OPEN ACCESS
Journal Markcount Finance
Vol. 4 No. 4. August 2026, pp. 313-330
DOI. 10.70177/jmf.v4i4. 4181

Research Article

IMPROVING DISTRIBUTION INVENTORY CONTROL THROUGH FIFO AND COSO FRAMEWORK AT PT. MITRA KENCANA DISTRIBUSINDO

Regina Luntungan[1], Sintia Nurani Korompis[2], Elisabeth Deisi Malonda[3], and Noah Smith[4]
[1] Politeknik Negeri Manado, Indonesia
[2] Politeknik Negeri Manado, Indonesia
[3] Politeknik Negeri Manado, Indonesia
[4] University Waikato, New Zealand

Corresponding Author:

Regina Luntungan,
Department of Applied Financial Accounting, Politeknik Negeri Manado.
Jl. Raya Politeknik, Buha, Kec. Mapanget, Kota Manado, Sulawesi Utara, Indonesia
Email: reginaluntungan74@gmail.com

Article Info

Received: February 10, 2026
Revised: May 15, 2026
Accepted: July 25, 2026
Online Version: August, 2 2026

Abstract

This study aims to analyze the effectiveness of inventory internal control using the First In, First Out (FIFO) method at PT Mitra Kencana Distribusindo, particularly in the Non-Food Warehouse. This research employed a descriptive qualitative approach with an evaluative orientation based on the COSO internal control framework. Data were collected through structured interviews with two purposively selected informants, direct non-participant observation of warehouse activities, and documentation review of receiving notes, cash invoices, warehouse cards, stock opname documents, aging reports, non-food inventory data, and checker duty documents. Data analysis was carried out through data reduction, data display, and conclusion drawing by grouping the findings into the five COSO components and FIFO implementation criteria. The findings indicate that inventory control has been implemented through receiving and issuing procedures, segregation of duties, authorization, internal and external checker functions, warehouse cards, stock opname, aging reports, and FIFO-based inventory circulation. However, the control system is not yet fully optimal because several critical weaknesses remain, particularly incomplete batch/expiry information, limited written follow-up documentation for stock opname results, insufficient FIFO-based warehouse layout control, and inadequate follow-up records for discrepancies, returns, damaged goods, defective goods, and items approaching expiry. This study concludes that FIFO-based inventory internal control is sufficiently effective, but still requires stronger documentation, monitoring, and corrective action procedures to improve inventory accuracy, traceability, and risk responsiveness.

Keywords: COSO, Distribution Company, FIFO, Internal Control, Inventory Management

© 2026 by the author(s)
This article is an open-access article distributed under the terms and conditions of the Creative Commons Attribution-ShareAlike 4.0 International (CC BY SA) license (https://creativecommons.org/licenses/by-sa/4.0/).

Journal Homepage https://research.adra.ac.id/index.php/jmf
How to cite: Luntungan, R., Korompis, S.N., Malonda, E.D., and Smith, N. (2026). Improving Distribution Inventory Control Through Fifo and Coso Framework at PT. Mitra Kencana Distribusindo. *Journal Markcount Finance*, *4*(4), 313-330. https://doi.org/10.70177/jmf.v4i4.4181
Published by: Yayasan Adra Karima Hubbi

INTRODUCTION

Merchandise inventory is one of the most important current assets in distribution companies because it directly supports sales continuity, customer service, operational efficiency, and the reliability of inventory information (Saisud & Kongkaew, 2026). In distribution activities, inventory control is not only related to the availability of goods, but also to the accuracy of recording, the suitability of physical stock with system data, the timeliness of warehouse information, and the ability of the company to prevent discrepancies, damage, expired goods, and misappropriation (Najafi & Zolfagharinia, 2024). Recent studies show that inventory control remains a critical issue because weak recording, limited monitoring, and inaccurate inventory data can affect operational decisions and reduce the reliability of warehouse information (Ahmadkhan et al., 2026). Therefore, inventory control in distribution companies requires systematic procedures for receiving, storing, checking, issuing, documenting, and monitoring goods.

