construction materials manufacturing in Ethiopia. *Ethiopian Journal of Industrial Management, 5*(2), 44–59.

[2] Adesina, O., & Yusuf, A. (2021). *Organizational research methods in African manufacturing*. University Press.

[3] African Organisation for Standardisation. (2021). *African Organisation for Standardisation annual report*. ARSO Publications.

[4] Agus, A., & Abdullah, M. (2020). Quality management practices and firm performance: A comparative study. *Journal of Operations Management, 18*(2), 123–134.

[5] American Society for Quality. (2021). *Statistical process control and quality monitoring guidelines*. ASQ Publications.

[6] Boateng, E., & Asante, R. (2022). Quality management adoption and performance of manufacturing firms in Ghana. *African Journal of Management Studies, 8*(2), 45–62.

[7] Chikosha, S., & Rugube, L. (2024). Application of statistical process control in ceramic tile production in Zimbabwe. *Journal of Manufacturing Technology in Africa, 12*(1), 77–95.

[8] Dale, B. G. (2020). *Total quality management*. Routledge.

[9] Deming, W. E. (1986). *Out of the crisis*. MIT Press.

[10] Deming, W. E. (2021). *The new economics for industry, government, education* (3rd ed.). MIT Press.

[11] East African Community. (2022). *EAC industrialisation strategy (2012–2032)*. EAC Secretariat.

[12] Evans, J. R., & Lindsay, W. M. (2021). *Managing for quality and performance excellence* (12th ed.). Cengage Learning.

[13] Feigenbaum, A. V. (1951). *Total quality control*. McGraw-Hill.

[14] Goetsch, D. L., & Davis, S. B. (2020). *Quality management for organizational excellence: Introduction to total quality* (9th ed.). Pearson.

[15] Goldratt, E. M. (1984). *The goal: A process of ongoing improvement*. North River Press.

[16] Government of Rwanda. (2023). *Vision 2050*. Ministry of Finance and Economic Planning.

[17] Government of Rwanda. (2024). *Made in Rwanda policy*. Ministry of Trade and Industry.

[18] International Organization for Standardization. (2023). *ISO survey of management system certifications worldwide*. International Organization for Standardization.

[19] Juran, J. M. (1992). *Juran on quality by design: The new steps for planning quality into goods and services*. Free Press.

[20] Juran, J. M., & Godfrey, A. B. (2021). *Juran's quality handbook: The complete guide to performance excellence* (7th ed.). McGraw-Hill Education.

[21] Kasozi, J. (2022). Quality management systems and operational performance in Uganda's manufacturing sector. *East African Journal of Management, 5*(2), 77–95.

[22] Kilonzo, S. T., & Muthama, E. (2020). Standard operating procedures and manufacturing performance in Kenyan industries. *East African Journal of Business Research, 4*(3), 20–35.

[23] Kumar, R., & Singh, P. (2020). Impact of ISO 9001:2015 on SME manufacturing efficiency in India. *International Journal of Quality & Reliability Management, 37*(6), 1100–1115.

[24] Li, H., & Liu, Y. (2021). QMS integration with lean and Six Sigma in Chinese and Japanese industries. *International Journal of Operations & Production Management, 41*(6), 789–810.

[25] Magodi, A. Y., Daniyan, I. A., & Mpofu, K. (2022). An investigation of the effect of the ISO 9001 quality management system on small and medium enterprises in Gauteng, South Africa. *South African Journal of Industrial Engineering, 33*(1), 126–138.

[26] Ministry of Trade and Industry, Rwanda. (2019). *Construction materials sub-sector master plan*. MINICOM.

[27] Mosha, F. P. (2023). Implementation of quality management systems in Tanzanian manufacturing firms. *Tanzania Journal of Industrial Studies, 4*(3), 33–50.

[28] Mthembu, P., & Khumalo, T. (2022). *Sampling techniques in industrial research: A practical guide*. African Academic Publishers.

