

A Study on Warehouse Operations: Receiving, Putaway, and Picking in a Railway Equipment Manufacturing Company

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Abstract

Warehouse operations form the backbone of manufacturing supply chains, ensuring the timely and accurate flow of materials from receipt to production and dispatch. This study examines the three core warehouse functions of receiving, putaway, and picking within a railway equipment manufacturing company, with the objective of evaluating existing practices, identifying operational gaps, and recommending measures for improvement. A descriptive research design was adopted, and primary data were collected through a structured questionnaire administered to 58 employees engaged in receiving, putaway, picking, inventory, and related warehouse functions, supplemented by direct observation and secondary data from organisational records and prior literature. The findings indicate that receiving, putaway, and picking processes are perceived positively overall, with strong compliance in material verification, FEFO/FIFO practice, safety procedure adherence, and enterprise resource planning (ERP) system effectiveness. However, respondents identified delays in Goods Receipt Note (GRN) generation, occasional quantity mismatches during picking, and only moderate confidence in warehouse layout and space utilisation as key areas requiring attention. The study concludes that continuous improvement initiatives, targeted employee training, periodic inventory audits, and better warehouse layout planning can further enhance operational efficiency, inventory accuracy, and supply chain performance.

Keywords: Warehouse management; receiving; putaway; picking; inventory accuracy; supply chain efficiency; manufacturing logistics.

1. Introduction

Warehouse operations play a vital role in supply chain management by ensuring the efficient storage, movement, and distribution of goods. A warehouse acts as a central point where materials are received, stored, managed, and dispatched to meet production and customer requirements. Efficient warehouse operations help organisations reduce operational costs, improve inventory accuracy, minimise delays, and enhance customer satisfaction.

The three fundamental warehouse activities examined in this study are receiving, putaway, and picking. Receiving is the process of accepting incoming materials from suppliers, verifying their quantity and quality, and recording them in the warehouse system. Putaway involves moving

received materials to designated storage locations, ensuring proper organisation and easy accessibility. Picking is the process of selecting and collecting the required materials from storage locations to fulfil production or customer orders accurately and on time.

With increasing competition and rising customer expectations, organisations are focusing on improving warehouse efficiency through standardised procedures, inventory management systems, barcode technology, and Warehouse Management Systems (WMS). Effective warehouse operations reduce material-handling time, prevent inventory errors, optimise storage space, and improve productivity.

1.1 Industry Overview

The railway equipment manufacturing industry plays a vital role in the transportation sector by designing, producing, and supplying components used in railway systems, including train couplers, gangways, braking systems, and electrical connectors. The industry supports passenger and freight transportation by ensuring safety, reliability, and operational efficiency, and has experienced sustained growth driven by the expansion of metro and high-speed rail networks, increased investment in railway infrastructure, adoption of smart manufacturing and Industry 4.0 technologies, and a global focus on environmentally sustainable transport.

Within this industry, warehouses are essential for managing raw materials, spare parts, and finished goods. Major warehouse activities include receiving materials, quality inspection, Goods Receipt Note (GRN) processing, putaway, inventory management, picking and packing, and dispatch and shipping. Efficient warehouse management in this context helps reduce costs, improve inventory accuracy, and ensure timely production, thereby supporting the broader competitiveness of the sector.

1.2 Need and Importance of the Study

The warehouse is a critical function in the manufacturing industry, ensuring the smooth flow of materials from receipt to production and dispatch. Studying warehouse operations within a manufacturing environment provides practical exposure to inventory management, material handling, and warehouse processes, and helps in understanding how efficient warehouse operations contribute to uninterrupted production, improved inventory accuracy, and customer satisfaction. Specifically, this study helps to gain practical knowledge of warehouse operations; understand the receiving, putaway, picking, and inventory management processes; learn the importance of material-handling and storage practices; observe warehouse safety standards and quality procedures; and bridge the gap between theoretical knowledge and industrial practice.