This issue is relevant to the Non-Food Warehouse of PT Mitra Kencana Distribusindo, which manages various consumer products such as Dettol, Shinzui, Harpic, Stella, Hit, Vanish, Polytex, rat glue, trash bags, and cling wrap (Tolio et al., 2025). These products have different characteristics, storage durations, packaging conditions, and expiry-related risks. As a result, inventory control in the non-food warehouse requires more than quantity recording; it also requires physical checking, document matching, batch/expiry control, FIFO-based storage, return verification, and follow-up documentation (Akbari et al., 2026). Studies on warehouse management emphasize that storage layout, picking processes, and warehouse information systems can influence inventory accuracy, operational efficiency, and the traceability of goods movement.

PT Mitra Kencana Distribusindo is a distribution company that handles food and non-food consumer products (Sharifi et al., 2026). Its distribution activities require coordination among purchasing, warehouse, administration, finance, sales, delivery, and checking functions. The empirical documents used in this study indicate that the company processes significant volumes of goods, especially in the Non-Food Warehouse (Hosseini-Motlagh et al., 2026). Receiving notes show the movement of goods into the warehouse, while cash invoices show outgoing goods to customers. Such operational activities make internal control important because every item received, stored, picked, checked, loaded, and issued must be documented, authorized, and monitored through reliable procedures (Douaa et al., 2026). Prior studies have shown that inventory control in trading, retail, manufacturing, and distribution companies requires strong documentation, supervision, authorization, and monitoring to protect assets and improve recording accuracy.

The COSO framework is relevant for assessing inventory internal control because it provides a structured basis for evaluating whether control procedures are properly designed and implemented (Alkhedher, 2026). In inventory management, COSO-based analysis can be used to examine the control environment, risk assessment, control activities, information and communication, and monitoring. Recent studies using the COSO framework show that internal control weaknesses often occur in documentation, segregation of duties, authorization, inventory supervision, monitoring, and follow-up actions (Yu et al., 2025). However, these studies generally evaluate the existence of internal control components, while fewer studies examine whether the control process can be traced through daily operational evidence, such as receiving documents, cash invoices, warehouse cards, checker functions, stock opname practices, aging reports, batch/expiry information, and corrective follow-up records.

FIFO, or First In, First Out, is also important in distribution inventory because it prioritizes the release of goods that entered the warehouse earlier. In practice, FIFO is not only an accounting assumption, but also an operational control practice that requires accurate receiving dates, batch/expiry information, warehouse layout, stock cards, aging reports, and discipline in issuing goods. (Kuo et al., 2025), show that FIFO supports warehouse inventory

control and operational continuity, while studies on inventory record accuracy, perishable goods, and storage-duration risks confirm that inspection, batch tracking, expiry monitoring, and inventory reconciliation are important for preventing outdated stock, inaccurate records, and operational inefficiency (Lunet et al., 2026). Thus, FIFO implementation should be assessed not only from the company's stated procedure, but also from whether warehouse evidence can prove that older goods or goods approaching expiry are prioritized for release.

The documentary evidence in this study shows that PT Mitra Kencana Distribusindo uses receiving notes for incoming goods and cash invoices for outgoing goods (Zhao et al., 2025). These documents contain important transaction information, such as transaction number, date, supplier or customer, product code, item name, quantity, warehouse location, and signatures or initials of responsible parties (Ai et al., 2026). However, preliminary document review also indicates that batch/expiry information needs more consistent completion. This issue is critical because incomplete batch/expiry data may weaken FIFO traceability and reduce the company's ability to identify which goods should be issued first. Studies on accounting information systems, warehouse modernization, and inventory documentation emphasize that accurate records, integrated information systems, and complete transaction documents are essential for supporting decision-making and improving inventory reliability.

Previous research also indicates that inventory control weaknesses remain a practical problem in many organizational settings (Hajej & Gharbi, 2026). Several studies emphasize the importance of strengthening internal control to protect inventory assets and improve stock record accuracy. Other studies focus on the risks arising from weak supervision, incomplete documentation, limited monitoring, fraud potential, and unreliable inventory information (Kandasamy et al., 2025). In addition, studies on stock opname and warehouse information systems show that periodic physical checking and proper documentation are needed to detect discrepancies and support inventory accuracy. Although these studies provide important insights, most of them remain focused on internal control or inventory management separately, and have not sufficiently integrated COSO-based evaluation with FIFO implementation in daily warehouse operations.

