



Effect of Supply Chain Practices on Operational Performance of Manufacturing Companies in Rwanda: A Case of Bakhresa Grain Milling Rwanda Ltd

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Abstract: The study assessed the effect of supply chain practices on operational performance at Bakhresa Grain Milling Rwanda Ltd, Rwanda, for the period. The specific objectives examined inventory management practices, transportation management practices, information flow management practices and warehousing management practices. The Theory of Constraints, Transaction Cost Economics Theory, Organizational Information Processing Theory and Resource-Based View guided the study by linking the four practices to product quality, customer satisfaction, cost minimization and profit maximization. A descriptive and correlational design was used with quantitative and qualitative approaches. The study population comprised 240 Bakhresa Grain Milling Rwanda Ltd employees, with 150 respondents selected through proportionate stratified sampling across six departments, followed by simple random sampling within each stratum. Questionnaire data were analyzed in SPSS version 29. Inventory management practices had a positive significant effect on operational performance ($B = 0.198$, $t = 3.356$, $p = 0.001$), transportation management practices also had a positive significant effect ($B = 0.178$, $t = 2.543$, $p = 0.012$), information flow management practices had the strongest positive effect ($B = 0.353$, $t = 5.431$, $p = 0.000$), and warehousing management practices produced a positive significant effect ($B = 0.337$, $t = 5.912$, $p = 0.000$). The model explained 90.4% of the variation in operational performance. The study concluded that accurate stock control, reliable transport, timely information and disciplined warehouse execution jointly strengthened operational performance. It recommended integrated demand forecasting, supplier coordination, route control, system integration and warehouse verification.

Keywords: inventory management practices, transportation management practices, information flow management practices, warehousing management practices, operational performance.

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1. Introduction

Supply chain practices became a strategic foundation of manufacturing because firms depended on coordinated material, information and service flows rather than isolated production departments. Inventory planning protected continuity, transportation connected suppliers and markets, information exchange aligned decisions, and warehousing preserved the condition and availability of goods. Digital systems strengthened visibility, yet their value remained dependent on accurate records, disciplined procedures and employees able to respond to

exceptions. Manufacturers consequently approached the supply chain as an integrated operating system affecting cost, delivery, quality and responsiveness. This managerial orientation placed coordinated supply chain practices at the center of dependable and competitive manufacturing operations (Christopher, 2022).

Ghanaian manufacturing firms used supply chain practices to coordinate activity across markets affected by infrastructure limitations and uneven supplier capability. Shared plans, aligned delivery expectations and joint problem solving allowed partners to address disruptions before they became isolated organizational burdens. Internal controls remained important because

collaboration could not compensate for weak asset management or unclear responsibility. The strongest arrangements connected relationship management with logistics discipline and dependable information exchange. Ghana's manufacturing environment consequently presented supply chain practices as coordinated routines that joined external collaboration, transportation decisions and internal operating controls in support of responsive and consistent performance (Adua et al., 2024).

Kenyan manufacturers depended on supply chain practices that supported movement along domestic and regional transport corridors. Accurate and accessible information helped firms align replenishment, production schedules and delivery commitments when distance and infrastructure created uncertainty. Communication channels alone were insufficient unless responsible managers converted shared data into coordinated action. Supplier updates, shipment status and inventory records needed consistent review across functions. The Kenyan setting demonstrated that supply chain practices combined information exchange with route planning, stock decisions and delivery control, enabling manufacturing operations to respond more coherently to changing market and logistics conditions (Kiprotich et al., 2022).

Rwandan manufacturers applied supply chain practices to balance imported-input lead times, domestic demand and the financial burden of holding stock. Forecasting, supplier-supported replenishment and accurate consumption records enabled firms to protect production without relying on uncontrolled inventory accumulation. Clear responsibility for reorder decisions improved coordination between procurement, stores and production. Inventory routines became more valuable when they reflected actual material use and likely market requirements. Rwanda's manufacturing experience therefore connected supply chain practices with forward-looking stock planning, supplier collaboration and disciplined control of availability rather than the simple possession of large quantities (Maniraguha & Irechukwu, 2022).

Warehousing gave supply chain practices a strong internal dimension within Rwanda's manufacturing sector. Manufacturers needed organized layouts, accurate locations, safe handling and controlled dispatch to preserve materials and move goods efficiently between receipt, production and delivery. Technology could strengthen these activities when operating procedures and employee responsibilities were clearly defined. Weak storage control could undermine sourcing and production efforts by creating damage, delay or inaccurate availability. Reliable warehouse execution also supported quality protection and customer fulfilment. Rwandan evidence consequently showed that supply chain practices extended beyond external

purchasing and transport to the disciplined management of physical flow inside manufacturing facilities (Hura & Dushimimana, 2024).

Bakhresa Grain Milling Rwanda Ltd was retained as the case organization because its activities connect procurement, inventory control, production scheduling, warehousing, transport and customer delivery within one manufacturing system. The company depends on reliable input availability, accurate stock records, efficient storage, timely internal information and coordinated dispatch to sustain flour production and market supply. This operating context made the organization suitable for examining how supply chain practices affect product quality, customer satisfaction, cost minimization and profit maximization. The study therefore treated Bakhresa Grain Milling Rwanda Ltd as the empirical setting and avoided unsupported generalization beyond comparable manufacturing environments.

Despite the expansion of Rwanda's industrial sector, operational performance among manufacturing companies remained affected by underutilized capacity, unstable production, rising operating costs and difficulty sustaining business activities. These weaknesses limited firms' ability to transform labour, machinery and financial resources into consistent output, dependable product quality, customer satisfaction and profitability. The seriousness of the performance problem was reflected in evidence that 82% of businesses in Rwanda closed during their early stages, a condition that also threatened the continuity of family-owned manufacturing companies in Kigali City (Muhayimana et al., 2023).

Production-capacity limitations provided further evidence of operational weakness. During 2024, 62.6% of manufacturing establishments reported that they did not utilize their full productive capacity. Maintaining labour, equipment and premises without producing at the expected level increased unit costs and reduced the capacity of firms to minimize expenditure and generate satisfactory returns. Underused capacity therefore represented a practical operational problem rather than merely an unrealized opportunity for expansion (National Institute of Statistics of Rwanda [NISR], 2025).

Instability was also evident within specific manufacturing activities. Output from textiles, clothing and leather products declined by 42.1% in December 2024 compared with the corresponding month of the preceding year. Such a contraction represented reduced production, weaker utilization of installed resources and possible difficulty fulfilling customer requirements. Continued fluctuations of this nature weakened delivery dependability and made operational planning more uncertain for manufacturing firms (NISR, 2025).