1.3 Statement of the Problem

Warehouse operations such as receiving, putaway, and picking are critical activities that directly affect inventory accuracy, storage utilisation, and overall warehouse efficiency. Any delay, incorrect storage location, inaccurate picking, or lack of standard procedures can lead to operational inefficiencies, increased costs, and reduced customer satisfaction. Warehouse activities typically involve multiple manual and system-based processes that require proper coordination, and challenges such as delays in material movement, incorrect location updates, inventory mismatches, improper material handling, and non-adherence to standard operating procedures can affect warehouse performance. There is, therefore, a need to analyse existing warehouse operations, identify operational gaps, and evaluate the effectiveness of the receiving, putaway, and picking processes.

1.4 Objectives of the Study

(i) To study the overall warehouse operations of receiving, putaway, and picking in a railway equipment manufacturing company; (ii) To understand the receiving, putaway, and picking processes followed in the warehouse; (iii) to study inventory management and material-handling practices; (vi) to observe the warehouse safety and quality procedures implemented; and (v) to gain practical insight into warehouse management through direct workplace exposure.

1.5 Scope of the Study

The scope of the study is limited to the warehouse operations of receiving, putaway, and picking within a single manufacturing organisation, examined over a defined period. The study focuses on day-to-day warehouse activities and their role in supporting manufacturing operations, including the receiving of incoming materials, the putaway and storage of materials, the picking process for production requirements, inventory management and material-tracking practices, warehouse safety procedures and quality standards, and the use of warehouse documents and systems in daily operations.

2. Review of Literature

A review of literature was undertaken to situate this study within the existing body of knowledge on warehouse and operations management, and to identify gaps that the present study seeks to address.

2.1 Technology, AI, and Digital Transformation in Warehousing

A growing body of research links technological adoption with operational excellence in warehouse and manufacturing settings. Martuscelli et al. (2026), reviewing 67 peer-reviewed articles, found that artificial intelligence contributes significantly to production planning, inventory management, quality control, predictive maintenance, and supply-chain decision-making by reducing process

variability and enabling faster, data-driven decisions. Complementing this, Cano et al. (2026) demonstrated that digital learning technologies such as ERP systems, simulations, and virtual/augmented reality enhance experiential understanding of operations management concepts. Rungruengkultorn et al. (2025) and Youssef et al. (2022) both examined Industry 4.0 technologies—including IoT, cyber-physical systems, RFID, and automation—concluding that such tools improve inventory visibility, order-picking accuracy, and real-time monitoring, though implementation costs, training needs, and cybersecurity remain barriers. Hasan et al. (2022) similarly proposed an IoT- and RFID-based warehouse management system that improved tracking accuracy and reduced labour requirements, while Jude (2025) and Hasan (2025) showed that cloud computing and predictive analytics support real-time inventory visibility and optimised replenishment scheduling.

2.2 Warehouse Management Systems, Lean, and Sustainability

Several studies examine structured approaches to improving warehouse performance. Al Bashar (2024) mapped the complete roadmap of WMS implementation—from requirement analysis to full-scale deployment—finding that integration with barcode scanning, RFID, and AI improves inventory accuracy, order-fulfilment speed, and overall productivity. Minashkina (2024) emphasised that sustainable use of WMS additionally supports employee safety and ergonomic working conditions. Osman et al. (2025) reviewed the application of Lean methodology to warehousing, concluding that tools such as 5S, standardised work, and waste-reduction techniques improve space utilisation and reduce handling time, while Teplická and Kadárová (2026) proposed a Sustainable Warehouse Process (SWP) model linking cost reduction with long-term performance growth. Venkatesh and Kavya (2024) extended this sustainability lens to green warehousing, noting that energy-efficient technologies and renewable energy integration reduce environmental impact without compromising operational effectiveness.