This limitation creates a specific research gap. Prior studies have generally assessed whether internal control procedures exist, but fewer studies have examined whether those controls are supported by operational evidence and can be traced across receiving, storage, picking, checking, loading, issuing, return verification, stock opname, and aging report activities (Verma & Samanta, 2026). Moreover, the relationship between COSO components and FIFO implementation has not been sufficiently explored in the context of a non-food distribution warehouse, where inventory risks may arise from stock discrepancies, returned goods, damaged or defective goods, slow-moving items, incomplete batch/expiry records, weak warehouse layout control, and limited follow-up documentation (Wang et al., 2026). Therefore, this study contributes empirically by integrating COSO-based internal control analysis with FIFO implementation using structured interviews, direct observation, and company documents.

Based on this gap, this research analyzes the effectiveness of internal control over merchandise inventory using the FIFO method at PT Mitra Kencana Distribusindo, specifically in the Non-Food Warehouse (Rautela et al., 2026). The study addresses five objectives: to describe receiving and issuing procedures, to analyze inventory internal control using the COSO framework, to examine FIFO implementation, to identify constraints in inventory control and FIFO application, and to propose practical improvements (Olvera et al., 2026). The contribution of this study lies in showing that inventory control should not only be evaluated based on the existence of SOPs, authorization, checker functions, warehouse cards, stock opname, and aging reports, but also based on whether those controls are traceable, consistently implemented, and responsive to operational risks in warehouse activities (Touzout et al., 2026). This COSO–FIFO integration offers a distinct empirical contribution by connecting internal

control components with practical FIFO evidence in the daily operation of a non-food distribution warehouse.

RESEARCH METHOD

Research Design

This study used a descriptive qualitative approach with an evaluative orientation. The qualitative approach was selected because the research problem focuses on understanding inventory procedures, control practices, risk identification, documentation, monitoring activities, and FIFO implementation in the natural setting of a distribution warehouse. The study did not aim to measure inventory control statistically, but to examine how control procedures were practiced, documented, verified, and followed up in daily warehouse operations. This approach was considered appropriate because the research focused on field-based evidence, including structured interviews, direct non-participant observation, and documentation review of warehouse activities.

The evaluative orientation was applied because this study did not merely describe inventory activities, but also assessed the adequacy of internal control practices using the COSO-based control perspective. The empirical findings were organized into five control components: control environment, risk assessment, control activities, information and communication, and monitoring (Mohamadi et al., 2025). These components were used to evaluate whether warehouse responsibilities were properly separated, inventory risks were identified, control procedures were implemented, inventory information was communicated, and monitoring activities were followed by corrective actions. Recent studies show that COSO-based evaluation is relevant for assessing inventory control because it helps identify weaknesses in documentation, authorization, supervision, risk response, monitoring, and follow-up procedures.

In addition to the COSO-based evaluation, this study also examined FIFO implementation as an operational inventory control practice. FIFO was evaluated by observing and analyzing the flow of incoming and outgoing goods, the use of receiving notes, cash invoices, warehouse cards, aging reports, stock opname activities, checker functions, batch/expiry information, and warehouse layout. This evaluation was important because FIFO is not only related to the order of issuing goods, but also to inventory traceability, expiry control, warehouse arrangement, and stock accuracy. Previous studies indicate that FIFO, stock opname, inventory record accuracy, and warehouse layout are closely related to the ability of a company to reduce stock discrepancies, prevent outdated or slow-moving goods, and improve inventory reliability.

The COSO–FIFO integration in this study provides a distinct empirical contribution because it connects internal control components with actual warehouse practices. This integration allows the study to assess not only whether control procedures exist, but also whether those procedures are traceable, consistently implemented, and responsive to operational risks. In the context of the Non-Food Warehouse, the evaluation focused on risks such as stock discrepancies, returned goods, damaged or defective goods, slow-moving items, incomplete batch/expiry records, weak FIFO traceability, and limited follow-up documentation. Therefore, the research design was structured to connect interview findings, observation results, and company documents with both internal control criteria and FIFO implementation criteria.

The research was conducted at PT Mitra Kencana Distribusindo, located on Jl. Walanda Maramis No. 88, Kairagi Satu, Mapanget, Manado, North Sulawesi, Indonesia. The study focused on the Non-Food Warehouse because the empirical documents obtained in the research showed substantial activities related to incoming and outgoing non-food products. The research

period was planned from April 2026 to June 2026, covering data collection through structured interviews, direct non-participant observation, and documentation review.