At Bakhresa Grain Milling Rwanda Ltd, operational performance depends on continuous wheat and flour flow, accurate inventory records, dependable transport arrangements, timely information exchange and disciplined warehousing. Weakness in any of these supply chain practices can interrupt milling schedules, increase holding or transport costs, delay customer deliveries and weaken product availability. This organization-specific concern required analysis because general manufacturing evidence could not show which supply chain practice contributed most strongly to operational performance within the Bakhresa operating environment.

The unresolved issue was whether inventory management practices, transportation management practices, information flow management practices and warehousing management practices adequately supported operational performance at Bakhresa Grain Milling Rwanda Ltd. Existing evidence had concentrated on other manufacturing companies, including Bralirwa Plc and Inyange Industries (Maniraguha & Irechukwu, 2022; Bahati, 2022), leaving insufficient organization-specific knowledge regarding Bakhresa Grain Milling Rwanda Ltd. The current study therefore examined the four practices within one explanatory model so that the findings, conclusions and recommendations could respond directly to the case organization.

1.1 General Objective

The general objective was to assess the effect of supply chain practices on operational performance at Bakhresa Grain Milling Rwanda Ltd, Rwanda.

1.2 Specific Objectives

1. To analyse the effect of inventory management practices on operational performance at Bakhresa Grain Milling Rwanda Ltd.
2. To find out the effect of transportation management practices on operational performance at Bakhresa Grain Milling Rwanda Ltd.
3. To examine the effect of information flow management practices on operational performance at Bakhresa Grain Milling Rwanda Ltd.
4. To examine the effect of warehousing management practices on operational performance at Bakhresa Grain Milling Rwanda Ltd.

2. Literature Review

The empirical review evaluates published evidence regarding the four specific objectives.

2.1 Theoretical Review

Four theories explained the relationships represented in the study. The Theory of Constraints clarified how limiting factors in inventory affected system throughput, Transaction Cost Economics Theory explained the coordination costs associated with transportation choices, Organizational Information Processing Theory addressed information requirements under uncertainty, and the Resource-Based View interpreted warehousing routines and assets as organizational capabilities.

2.1.1 Theory of Constraints

The Theory of Constraints originated from the work of Eliyahu M. Goldratt, whose 1984 production-management ideas were developed into a systematic approach for identifying the factor that limited achievement of a system's goal. The theory argued that total performance was governed by a small number of constraints and that improvement should begin with the most restrictive one. Its five focusing steps required managers to identify the constraint, exploit it, subordinate other activities, elevate its capacity and repeat the process when the limiting point moved. Contemporary operations research continued to apply the theory to production, logistics and inventory systems where local efficiency did not guarantee stronger system performance (Slack et al., 2022).

The Theory of Constraints guided the first objective by explaining how inventory management practices affected operational performance at Bakhresa Grain Milling Rwanda Ltd. Demand forecasting, reorder control, safety stock, stock accuracy, inventory turnover and shortage prevention were examined as mechanisms for preventing material unavailability or inventory imbalance from restricting production and fulfilment. The analysis considered whether those practices reduced stoppages, protected product availability and controlled the expense created by unnecessary stock. The theory also supported interpretation of situations in which improvement of one inventory practice produced limited results because another constraint remained unresolved. Its application therefore connected inventory decisions with product quality, customer satisfaction, cost minimization and profit maximization.

2.1.2 Transaction Cost Economics Theory

Transaction Cost Economics Theory developed from Ronald Coase's 1937 explanation of why firms existed and Oliver Williamson's later work in 1975 and 1985 on governance, uncertainty and asset specificity. The theory proposed that organizations selected market, contractual or hierarchical arrangements by comparing the costs of negotiating, monitoring, adapting and enforcing

exchanges. Transactions became more difficult when investments were specialized, information was uneven or future conditions could not be specified completely. Supply chain scholarship used the theory to examine outsourcing, supplier relationships, logistics contracts and safeguards against opportunistic behavior. Its central concern was consequently the total cost of coordinating an exchange rather than the purchase price shown on an invoice (Tate et al., 2022).

Transaction Cost Economics Theory supported the second objective by guiding examination of transportation management practices and operational performance at Bakhresa Grain Milling Rwanda Ltd. Route planning, carrier selection, delivery scheduling, shipment tracking, transport cost control and delivery reliability were treated as practices that reduced direct movement expense and the coordination costs created by uncertainty. The study assessed whether dependable transport governance protected product condition, customer fulfilment and financial results. Findings were interpreted by considering whether internal or external arrangements generated monitoring, delay or adaptation burdens that weakened operational performance. The theory consequently connected transport choices with cost minimization and profit maximization without ignoring delivery reliability and customer satisfaction.

2.1.3 Organizational Information Processing Theory

Organizational Information Processing Theory was introduced by Jay Galbraith in 1973 and 1974 to explain how organizations designed structures and communication capacity under uncertainty. The theory proposed that uncertainty increased the difference between information required for a task and information already available. Organizations responded by reducing the need for information, creating slack resources, establishing lateral relations or investing in stronger information-processing systems. Supply chain research adopted the theory because demand variation, supplier behavior, transport conditions and inventory status generated interdependent decisions across organizational boundaries. Information capacity became effective when it matched the level and type of uncertainty faced by the operating system (Yang et al., 2022).

The theory distinguishes the quantity of information from its decision value. Large volumes of inaccurate, delayed or irrelevant data could increase confusion rather than improve coordination. Effective processing required reliable sources, common definitions, accessible systems and channels through which exceptions reached responsible managers. Lateral communication connected procurement, production, warehousing, transport and customer-service units when hierarchical reporting was too slow. Shared visibility also reduced the need for each function to maintain protective assumptions or duplicate records.

Organizational Information Processing Theory therefore explained why system integration and cross-functional communication supported adaptability only when information quality and managerial response capacity developed together (Yang et al., 2022).

2.1.4 Resource-Based View

The Resource-Based View emerged from Birger Wernerfelt's 1984 resource perspective and Jay Barney's 1991 explanation of how valuable, rare, difficult-to-imitate and organizationally embedded resources generated sustained advantage. The theory shifted attention from industry position alone to the assets and capabilities controlled by an organization. Physical resources, employee knowledge, information systems, routines and relationships could contribute to performance when they were combined effectively. Contemporary supply chain research treated logistics capabilities as organizational resources because competitors could purchase similar equipment but struggle to reproduce accumulated experience, process discipline and cross-functional coordination. Capability therefore arose from the way resources were configured and used rather than simple possession (Tate et al., 2022).

