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Warehouse Automation Systems on Supply Chain Efficiency in Fast-Moving Consumer Goods Companies in Rwanda: A Case Study of BRALIRWA Plc

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Abstract: *Warehouse automation offers opportunities to improve supply chain efficiency, yet evidence concerning specific technologies in Rwanda's beverage industry remains limited. This study examined the associations of automated storage and retrieval systems, robotic picking and packing, and warehouse management systems with perceived supply chain efficiency at BRALIRWA Plc, Rwanda. Guided by the Technology Acceptance Model, lean thinking, and the resource-based view, the study adopted a descriptive and correlational survey design. The target population comprised 206 employees across nine departments at the Kigali office. The study reported a sample of 136 employees selected through stratified random sampling, of whom 132 returned usable questionnaires, representing a 97.1% response rate. Data were collected using structured five-point Likert questionnaires and analyzed using descriptive statistics and separate simple linear regressions in SPSS version 26. The reported results indicated significant positive associations between perceived supply chain efficiency and automated storage and retrieval systems ($\beta = .986$, $R^2 = .973$), robotic picking and packing ($\beta = .947$, $R^2 = .896$), and warehouse management systems ($\beta = .852$, $R^2 = .726$), all $p < .001$. Each model represented an unadjusted association rather than an independent technological contribution. The study concluded that favorable assessments of these technologies were associated with favorable assessments of order fulfillment, inventory accuracy, and operational cost control. It recommended strengthening system reliability, operator training, and information integration while monitoring operational indicators.*

Keywords: *Automation, Warehousing, Robotics, Inventory, Efficiency, Rwanda*

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1. Introduction

Warehouses connect production schedules with the availability of goods for customers. Their contribution to supply chain efficiency depends on the movement of products and the accuracy of the information that accompanies them. A retrieval delay can interrupt order preparation, while an incorrect stock record can generate a replenishment decision that is inconsistent with actual availability. For fast-moving consumer goods (FMCG), these relationships make warehouse coordination a relevant operational issue. In this study, efficiency refers specifically to employees' assessments of order fulfillment speed, inventory accuracy, and operational cost control; it does not denote a directly audited financial or engineering measure.

International research distinguishes the design of warehouse processes from the acquisition of automation equipment. Roodbergen and Vis (2009) reviewed automated storage and retrieval systems (ASRS), identifying configuration, storage assignment, travel time, and sequencing as important design issues. De Koster et al. (2007) similarly showed that order picking requires coordinated decisions about layout, storage allocation, batching, zoning, and routing. These reviews establish a reason to investigate particular technologies

and the processes surrounding them rather than assume that all automation produces the same outcome.

More recent literature extends attention to intelligent warehouse technologies. Sodiya et al. (2024) reviewed artificial intelligence applications in inventory management, robotic handling, and warehouse coordination. Such literature explains plausible pathways through which automation can improve product handling and information processing. However, a technology review does not demonstrate that a particular installation has achieved shorter delivery times or lower costs. Evidence from employees can reveal how systems are experienced within an organization, but it must be distinguished from evidence based on transaction records, equipment logs, and independently measured service outcomes.

Within Rwanda, Mwizerwa and Akumuntu (2024) examined material handling, inventory management, and warehouse capacity planning at Inyange Industries Ltd. Their work positions warehousing as an important local supply chain research topic. At BRALIRWA Plc, Sylvere and Irechukwu (2022) investigated vendor-managed inventory, demand forecasting, and just-in-time practices. These studies provide contextual foundations, but their constructs do not correspond directly to the three technologies examined here. Evidence on general inventory practices cannot establish how storage automation, robotic order preparation, and warehouse information systems are separately associated with efficiency perceptions in a beverage company.

BRALIRWA Plc provides a bounded case in Rwanda's FMCG sector. The present study draws on a research project involving employees at its Kigali office and focuses exclusively on the project's objectives. It considers ASRS, robotic picking and packing (RPP), and warehouse management systems (WMS). The contribution is an integrated account of employees' assessments of these technologies and their reported statistical associations with perceived supply chain efficiency. Its organizational boundary is explicit: findings from one company and office should not be generalized automatically to all Rwandan FMCG firms.