Research Subject

The research subjects were parties who understood and were directly involved in inventory management activities in the Non-Food Warehouse of PT Mitra Kencana Distribusindo. The study involved two informants who had relevant knowledge of receiving procedures, issuing procedures, warehouse checking activities, FIFO implementation, warehouse cards, stock opname, inventory risks, and aging reports. The informants were selected purposively because the study required information from individuals who were directly related to daily warehouse control practices (Kouki et al., 2026). The first informant provided information related to segregation of duties, authorization, inventory risks, stock discrepancies, and corrective actions, while the second informant provided information related to SOPs, FIFO implementation, warehouse cards, stock opname, and aging reports. The use of two informants was considered appropriate because this qualitative study emphasized the depth and relevance of information rather than statistical representation. Similar studies on inventory internal control and warehouse management also emphasize the importance of obtaining information from parties directly involved in inventory procedures, documentation, supervision, and monitoring activities.

Data were collected through structured interviews, direct non-participant observation, and documentation review. Structured interviews were conducted using a predetermined list of questions to obtain systematic information about standard operating procedures, segregation of duties, authorization, checker functions, warehouse cards, FIFO application, expired goods risk, stock discrepancies, stock opname, aging reports, and monitoring practices. Direct non-participant observation was conducted to examine warehouse activities without the researcher being involved in operational work. The observation focused on receiving goods, unloading checks, storage arrangements, picking activities, internal checker verification, loading checks, external checker verification, document matching, warehouse card recording, and FIFO-based goods movement (Temizöz et al., 2025). Documentation review was conducted by examining receiving notes, cash invoices, warehouse cards, stock opname-related documents, aging reports, checker duty documents, non-food inventory data, and other supporting records. These data collection techniques were used to compare interview statements with actual warehouse practices and documentary evidence, because recent inventory control studies emphasize that documentation, stock opname, warehouse records, checker functions, and monitoring evidence are important for assessing the reliability of inventory control practices.

Research Procedure

The research procedure was carried out in several stages. The first stage was identifying the research problem related to inventory internal control and FIFO implementation at PT Mitra Kencana Distribusindo. This stage was conducted by reviewing preliminary information, company documents, and inventory-related activities in the Non-Food Warehouse. The initial review focused on the flow of goods from receiving, storage, picking, checking, loading, and issuing, as well as the use of supporting documents in controlling inventory movement. This stage was important because recent studies emphasize that inventory control problems often arise from inaccurate records, weak documentation, limited monitoring, and insufficient control over warehouse activities.

The second stage was determining the research informants. The informants were selected purposively because they were directly involved in and understood the company's inventory management practices. The study involved two informants who had knowledge of receiving procedures, issuing procedures, warehouse checking activities, checker functions, FIFO implementation, warehouse cards, stock opname, inventory risks, and aging reports. The first

informant provided information related to warehouse control practices, segregation of duties, authorization, inventory risks, stock discrepancies, and corrective actions. The second informant provided information related to SOPs, FIFO implementation, warehouse cards, stock opname, and aging reports (Cuong et al., 2025). The small number of informants was considered appropriate because this qualitative study emphasized the depth and relevance of information rather than statistical representation. Each interview was conducted using a structured interview guide and lasted approximately 20 minutes, depending on the completeness of the responses provided by the informants. Similar inventory control studies also emphasize the importance of obtaining information from parties who understand documentation, authorization, supervision, and monitoring in warehouse or inventory activities.

The third stage was collecting data through structured interviews, direct non-participant observation, and documentation review. Interviews were conducted to obtain systematic information about inventory control procedures, segregation of duties, authorization, documentation, checker functions, FIFO implementation, stock opname, warehouse cards, aging reports, and inventory risks. Observation was carried out in the Non-Food Warehouse to examine actual inventory management practices, including receiving goods, unloading checks, storage arrangements, picking activities, internal checker verification, loading checks, external checker verification, document matching, warehouse card recording, and FIFO-based goods movement. The observation also focused on whether older goods or items approaching expiry could be identified and whether the warehouse layout supported FIFO implementation. These observation points are relevant because warehouse layout, picking systems, checking activities, and inventory monitoring influence the accuracy and traceability of goods movement.