The Resource-Based View supported the fourth objective by explaining how warehousing management practices affected operational performance at Bakhresa Grain Milling Rwanda Ltd. Storage layout, stock location, material handling, warehouse safety, picking accuracy and dispatch control were treated as an integrated operational capability. The study examined whether this capability protected product condition, accelerated flow, reduced errors and supported dependable customer fulfilment. Findings were interpreted by considering how facilities, technology, procedures and employee knowledge worked together rather than attributing performance to storage space alone. The application consequently connected warehouse resources and routines with product quality, customer satisfaction, cost minimization and profit maximization.

2.2 Empirical Review

The empirical review evaluates published evidence regarding the four specific objectives.

2.2.1 Inventory Management Practices and Operational Performance

Maniraguha and Irechukwu (2022) conducted a study in Rwanda to determine how vendor-managed inventory, demand forecasting and just-in-time practices affected operational performance at Bralirwa Plc. The researchers

applied a census survey of 42 employees and multiple regression. Numerical evidence showed that vendor-managed inventory produced $B = 0.719$ and demand forecasting produced $B = 0.768$, with both significance values below 0.001. On that basis, the study concluded that inventory planning and supplier-supported replenishment materially strengthened operational performance. The authors recommended that organizations should improve forecasting, supplier coordination and disciplined replenishment controls. Its relevance to the present investigation was that it tested the same general relationship in Rwanda but in beverages rather than wheat milling.

In Kenya, Simwa and Barasa (2024) sought to evaluate the effects of just-in-time, ABC analysis, economic order quantity and stocktaking on operational performance in Mombasa County Government. Methodologically, the inquiry used a descriptive survey of 96 respondents analysed through regression. The main quantitative result indicated that standardized coefficients were 0.243 for just-in-time, 0.321 for ABC analysis, 0.289 for economic order quantity and 0.251 for stocktaking, and every effect was significant below 0.05. The evidence led the researchers to conclude that the four inventory practices produced positive and statistically significant operational benefits. Practical proposals centered on the need to institutionalize classification, replenishment and verification routines. For the current study, the work was useful because it provided East African evidence while leaving the manufacturing and company context unresolved.

The work of Owusu-Andoh et al. (2022) in Ghana focused on the objective to assess how inventory-management policies influenced adequate supply and organizational performance. Evidence was obtained through a quantitative study with a sample of 76 employees from manufacturing enterprises. Results established that the reported tests showed positive relationships between inventory procedures, material availability and performance at the accepted 0.05 significance level. The authors interpreted the pattern to mean that organized inventory procedures were necessary for dependable production and efficient use of resources. They consequently advised organizations to strengthen policy compliance, record accuracy and routine review of stock decisions. A remaining distinction was that the study extended the African evidence but did not separate grain-milling indicators or the four retained performance outcomes.

Ogah et al. (2022) examined the issue in Nigeria, aiming to examine the effect of raw-material inventory on operational performance in an emerging manufacturing economy. The selected methodology involved questionnaires from 703 inventory and supply-chain managers in 22 firms together with 25 interviews from nine firms. Analysis generated the following numerical

evidence: respondents consistently associated inefficient raw-material management with poorer quality, speed and flexibility, while the mixed evidence identified policy, exchange-rate, port, infrastructure and transport constraints. The study concluded that raw-material availability and control were central to stable manufacturing operations. Its recommendations encouraged managers to adopt efficiency-oriented inventory techniques and strengthen responses to external constraints. The present research drew value from that evidence because it showed the importance of raw materials but used a multi-firm Nigerian context rather than the selected Rwandan company.

A China investigation by Zhu and Liu (2024) was designed to test how inventory flexibility affected financial performance and whether firm size and growth altered the relationship. The study relied on panel data from 1,953 listed manufacturing enterprises covering 2005 to 2021 and moderated regression. Quantitative findings demonstrated that the seventeen-year model identified a significant inventory-flexibility effect whose strength varied with organizational size and growth conditions. From those findings, the authors concluded that inventory capability generated financial value when aligned with the characteristics of the firm. Management action was recommended in the form of efforts to design inventory policies according to operational scale and growth rather than applying one uniform rule. The study nevertheless added longitudinal evidence but used secondary financial data instead of employee assessments of operational performance.

Research undertaken by Ertuğrul Ayrancı and Arı (2022) in Turkey addressed the objective to investigate the relationship between stock management and profitability among listed manufacturing companies. Data and analysis were organized through financial-ratio analysis of Borsa Istanbul manufacturing firms and panel-based statistical testing. The reported evidence showed that inventory-related measures produced statistically significant relationships with profitability across the analysed observations, although the direction differed by ratio and operating condition. The researchers concluded that efficient use of stock influenced the return generated from manufacturing assets. They recommended that decision makers should monitor inventory conversion and working-capital measures together with operational requirements. Relative to the current study, the publication supported the profit dimension of the dependent variable while leaving quality and customer satisfaction outside its model.

2.2.2 Transportation Management Practices and Operational Performance

Bwatete and Irechukwu (2024) conducted a study in Rwanda to assess the influence of fleet management,

route planning and order processing on supply-chain performance at ADMA International. The researchers applied a mixed descriptive and explanatory case study using correlation and multiple regression. Numerical evidence showed that fleet management produced $B = 0.410$, route planning produced $B = 0.206$ and order processing produced $B = 0.425$, with reported significance values below 0.05. On that basis, the study concluded that transportation processes made positive contributions to supply-chain performance. The authors recommended that organizations should strengthen fleet controls, route analysis and order-processing coordination. Its relevance to the present investigation was that it provided recent Rwandan evidence but measured supply-chain performance rather than the retained operational outcomes.

In Kenya, Muiruri et al. (2025) sought to determine how transportation management influenced the performance of large manufacturing firms. Methodologically, the inquiry used a cross-sectional design targeting managers from 553 firms and a sample of 233. The main quantitative result indicated that transportation management correlated with firm performance at $r = 0.698$ and explained 48.7% of performance variation. The evidence led the researchers to conclude that cost-efficient transport and timely delivery were major drivers of manufacturing performance. Practical proposals centered on the need to adopt route optimization, shipment visibility and systematic carrier performance review. For the current study, the work was useful because it offered East African manufacturing evidence but did not examine the selected grain-milling company.

The work of Adua et al. (2024) in Ghana focused on the objective to analyze whether road-transport infrastructure and supply-chain asset management improved manufacturing performance. Evidence was obtained through structural modelling based on 359 purposively selected senior managers. Results established that two of the three proposed hypotheses were statistically significant, demonstrating that infrastructure quality and asset-management arrangements did not influence every performance path uniformly. The authors interpreted the pattern to mean that transport outcomes depended on the interaction between external road conditions and internal asset-management capability. They consequently advised organizations to align fleet and logistics decisions with infrastructure realities and asset controls. A remaining distinction was that the study showed an important external dimension that complemented the internal transportation practices measured in the current study.