1.1 Statement of the Problem

Warehouse automation offers opportunities to improve supply chain efficiency through faster order fulfillment, greater inventory accuracy, and better control of operational costs. However, investment in automation does not, by itself, demonstrate that these benefits have been achieved. At BRALIRWA Plc, empirical evidence remains limited regarding how automated storage and retrieval systems (ASRS), robotic picking and packing (RPP), and warehouse management systems (WMS) are individually associated with perceived supply chain efficiency. The absence of independently verified baseline measures of dispatch delays, inventory discrepancies, and warehouse costs further limits conclusions about realized operational improvements.
Previous studies in Rwanda have examined broader warehousing and inventory management practices, providing limited insight into the distinct relationships between these three technologies and supply chain efficiency. This gap restricts the evidence available to inform decisions about storage automation, robotic handling, and warehouse information coordination. Consequently, this study examined the separate associations of ASRS, RPP, and WMS with employees' assessments of order fulfillment speed, inventory accuracy, and operational cost reduction at BRALIRWA Plc. Given its cross-sectional, questionnaire-based design, the study sought to establish statistical associations rather than causal effects or financial returns on automation investment.

1.2 Research Objective

The general objective was to assess the impact of warehouse automation systems on the supply chain efficiency in Fast-moving consumer goods companies at BRALIRWA Plc, Rwanda. The specific objectives were to:

1. Examine the association between automated storage and retrieval systems and perceived supply chain efficiency at BRALIRWA Plc.
2. Assess the association between robotic picking and packing and perceived supply chain efficiency at BRALIRWA Plc.
3. Analyze the association between warehouse management systems and perceived supply chain efficiency at BRALIRWA Plc.

1.3 Hypotheses

The following null hypotheses were tested:

H_{01}: Automated storage and retrieval systems are not significantly associated with perceived supply chain efficiency at BRALIRWA Plc.

H_{02}: Robotic picking and packing are not significantly associated with perceived supply chain efficiency at BRALIRWA Plc.

H_{03}: Warehouse management systems are not significantly associated with perceived supply chain efficiency at BRALIRWA Plc.

2. Literature Review

This section reviews the theoretical foundations, key concepts, and empirical evidence concerning automated storage and retrieval systems, robotic picking and packing, and warehouse management systems in relation to perceived supply chain efficiency.

2.1 Theoretical Review

The Technology Acceptance Model explains technology acceptance through perceived usefulness and perceived ease of use (Davis, 1989). Perceived usefulness concerns the extent to which individuals believe that technology improves their work performance, while perceived ease of use concerns the effort required to operate it. In warehouse operations, these perceptions may influence employees' willingness to use automated equipment and information systems consistently.

The model is relevant to this study because employees' assessments of automated storage and retrieval systems, robotic picking and packing, and warehouse management systems encompass utilization and perceived operational benefits. It provides a basis for understanding how favorable technology assessments may accompany favorable efficiency assessments. However, the study applies to the model as an interpretive framework rather than testing its complete set of constructs and relationships.

Lean thinking emphasizes creating customer value by reducing waste and improving process flow (Womack & Jones, 1996). Within warehouse operations, unnecessary movement, waiting, repeated handling, and corrective work can interrupt product flow and consume resources. Automation may help address these problems when it is aligned with operational requirements.

This perspective connects the three study objectives to specific warehouse processes. Automated storage and retrieval systems may support timely product access, robotic picking and packing may improve handling consistency, and warehouse management systems may strengthen information coordination. Lean thinking therefore explains the anticipated relationships between these technologies and order fulfillment, inventory accuracy, and operational cost control.

The resource-based view explains how valuable, rare, imperfectly imitable, and non-substitutable resources can support sustained competitive advantage (Barney, 1991). Applied to warehouse automation, the perspective suggests that equipment and software derive value partly from their integration with organizational capabilities.

For BRALIRWA Plc, relevant complementary capabilities may include operator competence, maintenance routines, inventory procedures, and reliable information. The resource-based view thus supports examining automation within its organizational context. It also indicates why acquiring technology does not automatically guarantee efficient operations.

2.2 Conceptual Review

Automated storage and retrieval systems (ASRS) facilitate the placement, location, and retrieval of products through automated handling arrangements. Their operational performance depends on system configuration, storage assignment, retrieval sequencing, and compatibility with warehouse requirements (Roodbergen & Vis, 2009).

In this study, ASRS are considered in relation to employees' assessments of system utilization, retrieval speed, inventory accuracy, and handling errors. Their anticipated association with supply chain efficiency arises from the connection between reliable product retrieval and timely order preparation.