Documentation was conducted by reviewing documents that were directly related to inventory control and FIFO implementation. The documents were selected based on their relevance to receiving, issuing, recording, checking, monitoring, and reporting activities. The documents reviewed included receiving notes, cash invoices, warehouse cards, stock opname-related documents, aging reports, checker duty documents, non-food inventory data, and company profiles (Asghari et al., 2026). The document review focused on the completeness of transaction information, such as document number, transaction date, item code, item name, quantity, warehouse location, signatures or initials of responsible parties, and batch/expiry information. This documentation review was necessary because inventory records, accounting information systems, stock opname documents, and warehouse reports are important evidence for assessing the reliability of inventory control and the traceability of stock movement.

The fourth stage was operationalizing the COSO and FIFO categories for analysis. The COSO-based categories were used to classify and evaluate the findings into five control components. The control environment was assessed through segregation of duties, responsibility assignment, and the existence of internal and external checker functions. Risk assessment was evaluated through the identification of expired goods, stock discrepancies, recording errors, damaged goods, defective goods, returned goods, slow-moving items, and possible misappropriation (Poursoltani et al., 2026). Control activities were assessed through SOPs, authorization, receiving notes, cash invoices, warehouse cards, stock opname, checker verification, and access control. Information and communication were evaluated through stock information, aging reports, warehouse card updates, and communication between warehouse and sales. Monitoring was assessed through stock opname, discrepancy correction, follow-up records, and corrective actions. This operationalization is consistent with recent studies showing that COSO-based inventory evaluation can be used to identify weaknesses in documentation, supervision, monitoring, risk response, and corrective action.

FIFO implementation was operationalized by examining whether goods that entered earlier or approached expiry were prioritized for release. The FIFO criteria included the availability of receiving date information, batch/expiry records, warehouse card recording, aging reports, storage layout, picking practices, and checker verification during goods issuing.

These criteria were used to assess whether FIFO was only stated as a procedure or was actually supported by traceable warehouse evidence. FIFO was also evaluated in relation to risks of slow-moving goods, expiry, inaccurate records, and weak warehouse layout control. This is relevant because studies on FIFO, perishable inventory, warehouse monitoring, and inventory record accuracy show that batch tracking, expiry control, inspection, and layout management are important for maintaining inventory accuracy and preventing outdated stock.

The fifth stage was analyzing the collected data and ensuring methodological credibility. Data from interviews, observation, and documentation were reduced, grouped, and displayed in an analytical matrix based on COSO components and FIFO criteria. Credibility was ensured through source triangulation and technique triangulation. Source triangulation was conducted by comparing information from the two informants, while technique triangulation was conducted by comparing interview results with observation findings and company documents. This process allowed the researcher to verify whether statements about SOPs, checker functions, stock opname, warehouse cards, aging reports, and FIFO implementation were supported by actual practices and documentary evidence (Hasiloglu-Ciftciler & Kaya, 2025). The results of this analysis were then used to determine whether the inventory internal control system was effective, sufficiently effective, or still required improvement. This procedure supports the need for stronger inventory evaluation because previous studies show that internal control should be assessed not only from the existence of procedures, but also from evidence of implementation, monitoring, and follow-up actions.

Instruments, and Data Collection Techniques

Data were collected through structured interviews, direct non-participant observation, and documentation review. Structured interviews were conducted using a predetermined list of questions to obtain systematic information about standard operating procedures, segregation of duties, authorization, checker functions, warehouse cards, FIFO application, expired goods risk, stock discrepancies, stock opname, aging reports, and monitoring practices. Direct non-participant observation was carried out in the Non-Food Warehouse to examine warehouse activities without the researcher being involved in operational work (Arunadevi & Umamaheswari, 2026). The observation focused on receiving goods, unloading checks, storage arrangements, picking activities, internal checker verification, loading checks, external checker verification, document matching, warehouse card recording, and FIFO-based goods movement. Documentation review was conducted by examining receiving notes, cash invoices, warehouse cards, stock opname-related documents, aging reports, checker duty documents, non-food inventory data, and other supporting records. These three techniques were used to compare interview statements with observed warehouse practices and documentary evidence, because recent studies emphasize that documentation, stock opname, warehouse records, checker functions, and monitoring evidence are important for assessing the reliability and traceability of inventory control practices.