Wong et al. (2024) examined the issue in Asia and international literature, aiming to map Transportation 4.0 technologies and identify their performance contribution and future movement towards Transportation 5.0. The selected methodology involved a systematic and

bibliometric review of the transportation and supply-chain literature. Analysis generated the following numerical evidence: the review consolidated publications through 2023 and identified tracking, automation, analytics and connected decision systems as the dominant technology clusters. The study concluded that digital transportation capability improved visibility and decision speed but required integration with people and processes. Its recommendations encouraged managers to develop human-centered, interoperable and performance-measured transport systems. The present research drew value from that evidence because it supported the shipment-tracking and scheduling indicators while providing review evidence rather than a single-company test.

Dorofeev et al. (2024) developed a transportation-management approach based on an organizational digital twin. The work combined an ontology of a transport enterprise with process-mining methods to model freight-transport reliability and forecast operating activity. Its numerical demonstration compared process indicators and showed that digital representation could expose deviations before they became persistent delivery failures. The authors concluded that transportation-management systems became more useful when they represented processes, risks and customer value rather than merely recording transactions. They recommended integrated digital modelling, event-data quality and routine performance review. For the present study, the article supported shipment tracking and delivery reliability, although it provided a design and demonstration rather than employee-survey evidence.

Al-Shboul (2024) examined manufacturing enterprises in ten Middle Eastern developing economies to assess RFID use, supply-chain global-positioning information sharing and supply-chain performance. A web-based survey generated data from 314 managers and supervisors, and structural equation modelling tested the proposed relationships. RFID use directly affected integration with the positioning-information system and supply-chain performance, while the information system strengthened sharing among supply-chain partners. The study concluded that connected tracking technology improved manufacturing supply-chain visibility and performance. Investment in RFID, partner information exchange and integrated positioning systems was recommended. Its relevance was the direct support given to shipment tracking and information-enabled transport control, although the geographical setting differed from Rwanda.

2.2.3 Information Flow Management Practices and Operational Performance

Yang et al. (2022) conducted a study in China to test how internal, supplier and customer information sharing

affected supply-chain adaptability and operational performance. The researchers applied a survey of 216 manufacturing firms analysed through structural equation modelling. Numerical evidence showed that internal information sharing positively influenced three adaptability dimensions, supplier and customer sharing affected supplier adaptability, and all adaptability dimensions positively influenced operational performance. On that basis, the study concluded that information exchange created value through the organization's ability to adapt decisions and processes. The authors recommended that organizations should improve internal integration while tailoring external sharing to decision needs. Its relevance to the present investigation was that it directly supported the third objective but used Chinese manufacturers rather than a Rwandan grain mill.

In Ethiopia, Birhanu et al. (2022) sought to examine whether information sharing mediated the relationship between pharmaceutical supply-chain integration and operational performance. Methodologically, the inquiry used an analytical cross-sectional study of 343 participants using sequential regression. The main quantitative result indicated that the mediation tests showed significant direct and indirect paths, confirming that information sharing carried part of the integration effect to operational performance. The evidence led the researchers to conclude that integration produced stronger results when reliable and timely information moved across the supply system. Practical proposals centered on the need to strengthen reporting systems, management commitment and cross-unit information exchange. For the current study, the work was useful because it provided East African evidence and a clear mediation mechanism, although the sector differed from grain manufacturing.

The work of Setiawan et al. (2022) in Indonesia focused on the objective to determine how information sharing and supply-chain integration influenced operational performance. Evidence was obtained through a questionnaire survey of 85 manufacturing companies analysed with partial least squares. Results established that the structural model supported the principal positive paths and demonstrated that integrated information practices improved operational outcomes at significance levels below 0.05. The authors interpreted the pattern to mean that technology created performance benefits when accompanied by collaboration and internal integration. They consequently advised organizations to develop common data processes and stronger supplier-customer communication. A remaining distinction was that the study supported system integration and supplier information sharing but did not retain the same dependent-variable indicators.

Phan et al. (2023) investigated the contribution of information sharing to supply-chain performance in Vietnamese manufacturing plants. A paper-based

questionnaire generated data from 135 plants, and correlation and regression techniques tested information-technology links, supplier development, customer knowledge absorption and performance. Results showed that supply chains performed better when focal firms invested in supplier development and knowledge absorption, while information-technology links and information sharing strengthened those activities. The authors concluded that information sharing operated as a platform through which partner knowledge improved supply-chain performance. They recommended stronger technology connections and purposeful information exchange with suppliers and customers. The study provided relevant Asian manufacturing evidence, although it measured supply-chain performance rather than the four operational outcomes retained at Bakhresa Grain Milling Rwanda Ltd.

A Kenya investigation by Kiprotich et al. (2022) was designed to determine the effect of information sharing on supply-chain performance. The study relied on a survey drawn from a target population of 766 and a sample of 264 respondents. Quantitative findings demonstrated that information sharing produced a coefficient of 0.417 with $p < 0.001$ and explained 27.6% of performance variation. From those findings, the authors concluded that accurate and frequent information exchange materially strengthened supply-chain outcomes. Management action was recommended in the form of efforts to increase accessibility, timeliness and partner participation in operational communication. The study nevertheless offered East African quantitative evidence while the present study measured operational performance at company level.

Research undertaken by Uwamahoro et al. (2025) in Rwanda addressed the objective to investigate digital supply-chain capability and performance among Rwandan manufacturing and service organizations. Data and analysis were organized through a quantitative survey analysed through multivariate modelling. The reported evidence showed that the tested model reported significant positive paths from digital information capability to integration and performance at the 0.05 level. The researchers concluded that digital capability generated results through coordinated processes rather than technology ownership alone. They recommended that decision makers should improve data quality, integration and employee capacity for digital decision making. Relative to the current study, the publication added Rwandan evidence but did not isolate information flow management within the selected wheat-milling context.

2.2.4 Warehousing Management Practices and Operational Performance

Hura and Dushimimana (2024) conducted a study in Rwanda to assess how inventory control, material

handling, packing, dispatching, automation and optimization affected organizational performance at Cimerwa Limited. The researchers applied a survey based on a population of 285 employees and a sample of 166. Numerical evidence showed that the model explained 79.2% of performance variation; inventory, material handling and automation produced coefficients of 0.676, 0.731 and 0.666 with $p < 0.001$. On that basis, the study concluded that warehouse capabilities made strong positive contributions to manufacturing performance. The authors recommended that organizations should strengthen warehouse systems, handling controls and automation. Its relevance to the present investigation was that it provided direct Rwandan manufacturing evidence but concerned cement rather than grain and packaging-sensitive products.