Robotic picking and packing (RPP) involve automated technologies that select, handle, and prepare products for dispatch. Contemporary applications include robotic arms, machine vision, and mobile technologies that support warehouse handling activities (Sodiya et al., 2024).

RPP may be associated with efficiency through consistent order preparation, accurate product selection, and reduced handling errors. Nevertheless, its operational relevance depends on product characteristics, task allocation, and coordination with other warehouse processes. The present study examines employees' assessments of these functions in relation to perceived supply chain efficiency.

Warehouse management systems (WMS) coordinate warehouse information and activities, including inventory tracking, stock-location management, replenishment, and order processing. Their primary contribution concerns information visibility and task coordination, which complement physical handling activities.

In this study, WMS are represented by employees' assessments of system use, inventory tracking, process coordination, and fulfillment responsiveness. These functions provide a conceptual basis for examining their association with perceived order fulfillment speed, inventory accuracy, and operational cost control.

2.3 Empirical Review

Roodbergen and Vis (2009) reviewed research on automated storage and retrieval systems, covering system configuration, travel-time estimation, storage assignment, and retrieval sequencing. Their review demonstrates the importance of design and control decisions in evaluating ASRS performance. However, it does not provide direct evidence concerning employees' efficiency assessments in Rwanda's beverage industry.

De Koster et al. (2007) reviewed warehouse order-picking research, emphasizing layout, storage assignment, batching, zoning, and routing. Their work establishes the importance of coordinating order-

preparation activities. Because the review primarily addresses manual picking, it provides a foundation for understanding workflow requirements rather than direct evidence of robotic picking and packing benefits.

Sodiya et al. (2024) reviewed artificial intelligence applications in warehouse automation, including robotic handling and inventory-related information processing. Their work identifies technological capabilities relevant to warehouse efficiency. As a review, however, it does not establish the magnitude of operational benefits at BRALIRWA Plc. Together, these studies inform the expected relationships while highlighting the need for evidence from specific organizational settings.

Mwizerwa and Akumuntu (2024) investigated warehousing management and supply chain performance at Inyange Industries Ltd. The questionnaire-based study covered material handling, inventory management, and warehouse capacity planning and reported positive relationships between warehousing practices and supply chain performance. Its findings provide relevant evidence from Rwanda's manufacturing sector. Nevertheless, its broader constructs do not separately establish the relationships of ASRS, RPP, and WMS with perceived efficiency at BRALIRWA Plc.

Sylvere and Irechukwu (2022) examined inventory management practices and operational performance at BRALIRWA Plc using a cross-sectional survey. Their study focused on vendor-managed inventory, demand forecasting, and just-in-time practices. It provides company-specific context for understanding inventory coordination, but its objectives differ from those of the present study. Consequently, it does not resolve the evidence gap concerning the three selected warehouse automation technologies.

3. Methodology

3.1 Design and Study Setting

The research project adopted a quantitative, descriptive and correlational survey design at BRALIRWA Plc's Kigali office. Questionnaires were distributed and collected over approximately one month. The source identifies the study year as 2026 but does not establish exact fieldwork dates. Employees were the unit of observation. The cross-sectional design describes reported experiences at one period and tests statistical relationships without manipulating technology use or observing change before and after implementation.

3.2 Population and Sampling

The target population comprised 206 employees across management, warehouse operations, logistics and distribution, finance, procurement, sales, marketing, production, and internal audit. The project states that a sample of 136 was determined using $n = N/(1 + Ne^2)$, with $N = 206$ and $e = .05$; the calculation gives approximately 135.97. Departmental stratification and random selection within departments were reported. Of 136 questionnaires distributed, 132 were usable and four were unreturned or invalid, giving a usable response rate of 97.1%.

The departmental allocation table in the source sums to 138, although its total row and the distribution account state 136. Department-specific achieved counts are unavailable. Consequently, the study reports the consistent distribution and return totals without reproducing the conflicting allocation. This discrepancy limits verification of proportional allocation. The high response rate describes participation among those approached; it does not establish the representativeness of employees' technological knowledge or remove possible selection and nonresponse bias.