Data Analysis Technique

Data analysis was conducted using a descriptive qualitative analysis technique through three main stages: data reduction, data display, and conclusion drawing. The analysis was carried out systematically to ensure that the interpretation of findings remained transparent, consistent, and aligned with the research objectives. This analytical approach was considered appropriate because the study focused on evaluating inventory procedures, documentation, warehouse control practices, stock opname, FIFO implementation, and follow-up actions in the Non-Food Warehouse (Jahan et al., 2025). Recent studies on inventory internal control also applied qualitative evaluation to assess whether inventory procedures, documentation, supervision, and monitoring activities were implemented properly in organizational practice.

First, the data reduction process was carried out by reading and reviewing all data obtained from structured interviews, direct non-participant observation, and documentation review. The data were then coded based on two main analytical categories: COSO-based internal control components and FIFO implementation criteria. The COSO-based codes consisted of control environment, risk assessment, control activities, information and communication, and monitoring. Meanwhile, the FIFO codes included receiving date, batch/expiry information, warehouse card recording, aging reports, stock opname, warehouse layout, picking practices, checker verification, and goods issuing procedures. Each interview statement, observation note, and document finding was grouped into the relevant code to identify patterns, consistencies, and control weaknesses. This coding process helped the researcher connect field findings with inventory control issues such as stock discrepancies, incomplete documentation, limited monitoring, weak FIFO traceability, and insufficient corrective action records.

Second, the reduced data were displayed in narrative descriptions and analytical tables. The data display was used to compare findings from interviews, observation, and documents. For example, statements from informants regarding SOPs, segregation of duties, checker functions, warehouse cards, stock opname, aging reports, and FIFO implementation were compared with observation findings and supporting documents such as receiving notes, cash invoices, checker duty documents, non-food inventory data, and other available warehouse records. This comparison helped determine whether the control procedures described by the informants were supported by actual warehouse practices and documentary evidence. Previous studies emphasize that inventory evaluation should not rely only on verbal explanations, but should also consider transaction documents, warehouse records, stock opname evidence, and monitoring practices to assess inventory reliability and traceability.

Third, the effectiveness of inventory internal control was classified into three categories: effective, sufficiently effective, and requiring improvement. A control aspect was categorized as effective when the procedure was clearly available, consistently implemented, supported by documents, and followed by monitoring or corrective action. A control aspect was categorized as sufficiently effective when the procedure had been implemented but still showed weaknesses in documentation, consistency, or follow-up. A control aspect was categorized as requiring improvement when the procedure was incomplete, not fully documented, not consistently applied, or created risks such as stock discrepancies, incomplete batch/expiry information, weak FIFO traceability, returned goods without clear follow-up, damaged or defective goods, and limited corrective action records. This classification was used because recent inventory control studies show that the existence of procedures alone is not sufficient; companies also need reliable documentation, supervision, reconciliation, and corrective action to ensure effective inventory control.

Fourth, triangulation was used to strengthen the credibility of the findings. Source triangulation was conducted by comparing information obtained from the two informants, while technique triangulation was conducted by comparing structured interview results, direct observation, and company documents. Through triangulation, the researcher verified whether findings related to receiving and issuing procedures, checker functions, warehouse cards, stock opname, aging reports, inventory risks, and FIFO implementation were supported by more than one source of evidence. This process was important because the company did not provide detailed reconciliation reports, numerical discrepancy data, complete stock opname follow-up reports, or formal records comparing warehouse cards, system balances, and physical stock. Therefore, the analysis was limited to the available interview, observation, and documentary evidence, while unavailable detailed records were treated as a data access limitation and as an area requiring improvement in inventory control documentation.

Fifth, consistency was maintained by using the same analytical categories throughout the analysis. All findings were assessed based on COSO-based internal control components and FIFO criteria, so that the interpretation remained consistent from data reduction to conclusion drawing. Researcher reflexivity was also applied by distinguishing between informant statements, observed practices, document evidence, and the researcher's interpretation. This step was taken to reduce personal bias and to ensure that conclusions were based on the available data rather than subjective assumptions. In this study, the researcher did not claim unobserved recording delays, specific numerical discrepancies, or FIFO violations when such evidence was not provided by the company.