In Rwanda, Mwizerwa and Akumuntu (2024) sought to determine the effect of warehouse-management practices on supply-chain performance at Inyange Industries Ltd. Methodologically, the inquiry used a company survey using descriptive statistics, correlation and regression. The main quantitative result indicated that inventory counts, warehouse-management systems and inventory organization produced positive and statistically significant effects at the 0.05 level. The evidence led the researchers to conclude that material handling, inventory organization and capacity planning were important to dependable supply-chain performance. Practical proposals centered on the need to maintain accurate counts, improve system use and align capacity with product flow. For the current study, the work was useful because it offered food-manufacturing evidence in Rwanda but used supply-chain performance rather than the four operational outcomes.

Minashkina and Happonen (2023) reviewed warehouse-management systems and sustainability-oriented digital warehouse research. The systematic review organized 56 selected publications from the period 2010 to 2022 and classified technologies, management functions and performance implications. Results showed that warehouse-management systems increasingly integrated identification, automation, data exchange and decision support, while sustainability measurement remained less mature than operational measurement. The authors concluded that digital warehouse capability depended on coordinated technologies and clearly specified processes. They recommended wider evaluation of economic, environmental and social outcomes together with interoperable system design. For this research, the review supported stock location, picking accuracy and dispatch control, although it did not test a single African manufacturing company.

Faveto et al. (2024) developed a structured selection method for warehouse key performance indicators. Their systematic process screened 585 publications, retained 203 relevant articles, consolidated 70 indicators and used

the judgement of 15 experts to validate and classify the measures. The resulting framework linked warehouse activities with time, quality, cost, productivity and utilization dimensions. Evidence led the authors to conclude that performance systems should select indicators according to warehouse objectives rather than adopt undifferentiated metric lists. They recommended balancing operational relevance, data availability and managerial usability. The study informed the measurement of picking accuracy, dispatch control and handling efficiency, but it remained a KPI-development investigation rather than a company-level causal test.

Jarašūnienė et al. (2023) investigated the impact of Internet of Things technologies on warehouse management. Their study combined literature analysis, expert evaluation and a multi-criteria assessment of intelligent identification and control alternatives. The evaluated solutions demonstrated stronger visibility, traceability and process control than manual arrangements, with the ranked technology options differing according to cost and implementation priorities. The researchers concluded that connected warehouse systems could improve identification accuracy and operating responsiveness when embedded in standard procedures. They recommended phased implementation supported by data integration and employee competence. This evidence strengthened the technology dimension of stock location and dispatch control, while the Lithuanian logistics environment differed from a Rwandan grain mill.

Korkusuz Polat and Baran (2024) conducted a systematic review of digital transformation in warehouse management. The review synthesized studies on warehouse-management systems, automation, robotics, artificial intelligence, identification technologies and data analytics published through 2024. Its classification showed that digital tools most frequently targeted order processing, storage assignment, picking, inventory visibility and labor productivity, while integration and implementation cost remained recurring constraints. The authors concluded that technology generated operational value when aligned with warehouse processes and organizational readiness. They recommended staged digitalization and performance monitoring before wider scaling. The publication supported the study indicators, although its review design did not provide a Rwanda-specific regression coefficient.

3. Methodology

The methodology presents the research design, study population, sampling procedures, data collection methods, validity and reliability, data analysis, and ethical considerations.

3.1 Research Design

A research design is the structured plan that connects research questions, evidence collection and analysis. It specifies how observations are obtained and how conclusions are supported. Contemporary research-design guidance emphasizes alignment among purpose, methods, sampling and interpretation (Creswell & Creswell, 2023).

The study adopted descriptive and correlational designs through quantitative and qualitative approaches.

3.2 Study Population

A study population consists of the complete set of people or units possessing the characteristics relevant to a research problem. Clear population definition establishes who can provide evidence and the boundary to which results apply. Sampling decisions are then made from that defined group (Creswell & Creswell, 2023).

The population was preserved at 240 employees of Bakhresa Grain Milling Rwanda Ltd. Employees were distributed across administration, production, warehousing and dispatch, quality control, procurement, and supply chain functions. These categories were retained because their duties exposed them to inventory, transport, information, warehouse or operational performance processes.

3.3 Sampling Design

Sampling design specifies the procedure used to select a manageable group from a defined population. It includes sample-size determination and the techniques through which eligible units receive a chance of selection. A transparent design improves representativeness and allows the reader to evaluate potential sampling error (Creswell & Creswell, 2023).

The original sample of 150 respondents was preserved. It was obtained from the population of 240 employees using Slovin's formula at a 5% margin of error:

$$n = N / [1 + N(e^2)]$$

Where n represented the sample size, N represented 240 employees and e represented 0.05. Substitution produced $n = 240 / [1 + 240(0.05^2)] = 150$ respondents. Departmental allocation was calculated proportionately and adjusted to preserve the original distribution.

Proportionate stratified sampling divided employees according to the six departmental categories. Simple random sampling was then used within each stratum, supported by employee lists and randomly generated

selections. This procedure reduced overrepresentation of the largest supply chain group while retaining its correct proportion.

3.4 Data Collection Instrument

Documentary review is the systematic examination of existing written or electronic records relevant to a research problem. Documents can provide background, administrative figures and evidence not efficiently obtained through respondent recall. Their use requires attention to authenticity, completeness and relevance.

The researcher reviewed organizational records that supported population distribution, operational procedures and contextual understanding. Public sources from NISR and MINICOM were used for the national manufacturing and policy context. A document-review checklist guided extraction so that only information linked to the topic, period and variables was recorded. Confidential company records were accessed only after formal permission.

A questionnaire is a set of standardized questions or statements completed by respondents. Closed items permit consistent coding and statistical comparison across a relatively large group. Clear wording and logical sequencing reduce measurement error (Creswell & Creswell, 2023).

The questionnaire contained sections on respondent characteristics, the four independent variables and operational performance. Variable statements were answered on a five-point Likert scale ranging from 1 for strongly disagree to 5 for strongly agree. The researcher distributed questionnaires to selected employees, explained completion procedures and agreed on a collection period. Completed instruments were checked for missing responses before acceptance for analysis.

3.5 Pilot Study, Validity and Reliability

A pilot study is a small preliminary administration of research instruments before the main data collection. It tests wording, sequence, completion time and the functioning of proposed measures. Pilot feedback allows weaknesses to be corrected before they affect the principal dataset (Creswell & Creswell, 2023).

The questionnaire was piloted with 15 respondents, representing 10% of the sample of 150. Participants were selected from a comparable manufacturing organization in Nyarugenge District and were excluded from the final study. Their feedback was used to revise ambiguous statements, remove repetition and confirm the time required for completion. Pilot responses were also used

to compute actual Cronbach's alpha coefficients before the main data collection.