2.3 Inventory Control and Order Picking

Inventory control remains a central theme in warehouse research. Jackson et al. (2020) traced the evolution of inventory control models across more than a century, highlighting that model selection depends on demand uncertainty and lead-time variability. Vaka (2024) argued for integrating inventory and distribution decisions to reduce logistics costs and stock-outs, while Ahmed et al. (2021) found that weak internal controls and inadequate documentation increase the risk of inventory-related errors and fraud. Hafnika et al. (2017) demonstrated, through a continuous-review inventory policy using EOQ, reorder point, and ABC classification, that systematic inventory control can substantially reduce excess stock-holding costs. On order picking specifically, Shah and Khanzode (2017) identified picking as the most cost-intensive warehouse activity, while Jumahat et al. (2023) reviewed augmented-reality pick-by-vision systems and found they reduce picking errors and travel distance while improving worker guidance.

2.4 Warehouse Layout, Location, and Operational Issues

Layout and location decisions strongly influence warehouse efficiency. Mohamud et al. (2023) found that effective layout minimises travel time and improves material flow, a finding empirically supported by Ernawati et al. (2023), who reported a strong positive relationship ($R = 0.868$) between warehouse layout and employee productivity. Guerrero et al. (2022), analysing nearly 2,000 warehouses in France, showed that location and distribution scope significantly affect transportation efficiency and logistics performance, while De Leeuw and Mok (2016) found that infrastructure quality and proximity to transport hubs are key determinants of warehouse-location decisions in humanitarian contexts. Kłodawski et al. (2017) and Lobok (2023) both emphasised those systematic decision-making frameworks and optimised resource allocation are essential for managing increasing warehouse complexity.

2.5 Broader Operations Management Perspectives

Finally, several studies situate warehouse operations within the wider discipline of operations management. Zhang et al. (2020), analysing 4,188 articles across two decades, identified connectivity, clarity, and continuity as strategic capabilities essential to modern, technology-enabled operations. Qi and Shen (2018) extended operations management thinking to smart-city contexts, while Heuwinkel (2022) linked warehousing and order fulfilment directly to customer satisfaction in e-commerce. Terwiesch (2023) offered a novel perspective by evaluating an AI language model's performance on operations management examinations, concluding that such tools can support—but not replace—human judgement in complex process-analysis tasks. Collectively, this literature underscores those technology adoption, lean and sustainable practices, sound inventory control, and effective layout planning are the principal levers for improving receiving, putaway, and picking performance—the same three functions examined empirically in this study.

3. Research Methodology

Research methodology is the systematic approach used to conduct a study, encompassing qualitative, quantitative, and mixed-method approaches. This study adopted a descriptive research methodology to examine warehouse operations relating to receiving, quality inspection, putaway, storage, and picking.

3.1 Research Design

A descriptive research design was adopted to examine existing warehouse processes through direct observation and practical workplace exposure. This design enabled analysis of current practices and identification of improvement opportunities without altering the normal work environment.

3.2 Sample Size and Technique

The study sample comprised 58 respondents drawn from employees working in receiving, quality inspection, putaway, picking, inventory, and logistics functions. A convenience sampling technique was used, with respondents selected based on their availability and direct involvement in warehouse operations during the study period.

3.3 Questionnaire Design and Data Collection

A structured questionnaire comprising close-ended and a small number of open-ended questions was designed to collect data on receiving, system updates, putaway, picking, material handling, inventory accuracy, safety practices, and process efficiency. Primary data were collected through the questionnaire, direct observation, and discussions with warehouse staff. Secondary data were drawn from organisational records, standard operating procedures, and published research literature.

3.4 Limitations of the Study

The study is subject to several limitations: it was confined to a single organisation and a limited observation period; the sample size was restricted to 58 respondents; certain organisational information could not be disclosed; and findings are based on employee perceptions and direct observation, which may limit generalisability to other organisational contexts.

4. Results and Data Analysis

This section presents the survey findings, grouped thematically across respondent profile, receiving, putaway, picking, and overall inventory, safety, and system performance.