Finally, conclusions were drawn by assessing whether the inventory internal control system at PT Mitra Kencana Distribusindo was effective, sufficiently effective, or still required improvement. The conclusion was verified by reviewing the consistency between interview data, observation findings, document evidence, COSO-based control categories, and FIFO implementation criteria (Vogt et al., 2026). This process allowed the study to provide a more credible and transparent evaluation of inventory internal control in the Non-Food Warehouse, particularly in relation to SOPs, segregation of duties, checker functions, warehouse cards, stock opname, aging reports, batch/expiry information, FIFO traceability, and follow-up documentation.

RESULTS AND DISCUSSION

The research results show that PT Mitra Kencana Distribusindo has implemented several basic controls over its non-food inventory. These controls include standard operating procedures for receiving and issuing goods, segregation of duties, supporting documents, authorization, checker functions, warehouse cards, stock opname, aging reports, and FIFO-based inventory circulation. The findings also show that several risks remain, particularly expired goods, stock discrepancies, recording errors, and possible misappropriation. The following discussion connects these empirical findings with COSO components and FIFO-based inventory control theory.

Two interview statements illustrate the company's control practices. Informant 2 stated, 'we have SOP for receiving goods and issuing goods,' and also explained that 'all goods use the FIFO method so that item circulation can run well.' Informant 1 explained that the duties were separated, stating that there were different people for preparing, checking, receiving, recording, and storing goods, including internal and external checkers. These statements were consistent with the documentary evidence showing receiving notes and cash invoices as transaction records for incoming and outgoing goods.

Table 1. COSO and FIFO-Based Research Findings

Component	Empirical Finding	Assessment	Improvement Needed
Control environment	Receiving, recording, storing, preparing, and checking duties are separated; internal and external checkers are used.	Responsibility is divided and layered checking exists.	Written job descriptions and periodic training.
Risk assessment	Expired goods, stock discrepancies, recording errors, and misappropriation risks are recognized.	Key warehouse risks have been identified.	Risk logs and written follow-up for discrepancies and expired goods.
Control activities	Receiving/issuing SOPs, documents, authorization,	Core control activities have been	Complete batch/expiry fields

	checkers, warehouse cards, and stock opname are used.	implemented.	and stronger access control.
Information and communication	Stock information and aging reports support coordination between warehouse and sales.	Inventory information supports decision-making.	More disciplined updating of warehouse cards, system data, and aging reports.
Monitoring	Stock opname matches physical stock with system data and corrections are made when differences occur.	Monitoring is performed through physical-system matching.	Clear schedule, stock opname report format, and corrective action records.
FIFO implementation	FIFO is used to maintain item circulation; aging reports identify goods approaching expiry.	FIFO is applied but not fully optimized.	Warehouse layout, batch/expiry completeness, and FIFO compliance checks.

The first finding concerns receiving and issuing procedures. The company has established SOPs for incoming and outgoing goods, and transaction documents are used as administrative evidence. Receiving notes record incoming goods from suppliers to the warehouse, while cash invoices record goods issued to customers. This indicates that the company has created an administrative basis for tracing inventory movement. In inventory control, transaction documentation is important because it supports accountability, verification, and stock traceability. Recent studies confirm that inventory documentation, supervision, and transaction records are essential in reducing stock discrepancies and improving the reliability of inventory information.

The second finding concerns segregation of duties. The company separates the functions of receiving, recording, storing, preparing, and checking goods. It also uses internal and external checkers as layered control mechanisms (Niedermayr et al., 2026). This condition reflects a relatively adequate control environment because no single party controls the entire inventory process. The separation of duties reduces the risk of recording errors, unauthorized goods movement, and possible misappropriation. This finding is consistent with recent COSO-based inventory studies showing that segregation of duties, supervision, authorization, and checker functions are important elements of inventory internal control.

The third finding relates to documentation and authorization. Interview evidence shows that all incoming and outgoing goods must be supported by documents and authorization. Receiving notes and cash invoices include transaction dates, product identities, quantities, warehouse information, and signatures or initials of responsible parties. These documents allow inventory movement to be traced and help the company verify whether goods are received and issued according to procedure. However, the effectiveness of documentation depends on the completeness and consistency of the information recorded, including item identity, quantity, batch/expiry information, and approval evidence. Studies on accounting information systems and inventory control emphasize that accurate warehouse records, complete transaction documents, and integrated inventory information are important for improving inventory traceability and reporting reliability.