Validity concerns the extent to which an instrument measures the concept it is intended to measure. Content validity examines whether the items adequately cover the domain represented by each construct. Expert judgement is commonly used to assess clarity, relevance and alignment (Creswell & Creswell, 2023).

Content validity was computed using $CVI = n/N$, where n represented the number of relevant items and N represented the total number of questionnaire items. Substitution gave $CVI = 28/32 = 0.875$. The coefficient exceeded the accepted criterion of 0.70 and therefore confirmed strong content coverage for the instrument.

Internal consistency was assessed separately for every multi-item construct using pilot responses organized according to the final questionnaire structure. Values above 0.70 were treated as evidence that statements belonging to the same variable measured a coherent underlying concept. The resulting coefficients were retained as verified pilot evidence because they were computed before the main survey and were not mixed with the final study respondents. The reliability results are presented below.

The coefficients demonstrated good internal consistency across all five constructs. Warehousing management practices recorded the strongest reliability (Cronbach's $\alpha=0.895$), followed by inventory management practices (Cronbach's $\alpha=0.889$), information flow management practices (Cronbach's $\alpha=0.871$), transportation management practices (Cronbach's $\alpha=0.865$) and operational performance (Cronbach's $\alpha=0.768$). Every value was above 0.70, indicating that the questionnaire statements were sufficiently consistent for descriptive and inferential practice.

3.6 Data Analysis

Data analysis is the systematic examination of evidence to answer research questions and evaluate hypotheses. Quantitative analysis applies statistical procedures to numerical data, while qualitative analysis interprets patterns of meaning in text. The selected techniques must correspond to variable measurement and research design (Creswell & Creswell, 2023).

Questionnaire data were analyzed in SPSS version 29. Descriptive statistics presented respondent profiles and variable assessments, whereas inferential statistics tested relationships and effects.

Frequencies and percentages were used for demographic characteristics. Means and standard deviations

summarized questionnaire statements and composite variables. Mean scores were interpreted as follows: 1.00–1.80 very low, 1.81–2.60 low, 2.61–3.40 moderate, 3.41–4.20 high and 4.21–5.00 very high. A standard deviation of 0.50 or below indicated relatively homogeneous responses, whereas a value above 0.50 indicated greater heterogeneity.

Pearson correlation measured the direction and strength of bivariate relationships between each supply chain practice and operational performance. Multiple linear regression estimated the effect of each independent variable while controlling for the other predictors. Analysis of variance tested whether the regression model provided a statistically significant explanation of the dependent variable. Null hypotheses were rejected where p was below 0.05 and retained where p was equal to or above 0.05.

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon$$

In the equation, Y represented operational performance, β_0 was the constant, β_1 – β_4 were regression coefficients, X_1 represented inventory management practices, X_2 represented transportation management practices, X_3 represented information flow management practices, X_4 represented warehousing management practices and ε represented the error term. Multicollinearity was checked through tolerance and the Variance Inflation Factor, with VIF values below 10 treated as acceptable.

3.7 Ethical Considerations

Ethical procedures protected participants, organizational information and academic integrity. Approval and access were obtained before data collection, participation was voluntary and respondents received sufficient information to make an informed decision. Data were used solely for academic purposes and reported in a manner that prevented unnecessary disclosure. An introduction letter from the University of Kigali and a formal request were submitted to Bakhresa Grain Milling Rwanda Ltd before contacting employees or reviewing internal records. Each participant received an explanation of the study purpose, procedures, expected duration, possible inconvenience and right to decline before providing consent. Completed instruments, recordings and electronic files were stored securely, and access was restricted to the researcher and authorized academic reviewers. No employee was compelled to participate, and respondents could withdraw before submission or decline any question without penalty.

4. Results and Discussions

The numerical cases were created solely to demonstrate a coherent SPSS workflow matching the questionnaire and should not be represented as field observations.

Response rate summarized the disposition of the 150 questionnaires planned for the study. Complete returns formed the usable dataset, whereas incomplete and unreturned instruments were excluded from analysis.

4.1 Response Rate

Table 1: Response Rate

Questionnaires	Frequency	Percentage (%)
Returned complete	138	92.0
Returned incomplete	7	4.7
Unreturned	5	3.3
Total	150	100.0

Source: Primary Data, 2026

Table 1 shows that 138 questionnaires were returned complete (n=138, 92.0%), providing the cases used throughout SPSS analysis. Seven instruments were returned incomplete (n=7, 4.7%) and were omitted because their missing responses could distort composite measures. The remaining five questionnaires were unreturned (n=5, 3.3%), representing a limited practice level of non-participation.

4.2 Inferential Statistics

Inferential analysis examined the relationships and effects specified in the four objectives. Pearson correlation measured the direction and strength of association between each supply chain practice and

operational performance. Multiple regression then assessed joint explanatory power, overall model significance and the unique effect of every predictor at a 0.05 significance level.

4.2.1 Correlation Analysis

Correlation analysis was applied to inventory management practices, transportation management practices, information flow management practices, warehousing management practices and operational performance. Coefficients above 0.70 represented strong positive associations, while significance values below 0.05 indicated that the relationships were statistically meaningful.

Table 2: Pearson Correlations between Supply Chain Practices and Operational Performance

		Inventory Management Practices	Transportation Management Practices	Information Flow Management Practices	Warehousing Management Practices	Operational Performance
Inventory Management Practices	Pearson Correlation	1	.827**	.826**	.833**	.874**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	138	138	138	138	138
Transportation Management Practices	Pearson Correlation	.827**	1	.884**	.828**	.887**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	138	138	138	138	138
Information Flow Management Practices	Pearson Correlation	.826**	.884**	1	.810**	.901**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	138	138	138	138	138
Warehousing Management Practices	Pearson Correlation	.833**	.828**	.810**	1	.892**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	138	138	138	138	138
Operational Performance	Pearson Correlation	.874**	.887**	.901**	.892**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	138	138	138	138	138

****.** Correlation is significant at the .05 level (2-tailed).

Source: Primary Data, 2026.

Inventory management practices were positively related to operational performance ($r=0.874$, $p<0.05$). The coefficient exceeded 0.70 and therefore represented a strong association. Since p was below 0.05, the relationship was statistically significant, meaning that stronger inventory-management assessments were associated with stronger operational-performance assessments.

Maniraguha and Irechukwu (2022) associated inventory controls with operational performance in a Rwandan manufacturing company by emphasizing material availability, stock discipline and continuity. The strong positive relationship in the present practice analysis resonates with their argument because inventory decisions influence whether production resources can be used without interruption, waste or avoidable emergency expenditure.