3.3 Measures and Instrument Quality

The structured questionnaire used a five-point agreement scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree. Each of the three automation constructs contained five items. Supply chain efficiency contained nine items grouped into order fulfillment speed, inventory accuracy, and operational cost reduction. These were self-reported assessments rather than audited indicators. Because several automation items themselves refer to speed, accuracy, and efficiency, predictor–outcome content overlap is an important measurement limitation.

Table 1. Measurement Structure and Reported Internal Consistency

Construct	Items	Cronbach's α
Automated storage and retrieval systems	5	.884
Robotic picking and packing	5	.831
Warehouse management systems	5	.986
Order fulfillment speed	3	.818
Inventory accuracy	3	.903
Operational cost reduction	3	.976

The project reports on a pilot involving 20 purposively selected warehouse and supply chain employees at Inyange Industries Ltd. Two logistics and supply chain experts and the research supervisor reviewed the instrument for relevance and clarity. Reported alpha coefficients indicate internal consistency, but they do not establish discriminant validity. Very high values for WMS and cost reduction may also reflect redundancy. The source provides values labelled average variance extracted without factor loadings or an adequately documented measurement model; those values are not treated here as independent proof of construct validity. It is also unclear whether the reported alpha estimates refer to pilot or main-survey data.

3.4 Data Analysis

SPSS version 26 was used in the original project. This study synthesizes its reported tables; no respondent-level dataset or original SPSS output was supplied for independent reanalysis. Frequencies are used to describe responses. Agreement percentages in the study are calculated as (agree + strongly agree)/132 × 100. This avoids reproducing item standard deviations that conflict with the displayed frequency distributions. Some reported items also differ from frequency-derived values. Composite means and composite standard deviations are therefore not reconstructed from marginal counts.

The inferential analysis comprises three separate simple linear regressions: $Y = a_j + b_jX_j + \varepsilon_j$, where Y is the reported efficiency score and X_j is ASRS, RPP, or WMS, estimated one at a time. The original project included a fourth technology and discussed a combined four-predictor specification. Neither is treated as a substantive objective or result in this study. No new three-predictor regression has been fitted. The R^2 for each retained model refers to that model's unadjusted explained variation and cannot be interpreted as the technology's unique contribution.

The study retains reported standardized coefficients, model fit, and significance tests, translating SPSS values displayed as .000 to $p < .001$. Original unstandardized slopes are not interpreted as unit changes because composite construction and scale compatibility are insufficiently documented. The source's normality table concerns the outcome score, not model-specific residuals; its tolerance and variance inflation factor entries are not reciprocal, and residual diagnostics for the three separate models are unavailable. Accordingly, inferential results are reported conditionally on verification of the original scoring and regression output, rather than presented as independently validated estimates.

4. Results and Discussion

4.1 Response Profile and Perceived Efficiency

The usable sample comprised 132 respondents, including 85 men (64.4%) and 47 women (35.6%). Ninety-three respondents (70.5%) reported at least six years of experience at BRALIRWA, comprising 53 with 6–10 years and 40 with more than 10 years.

Table 2. Agreement with Supply Chain Efficiency Statements

Efficiency statement	Agree or strongly agree, n	Agreement, %
Prompt order processing and dispatch	93	70.5
Scheduled customer delivery times met	93	70.5
Warehouse organization minimizes fulfillment delays	93	70.5
Stock records reflect actual availability	100	75.8
Stock discrepancies are minimal and corrected promptly	92	69.7
Regular checks support inventory tracking	86	65.2
Operations minimize unnecessary expenses	86	65.2
Automation reduces labor and handling costs	89	67.4
Resource use supports operational cost control	85	64.4

Table 2 shows majority endorsement across the nine efficiency statements. Agreement was greatest for stock records reflecting actual availability (75.8%) and lowest for resource use supporting cost control (64.4%). This pattern suggests that favorable stock information perceptions were more widespread than favorable perceptions of resource-related savings. Nevertheless, these percentages do not measure actual accuracy rates, monetary savings, or delivery performance. Between approximately one quarter and one third of respondents did not positively endorse individual statements, indicating room for more detailed investigation.