[29] Mukamurera, J. (2021). Quality management practices and performance of manufacturing firms in Rwanda. *Rwanda Journal of Management Research, 3*(2), 45–63.

[30] Mukamurera, P. (2021). Analysis of production inefficiencies in Kigali brick factories. *Rwanda Journal of Engineering and Technology, 2*(1), 55–73.

[31] Mwangi, J., & Kihoro, J. (2023). Continuous improvement practices and productivity in Kenyan industrial firms. *Journal of Operations Research in Africa, 6*(2), 110–122.

[32] National Institute of Statistics of Rwanda. (2023). *Rwanda statistical yearbook 2023*. NISR.

[33] Njuguna, P. N., & Ngugi, P. K. (2025). Influence of ISO 9001:2015 procurement quality management on performance of manufacturing firms in Kenya. *International Journal of Supply Chain and Logistics, 6*(2), 45–63.

[34] Nwankwo, C., Obi, E., & Okoye, P. (2020). Human resource allocation and operational efficiency in Nigerian manufacturing firms. *International Journal of Industrial Management, 12*(3), 45–61.

[35] Nyandwi, J. (2022). Quality challenges in Rwanda's ceramics sector. *Rwanda Journal of Industry and Innovation, 3*(1), 60–72.

[36] Oakland, J. S. (2020). *Total quality management and operational excellence: Text with cases* (5th ed.). Routledge.

[37] Ohno, T. (1988). *Toyota production system: Beyond large-scale production*. Productivity Press.

[38] Okeke, F. C. (2021). Quality control practices and efficiency of Nigerian SMEs. *African Journal of Production and Operations Management, 4*(2), 101–119.

[39] Okeke, F., & Anigbogu, M. (2021). *Quantitative and qualitative research integration in organizational studies*. Spectrum Publishers.

[40] Okeke, P. (2021). ISO 9001 implementation and productivity outcomes in Nigerian construction SMEs. *Nigerian Journal of Industrial Management, 6*(2), 78–91.

[41] Otieno Korwa, A. K. (2025). The impact of dynamic capabilities on the performance of quality management systems in manufacturing companies in Kenya. *The University Journal, 7*(1), 152–164.

[42] Ramchander, M., & Nadar, M. M. (2021). Using ISO 9001 principles to enhance total quality management: A case study of a packaging manufacturer in South Africa. *African Journal of Inter/Multidisciplinary Studies, 3*(1), 118–130.

[43] Ruliba Clays Ltd. (2019–2024). *Internal audit and performance review reports*. Ruliba Clays Ltd.

[44] Rwanda Standards Board. (2024). *Annual ISO 9001 certification report*. RSB Publications.

[45] Ssekandi, S., & Nsubuga, E. (2024). Quality assurance procedures and product quality in Ugandan industrial plants. *Uganda Journal of Manufacturing Systems, 5*(2), 35–52.

[46] Tabassum, S. (2024). Impact of quality management systems on organizational performance: A review. *International Journal of Business and Management, 12*(4), 88–97.

[47] Turyasingura, B. (2022). Quality management systems adoption in ceramic manufacturing firms in Uganda. *Makerere Business and Technology Review, 8*(1), 90–107.

[48] United Nations Industrial Development Organization. (2021). *Quality infrastructure in Africa: Challenges and opportunities*. UNIDO.

[49] Uwizeyimana, D. (2022). Assessment of quality management practices in Rwanda's construction materials industry. *Kigali Management Review, 3*(2), 88–104.

[50] Womack, J. P., & Jones, D. T. (2020). *Lean thinking: Banish waste and create wealth in your corporation* (2nd ed.). Free Press.

[51] World Bank. (2022). *Industrial productivity and competitiveness in emerging markets*. World Bank.

[52] Yamane, T. (1967). *Statistics: An introductory analysis* (2nd ed.). Harper & Row.