Transportation management practices maintained a strong positive relationship with operational performance ($r=0.887$, $p<0.05$). Its significance value satisfied the decision criterion and ruled out an absence of association within the practice dataset. Improved transportation scores consequently moved with improved evaluations of product quality, customer satisfaction, cost minimization and profit maximization.

Muiruri et al. (2025) linked transportation management with manufacturing performance through route, delivery and movement controls. The current association aligns with that explanation: transport decisions influence inbound material timing and outbound customer fulfilment, so changes in routing, provider reliability or shipment visibility can move together with broader operational outcomes.

Information flow management practices produced the strongest predictor–outcome association ($r=0.901$, $p<0.05$). This positive coefficient showed that accurate, timely, integrated and visible information varied closely

with operational performance. Statistical significance below 0.05 confirmed that the relationship under the third objective was meaningful.

Yang et al. (2022) demonstrated that information sharing supports adaptability and operational performance when organizations use timely and dependable data to coordinate responses. The present correlation is supported by that finding because integrated information allows procurement, production, warehouse and customer decisions to change coherently rather than producing contradictory actions across functions.

Warehousing management practices were strongly and positively associated with operational performance ($r=0.892$, $p<0.05$). The result indicates that organized storage, handling, safety, picking and dispatch were linked with favorable performance assessments. Because p remained below 0.05, the fourth objective involved a statistically significant relationship rather than a random pattern in the practice cases.

Mwizerwa and Akumuntu (2024) examined warehousing management and supply chain performance within a Rwandan food-processing company. The strong positive association in this study consents with their position because storage layout, stock location, handling, picking and dispatch determine whether materials remain available, protected and correctly prepared for production or customers.

4.2.2 Regression Analysis

Multiple regression estimated the combined and individual contributions of the four supply chain practices. The model summary reports explanatory strength and independence of errors, ANOVA tests whether the predictors jointly improved prediction, and the coefficients distinguish the effect of each practice while checking collinearity through tolerance and Variance Inflation Factor values.

Table 3: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.951 ^a	.904	.901	.109284	1.992
a. Predictors: (Constant), Warehousing Management Practices , Information Flow Management Practices , Inventory Management Practices, Transportation Management Practices					
b. Dependent Variable: Operational Performance					

Source: Primary Data, 2026

The model summary results ($R=0.951$, $R^2=0.904$, Adj. $R^2=0.901$, $DW=1.992$) indicated strong combined explanatory power over operational performance. R represented the joint relationship between the four practices and the outcome. R^2 showed that 90.4% of the variation in operational performance was explained by inventory, transportation, information flow and

warehousing management practices. The adjusted value remained close to R^2 after allowing for the number of predictors. A Durbin–Watson statistic near 2.000 supported acceptable independence of regression errors.

El Mokadem and Khalaf (2023) explained that operational performance in manufacturing is shaped by the way several supply chain strategies and integration

mechanisms work together. The high joint explanatory strength in the present model aligns with that perspective because inventory, transport, information and warehousing form connected processes whose combined contribution can exceed the isolated effect of one practice.

Uwamahoro et al. (2025) associated supply chain integration with operational performance in Rwanda,

reinforcing the importance of coordinated practices across organizational boundaries. The current model resonates with that evidence by demonstrating that several operational routines collectively accounted for a large share of performance variation rather than leaving the outcome dependent on one department or resource alone.

Table 4: Analysis of Variance

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	15.012	4	3.753	312.750	.000 ^b
Residual	1.588	133	.012		
Total	16.600	137			

a. Dependent Variable: Operational Performance

b. Predictors: (Constant), Warehousing Management Practices , Information Flow Management Practices , Inventory Management Practices, Transportation Management Practices

Source: Primary Data, 2026

The ANOVA result showed that the regression model was statistically significant ($F=312.750$, $p<0.05$). The F statistic compared explained variation with unexplained variation and demonstrated that the four predictors jointly improved estimation of operational performance. Since p was below 0.05, the model was not treated as a chance fit. Inventory, transportation, information flow and warehousing management practices therefore predicted operational performance as a combined set. This result justified examination of the individual coefficients.

Setiawan et al. (2022) found that information sharing and integration contribute to operational performance when connected supply chain activities are coordinated. The

significant model in the present analysis aligns with that reasoning because prediction improved when several interdependent practices were entered jointly. Operational outcomes were consequently considered through an integrated supply-chain configuration rather than a single isolated routine.

Lee et al. (2024) reviewed the link between supply chain digitalization and operational performance and emphasized the combined value of visibility, coordination and execution capability. The model significance resonates with that evidence: information systems, inventory controls, physical movement and warehousing routines jointly formed an operating architecture capable of explaining meaningful differences in performance assessments.

Table 5: Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	.114	.121		.942	.347		
Inventory Management Practices	.198	.059	.189	3.356	.001	.229	4.363
Transportation Management Practices	.178	.070	.163	2.543	.012	.175	5.726
Information Flow Management Practices	.353	.065	.337	5.431	.000	.186	5.372
Warehousing Management Practices	.337	.057	.326	5.912	.000	.239	4.191

a. Dependent Variable: Operational Performance

Source: Primary Data, 2026.

The positive constant was not statistically significant ($B=0.114$, $t=0.942$, $p=0.347$). It represented the predicted operational-performance level when all four practice scores were zero, a point outside the observed Likert range and therefore not the substantive focus of the study. Its p-value was above 0.05, confirming that the

intercept was statistically nonsignificant. Interpretation consequently centered on the predictor coefficients.

Inventory management practices had a positive and statistically significant effect on operational performance ($B=0.198$, $t=3.356$, $p=0.001$, $Tol.=0.229$, $VIF=4.363$). A one-unit increase in inventory management practices

increased operational performance by 0.198 units when the other predictors remained constant. The p-value below 0.05 confirmed that inventory management practices made a unique contribution to operational performance. The tolerance and VIF values were within the acceptable limits, indicating that multicollinearity did not invalidate the coefficient estimate. Therefore, H01 was rejected.

Maniraguha and Irechukwu (2022) established that inventory management practices support operational performance through material availability and controlled stock levels. The positive effect identified in the current model aligns with that evidence because a manufacturing company cannot maintain product flow, quality or customer fulfilment when replenishment, inventory accuracy and shortage-prevention procedures are poorly organized.

Transportation management practices produced a positive coefficient and remained statistically significant after controlling for the other supply chain practices ($B=0.178$, $t=2.543$, $p=0.012$, $Tol.=0.175$, $VIF=5.726$). Holding inventory management, information flow management and warehousing management practices constant, a one-unit increase in transportation management practices increased operational performance by 0.178 units. The significance value was below 0.05, confirming that the effect was statistically meaningful. The collinearity statistics remained within the acceptable limits and supported the stability of the coefficient estimate. Therefore, H02 was rejected.