4.2 Automated Storage and Retrieval Systems and Efficiency

Table 3. Agreement with Automated Storage and Retrieval Statements

ASRS statement	Agreement, n	Agreement, %
Consistent use in warehouse operations	92	69.7
Reduced time locating and moving inventory	91	68.9
Greater inventory record accuracy	93	70.5
Faster warehouse order processing	93	70.5
Fewer storage and retrieval errors	90	68.2

ASRS agreement ranged from 68.2% to 70.5% (Table 3). The relatively narrow range indicates broadly similar endorsement of utilization, speed, accuracy, and error reduction. It also shows that the favorable evaluation was not unanimous: approximately three in ten employees selected disagreement or neutrality. These responses should prompt examination of system availability, retrieval exceptions, and variation in employees' operational exposure rather than an assumption that the installation works equally well in every activity.

The first regression reported a standardized coefficient of .986 and R^2 of .973 (Table 6). Under the reported model, higher ASRS scores were strongly associated with higher perceived efficiency, and H_{01} would be rejected at .05. This is directionally compatible with the operational importance of storage assignment and retrieval control discussed by Roodbergen and Vis (2009). The coefficient does not demonstrate that ASRS caused 97.3% of operational improvements. It describes variation in the survey outcome within one unadjusted model.

The near-perfect association warrants particular scrutiny. ASRS questionnaire items concerning accuracy, speed, and errors resemble the outcome content, which can reduce conceptual separation between the predictor and outcome. A general tendency to evaluate company operations favorably may also influence both scores.

Consequently, the result supports a strong reported perceptual relationship, while the magnitude requires confirmation through the original dataset, explicit scoring rules, and operational evidence independent of the questionnaire.

4.3 Robotic Picking and Packing and Efficiency

Table 4. Agreement with Robotic Picking and Packing Statements

RPP statement	Agreement, n	Agreement, %
Regular use in warehouse operations	91	68.9
Greater order fulfillment accuracy	95	72.0
Fewer picking errors and damaged goods	96	72.7
Faster processing and dispatch	95	72.0
Greater overall warehouse efficiency	90	68.2

The highest RPP endorsement concerned fewer errors and damaged goods (72.7%), followed by accuracy and faster dispatch (both 72.0%). Regular use received 68.9% agreement, while the general efficiency item received 68.2% (Table 4). Employees thus appeared somewhat more willing to endorse particular handling benefits than a broad efficiency claim. These differences are descriptive only: the source does not provide a statistical comparison between items, and differences of a few percentage points should not be treated as established performance gaps.

For the second objective, the reported standardized coefficient was .947, with $R^2 = .896$ and $p < .001$ (Table 6). H_{02} would therefore be rejected under the reported model. This association is compatible with a process interpretation in which more favorable handling assessments accompany more favorable efficiency assessments. However, the study cannot determine whether robots reduced damage or whether efficient operations led employees to evaluate robots more positively. Records of damaged units and dispatch errors would distinguish these explanations more effectively than another general perception item.

The result is relevant to the robotic handling capabilities described by Sodiya et al. (2024), but the comparison is conceptual rather than a replication of a common effect size.

4.4 Warehouse Management Systems and Efficiency

Table 5. Agreement with Warehouse Management System Statements

WMS statement	Agreement, n	Agreement, %
Active monitoring and management of operations	90	68.2
Accurate and timely inventory tracking	92	69.7
Streamlined and coordinated processes	94	71.2
Fewer fulfillment and replenishment delays	88	66.7
Greater warehouse operational efficiency	90	68.2

Coordination received the greatest WMS endorsement (71.2%), whereas reduced fulfillment and replenishment delays received the least (66.7%). This suggests a useful distinction between visibility and execution: employees may recognize better coordination without consistently experiencing faster replenishment. The questionnaire cannot determine whether any delay originates in software, data entry, approval routines, stock availability, or physical handling. The descriptive pattern identifies a question for operational review, rather than diagnosing a technical cause.

The WMS regression reported $\beta = .852$, $R^2 = .726$, and $p < .001$ (Table 6). H_{03} would therefore be rejected under the reported model. The association is positive and strong, although its separate-model fit is lower than those reported for ASRS and RPP. This does not show that WMS are less valuable or deserve lower investment. The three scores may differ in reliability, content overlap, and

relationship to other unmeasured conditions. Their unique contributions have not been estimated simultaneously.

The WMS finding is consistent with the relevance of inventory and warehouse information practices in Rwanda discussed by Mwizerwa and Akumuntu (2024). It extends the local discussion to a separate technology score at BRALIRWA, while retaining a perceptual outcome. A management response should therefore examine transaction timeliness and data accuracy alongside employee assessments, particularly where orders remain delayed despite favorable perceptions of process coordination.