4.1 Respondent Profile

Table 1. Years of Experience and Team Distribution of Respondents

Category	Group	Respondents	Percentage (%)
Years of experience	Less than 1 year	9	15.52
	1–3 years	14	24.14
	4–6 years	20	34.48
	7–10 years	10	17.24
	More than 10 years	5	8.62
Team	Receiving	12	20.69
	Putaway	12	20.69
	Picking	12	20.69
	Consumable Storage	10	17.24

Category	Group	Respondents	Percentage (%)
	System	12	20.69

The majority of respondents (34.48%) had 4–6 years of experience, followed by 1–3 years (24.14%), indicating that the sample was reasonably experienced. Respondents were also evenly drawn across the receiving, putaway, picking, consumable storage, and system teams, ensuring balanced representation.

4.2 Receiving Process

Table 2. Receiving Process Indicators

Indicator	Positive Response (%)	Neutral / Sometimes (%)	Negative Response (%)
Receiving process is well organised	74.14 (Agree/Strongly agree)	17.24	8.62
Materials verified with PO and invoice before receiving	74.13 (Always/Often)	13.80	12.07
Damaged materials identified and reported immediately	74.14 (Always/Often)	15.52	10.35
GRN generated without delay	37.93 (Always/Often)	50.00	12.07

Respondents held a broadly positive view of the receiving process, with strong agreement on material verification and prompt reporting of damaged goods. However, only 37.93% reported that the Goods Receipt Note (GRN) is always or often generated without delay, with half of the respondents rating this as occurring only "sometimes" — indicating a specific operational bottleneck in receiving-to-system data entry.

4.3 Putaway Process

Table 3. Putaway Process Indicators

Indicator	Positive Response (%)	Neutral / Average (%)	Negative Response (%)
Materials are stored in the correct location	67.24 (Agree/Strongly agree)	24.14	8.62
Putaway process reduces material searching time	72.41 (Agree/Strongly agree)	17.24	10.35
Inventory records updated immediately after putaway	74.13 (Always/Often)	13.80	12.07
Warehouse locations are clearly identified	41.38 (Excellent/Good)	50.00 (Average)	8.62 (Poor)

The putaway process was generally viewed as effective in reducing material-searching time and maintaining timely inventory updates. Warehouse location identification, however, was rated as only "average" by half of respondents, suggesting scope for clearer labelling and signage.

4.4 Picking Process

Table 4. Picking Process Indicators

Indicator	Positive Response (%)	Neutral / Sometimes / Average (%)	Negative Response (%)
Picking list provides accurate information	72.41 (Agree/Strongly agree)	17.24	10.35
Materials are picked without errors	72.41 (Always/Often)	15.52	12.07
Quantity mismatch occurs during picking	37.93 (Always/Often)	50.00 (Sometimes)	12.07 (Rarely/Never)
Picking process supports timely production	75.86 (Excellent/Good)	17.24 (Average)	6.90 (Poor)

Picking-related indicators were consistently rated favourably: respondents perceived the picking list as accurate and reported that materials are generally picked without errors, supporting timely production. Quantity mismatches were reported as occurring only occasionally by half of the respondents, suggesting that while errors are not systemic, additional verification steps could further reduce their frequency.

4.5 Inventory, Safety, and System Performance

Table 5. Inventory, Safety, and System Indicators

Indicator	Positive Response (%)	Neutral / Average (%)	Negative Response (%)
Inventory accuracy is maintained	72.41 (Agree/Strongly agree)	17.24	10.35
FEFO/FIFO practices followed wherever applicable	74.13 (Always/Often)	15.52	10.35
PPE is used regularly	74.13 (Always/Often)	13.80	10.35
Warehouse safety procedures are followed	75.86 (Agree/Strongly agree)	15.52	8.62
Warehouse layout supports smooth material flow	39.65 (Agree/Strongly agree)	50.00 (Neutral)	10.35
M3 ERP system is effective for warehouse operations	79.31 (Excellent/Good)	15.52 (Average)	5.17 (Poor)

Indicator	Positive Response (%)	Neutral / Average (%)	Negative Response (%)
Material handling equipment is sufficient	75.86 (Excellent/Good)	17.24 (Average)	6.90 (Poor)
Overall warehouse operations are efficient	41.38 (Excellent/Good)	50.00 (Average)	8.62 (Poor)

Inventory accuracy, FEFO/FIFO adherence, PPE usage, and safety-procedure compliance were all rated positively by roughly three-quarters of respondents, reflecting a sound safety and inventory-control culture. The ERP system used for warehouse operations was rated favourably by 79.31% of respondents, indicating strong confidence in the system's operational support. Warehouse layout and overall operational efficiency, however, were rated as merely "average" by half of the respondents, pointing to these as the two areas with the greatest scope for improvement.