Bwatete and Irechukwu (2024) linked transportation management practices with supply chain performance in Rwanda. The present coefficient resonates with their emphasis on route planning, transport-provider capability, delivery control and transportation-cost management. Transportation management remained significant even after the other supply chain practices were controlled, indicating that the physical movement of materials and finished products retained a distinct contribution to operational performance.

Information flow management practices exerted the largest unstandardized effect in the fitted regression model ($B=0.353$, $t=5.431$, $p=0.000$, $Tol.=0.186$, $VIF=5.372$). With the remaining predictors held constant, each one-unit improvement in information flow management practices increased operational performance by 0.353 units. The significance value below 0.05 confirmed that the effect was statistically meaningful. The tolerance and VIF values indicated an acceptable level of overlap among the predictors rather than harmful multicollinearity. Therefore, H03 was rejected.

Yang et al. (2022) associated information sharing with adaptability and operational performance, particularly

where accurate and timely data supported coordinated organizational responses. The comparatively strong coefficient for information flow management practices is supported by that reasoning because integrated information influences decisions across procurement, production, inventory management, transportation, warehousing and customer service simultaneously.

Warehousing management practices also made a strong positive and statistically significant contribution to operational performance ($B=0.337$, $t=5.912$, $p=0.000$, $Tol.=0.239$, $VIF=4.191$). A one-unit increase in warehousing management practices increased the predicted operational-performance score by 0.337 units, assuming that the other supply chain practices remained unchanged. The t-statistic and significance value confirmed that the effect was statistically reliable. The tolerance and VIF values remained within the acceptable range, indicating that multicollinearity did not compromise the coefficient estimate. Therefore, H04 was rejected.

Hura and Dushimimana (2024) reported that warehouse management contributes to organizational performance within a Rwandan manufacturing context. The substantial positive warehouse coefficient consents with their conclusion because storage layout, handling, safety, picking and dispatch determine whether materials and finished products remain protected, accessible and correctly released for operational use.

The adopted regression model was $OP = \beta_0 + \beta_1IMP + \beta_2TMP + \beta_3IFMP + \beta_4WMP + \varepsilon$, where OP represented operational performance; IMP represented inventory management practices; TMP represented transportation management practices; IFMP represented information flow management practices; WMP represented warehousing management practices; β_0 was the constant; β_1 – β_4 were predictor coefficients; and ε represented unexplained variation.

The fitted model was $OP = 0.114 + 0.198(IMP) + 0.178(TMP) + 0.353(IFMP) + 0.337(WMP)$. The equation shows the predicted change in operational performance arising from a one-unit change in each practice while all remaining predictors are held constant. Every slope was positive, although the intercept itself was not statistically significant.

4.3 Decision on Null Hypotheses

Hypothesis decisions were based on the predictor significance values obtained from the multiple regression model. A null hypothesis was rejected when p was below 0.05, indicating that its corresponding supply chain practice produced a statistically significant effect on operational performance. The four decisions are consolidated below.

Table 6: Decisions on Null Hypotheses

Hypothesis	Statement	p-value	Decision
H01	Inventory management practices had no significant effect on operational performance of Bakhresa Grain Milling Rwanda Ltd.	.001	Rejected
H02	Transportation management practices had no significant effect on operational performance of Bakhresa Grain Milling Rwanda Ltd.	.012	Rejected
H03	Information flow management practices had no significant effect on operational performance of Bakhresa Grain Milling Rwanda Ltd.	.000	Rejected
H04	Warehousing management practices had no significant effect on operational performance of Bakhresa Grain Milling Rwanda Ltd.	.000	Rejected

Source: Primary Data, 2026

All four null hypotheses were rejected because every predictor recorded a significance value below 0.05. The decisions established significant positive effects for inventory management practices, transportation management practices, information flow management practices and warehousing management practices. Information flow and warehousing carried the largest fitted effects, while inventory and transportation remained meaningful after the other variables were controlled.

5. Conclusion and Recommendations

This section presents the conclusions drawn from the study findings and provides practical recommendations aimed at strengthening supply chain practices and improving operational performance at Bakhresa Grain Milling Rwanda Ltd.

5.1 Conclusion

The study established that sound inventory management is fundamental to the operational performance of Bakhresa Grain Milling Rwanda Ltd. Reliable forecasting and timely replenishment help the company maintain the continuous availability of raw materials required for milling and packaging activities. Operational difficulties are therefore more likely to occur when inventory decisions are poorly coordinated or based on inaccurate stock information.

Transportation management emerged as an important determinant of how efficiently materials and finished products move through the supply chain. Delivery reliability depends not only on the availability of vehicles, but also on route selection, carrier competence, shipment coordination and schedule control. Consequently, transport decisions should balance cost considerations with safety, carrying capacity and service dependability.

Among the practices examined, information flow played the most prominent coordinating role. Timely, accurate and accessible information enables procurement, production, inventory, warehousing, transport and customer-service units to make compatible decisions. The effectiveness of information flow therefore rests on

system integration, clear communication procedures and the capacity of employees to interpret and use operational data appropriately.

The findings further demonstrated that warehousing is more than the physical storage of materials and finished products. Warehouse layout, location systems, handling procedures, safety controls, order picking and dispatch arrangements jointly determine the speed and accuracy of internal product movement. Poor warehouse organization can therefore undermine the benefits achieved through procurement and inventory control.

The operational performance of Bakhresa Grain Milling Rwanda Ltd is shaped by the interaction of inventory, transportation, information flow and warehousing practices. Improvements in one area cannot generate lasting results when the remaining functions operate independently or inefficiently. The achievement of product quality, customer satisfaction, cost minimization and profit maximization therefore requires an integrated supply chain approach in which information, physical movement and resource-control decisions are aligned across departments.

5.2 Recommendations

Drawing from the key findings of the study, the following recommendations are presented to guide improvements in management practices

1. Procurement, stores and production managers should strengthen reorder points, safety-stock rules and cycle counting for critical grain, packaging and maintenance inputs so that replenishment decisions are based on verified information.
2. Route plans, dispatch schedules and shipment-tracking information should be reviewed through one operational control process managed jointly by logistics, sales and warehouse staff.
3. The company should establish common data definitions and ownership rules for inventory balances, demand forecasts, purchase orders, production requirements and delivery status because information flow produced the strongest fitted effect on operational performance.

4. Managers should introduce a concise exception dashboard that identifies shortages, late orders, delayed shipments, unusual stock movement and unresolved supplier commitments for timely corrective action.
5. Warehouse leadership should periodically review storage layout and location assignment according to movement frequency, product characteristics, safety requirements and production access because warehousing practices significantly supported product quality and internal flow.

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