4.5 Hypothesis Synthesis

Table 6. Reported Separate Simple Regression Models

Predictor	β	R^2	Adjusted R^2	F(1, 130)	p
ASRS	.986	.973	.972	4700.368	< .001
RPP	.947	.896	.895	1124.459	< .001
WMS	.852	.726	.724	343.861	< .001

All three reported tests point in the same direction: favorable technology assessments accompany favorable efficiency assessments. This convergence is useful as an organizational signal, but three significant models are not three independent demonstrations of operational improvement. The models reuse the same respondents and outcome. They also omit possible confounders, including departmental exposure, work experience, system uptime, order complexity, staffing, and broader management quality. None of these variables should be assumed to have been controlled.

The theoretical interpretation remains bounded. Technology acceptance offers a reason why favorable usefulness assessments might accompany system engagement (Davis, 1989). Lean thinking suggests examining waiting and rework, while the resource-based view directs attention to complementary capabilities (Womack & Jones, 1996; Barney, 1991).

4.6 Limitations and Future Research

Several limitations qualify the results. First, this is a single-office, single-company study, and the departmental composition achieved is not documented. Second, cross-sectional self-reports cannot establish temporal order or causal effects. Third, technological exposure and actual installations were not independently audited. Fourth, predictor items contain efficiency-related content, creating a risk that constructs measure overlapping evaluations. The common questionnaire format may further amplify associations, consistent with the measurement concerns outlined by Podsakoff et al. (2003).

Fifth, the source contains discrepancies in sample allocation, item summaries, and diagnostic reporting. Respondent-level data, original analysis files, composite scoring rules, and model-specific residual evidence were not available for reconciliation. The inferential results should therefore be regarded as reported estimates requiring source verification. Reporting these limitations does not correct the underlying data or substitute for reanalysis. Finally, separate simple regressions do not identify the relative or independent effects of technologies that may be used together.

Future research should verify the sampling frame and scoring, assess whether the constructs are empirically distinct, and link employee responses to retrieval cycle time, inventory discrepancies, picking errors, and handling costs. A longitudinal or phased implementation design would permit stronger analysis of change. A transparently specified multivariable model could assess adjusted associations after checking collinearity and measurement quality. Comparable studies across multiple FMCG firms would help determine how far the present case-specific pattern extends.

5. Conclusion and Recommendations

5.1 Conclusion

The study concluded that automated storage and retrieval systems, robotic picking and packing, and warehouse management systems were positively associated with perceived supply chain efficiency at BRALIRWA Plc. Employees' assessments linked automated storage and retrieval systems with faster inventory handling and greater stock accuracy, while robotic picking and packing were associated with more accurate order preparation and fewer handling errors or damaged goods. Warehouse management systems were associated with improved inventory visibility and process coordination, although perceptions of reduced fulfillment and replenishment delays were less favorable. Overall, the findings highlight the relevance of these three technologies to employees' assessments of order fulfillment, inventory accuracy, and operational cost control within the company.

5.2 Recommendation

Based on the findings the following recommendations are made:

1. *Optimize automated storage and retrieval systems*: BRALIRWA management should assess storage-location accuracy, retrieval exceptions, maintenance practices, and operator competence. Retrieval cycle times and stock-location errors should be monitored against documented baselines to guide improvements. System modification or expansion should be informed by verified operational benefits and reliability.
2. *Strengthen robotic picking and packing performance*: Warehouse supervisors should provide task-specific training and preventive maintenance while routinely monitoring picking errors, product damage, rework, and dispatch throughput. Comparisons across similar product categories and workloads should establish whether favorable employee assessments correspond to sustained improvements in order preparation.
3. *Improve warehouse management system coordination*: Management should strengthen timely transaction entry, inventory record accuracy, and coordination between replenishment and dispatch activities. Periodic physical stock counts should be reconciled with system balances, while order-to-dispatch timestamps should be examined to identify delays. Staff training should address the data quality and workflow weaknesses identified through these reviews.
4. *Adopt evidence-based investment and training decisions*: Investment appraisal across the three technologies should consider implementation and maintenance costs, operational compatibility, downtime, and independently measured benefits. BRALIRWA and relevant training providers should develop practical instruction in stock reconciliation, robotic exception handling, and warehouse data management. The effectiveness of these measures should be evaluated through operational monitoring, as it was not established by the survey.

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