4.6 Priority Area for Improvement

Table 6. Warehouse Activity Perceived to Require the Most Improvement

Activity	Respondents	Percentage (%)
Receiving	18	29.31
Putaway	15	27.59
Picking	13	20.69
System	7	13.79
All of the above	5	8.62

Receiving was identified by 29.31% of respondents as the activity requiring the most improvement, followed closely by putaway (27.59%) and picking (20.69%). This finding is consistent with the specific bottlenecks identified in Tables 2 and 3 — namely, delays in GRN generation and inconsistencies in warehouse location identification.

5. Discussion of Findings

The findings indicate that receiving, putaway, and picking processes are, on balance, perceived positively by warehouse employees, with strong compliance around material verification, damage reporting, FEFO/FIFO practice, PPE usage, and safety-procedure adherence. The high rating accorded to the ERP system suggests that digital tools are playing an effective supporting role in warehouse operations, consistent with prior literature linking WMS and ERP integration to improved inventory accuracy and productivity.

At the same time, three specific gaps emerge consistently across the data. First, GRN generation is not always timely, with half of respondents describing this as occurring only "sometimes" — a

finding that aligns with the wider literature's emphasis on the importance of prompt, technology-enabled documentation in receiving. Second, warehouse location identification and overall layout were rated only "average" by half of respondents, echoing prior findings that layout quality is strongly linked to material-flow efficiency and productivity. Third, occasional quantity mismatches during picking, while not systemic, indicate room for additional verification safeguards. Together, these findings explain why receiving and putaway were most frequently identified as priority areas for improvement.

6. Suggestions

Based on the findings, the following measures are suggested to enhance warehouse operational performance:

- Increase manpower during peak receiving periods to avoid delays in unloading, inspection, and GRN processing.
- Optimise warehouse layout and improve location labelling to enhance space utilisation and reduce material-handling and search time.
- Conduct regular employee training on ERP usage, warehouse procedures, and safety practices.
- Perform periodic inventory audits to maintain and further improve stock accuracy.
- Strengthen coordination between the warehouse and suppliers to reduce delivery discrepancies.
- Monitor warehouse performance using key performance indicators such as receiving time, putaway time, picking accuracy, and inventory accuracy.
- Continue implementing continuous-improvement initiatives such as 5S and Lean practices.
- Introduce additional verification checkpoints during picking to further reduce quantity mismatches.
- Encourage regular employee feedback to identify operational issues and implement corrective actions promptly.

7. Conclusion

This study on warehouse operations relating to receiving, putaway, and picking in a railway equipment manufacturing company concludes that effective warehouse operations play a vital role in ensuring smooth material flow, inventory accuracy, and uninterrupted production. The survey findings indicate that employees generally hold a positive view of the existing warehouse system: the receiving process is well organised, the putaway process helps reduce material-searching time, and the picking process generally provides accurate information supportive of timely production.

At the same time, respondents highlighted the need for further improvement in receiving and putaway activities, particularly regarding the timeliness of GRN generation and the clarity of warehouse location identification, especially during peak workload periods. The use of ERP systems, proper location management, standardised operating procedures, and trained personnel were all found to significantly improve warehouse performance, while effective coordination between warehouse, purchasing, quality, and production functions was found to contribute to timely material availability and overall supply-chain efficiency.

Overall, the warehouse operations examined in this study are well managed and effectively support manufacturing activities. By adopting continuous-improvement initiatives, enhancing employee training, optimising warehouse space, and strengthening inventory-control practices, manufacturing organisations can further improve operational efficiency, customer satisfaction, and overall supply-chain performance.

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