The fourth finding concerns warehouse cards as a supplementary manual control mechanism in inventory management. Informant 2 stated that warehouse cards are used as part of the warehouse's manual internal control to record incoming goods, outgoing goods, and remaining inventory balances. This finding is supported by the checker duty document, which shows that both internal and external checkers assist warehouse personnel in filling in stock

cards. The internal checker is responsible for checking picking results, verifying returned goods, checking incoming goods during unloading, and assisting in stock card recording. Meanwhile, the external checker checks outgoing goods during loading, verifies the conformity of goods with delivery documents, conducts handover with the driver, prepares reports when discrepancies, damage, or defects are found, and also assists in stock card recording.

However, due to company access limitations, the researcher was only allowed to record the documents and information permitted by the company, including the non-food inventory list, checker duty descriptions, transaction documents, and interview information. The company did not provide detailed reconciliation reports, specific records of warehouse card update delays, numerical stock discrepancy data, or formal follow-up reports comparing warehouse cards, system balances, and physical stock (Imeri et al., 2025). Therefore, this study does not claim that recording delays or specific discrepancies among warehouse cards, system records, and physical stock were empirically proven. Instead, the weakness identified in this study lies in the limited availability of documentary evidence to verify the timeliness of warehouse card recording, reconciliation practices, and corrective follow-up actions.

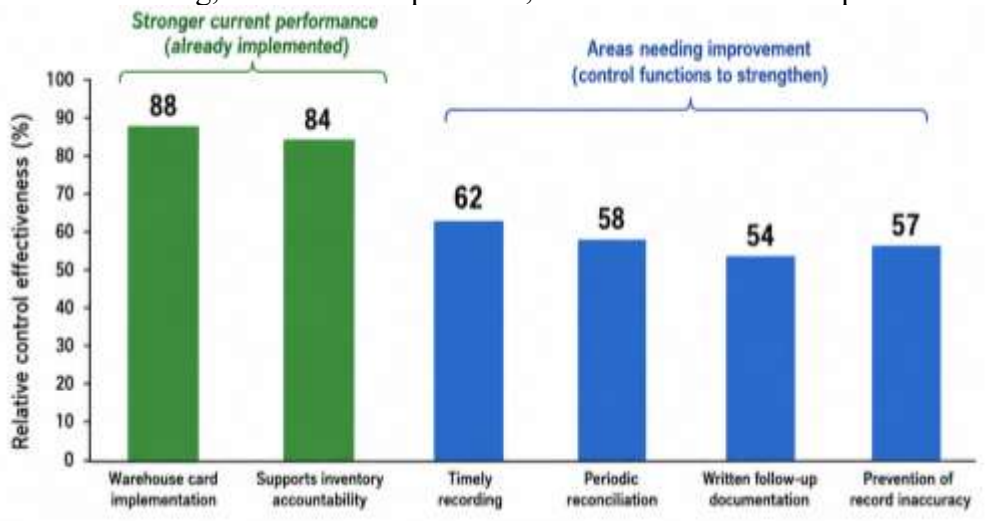


Figure 1. Effectiveness of Warehouse Crds in Inventory Control

Based on the available interview and documentary evidence, warehouse cards have been implemented and can support inventory accountability. Nevertheless, their control function still needs to be strengthened through more systematic documentation. If warehouse cards are not updated immediately after receiving, issuing, returning, or loading activities, the manual balance may differ from system data or physical stock. In addition, if stock differences, damaged goods, defective goods, returned goods, or loading discrepancies are corrected without written follow-up reports, the company may lose important evidence needed to trace the causes of problems and prevent recurrence (Melesse et al., 2026). Thus, although warehouse cards are already used as a control tool, their effectiveness should be improved through timely recording, periodic reconciliation, and written follow-up documentation. This finding is consistent with recent studies emphasizing that inventory control requires accurate records, stock verification, documentation discipline, and periodic reconciliation to prevent inventory record inaccuracy.

The fifth finding concerns risk assessment. The company recognizes several inventory risks, including expired goods, stock discrepancies, recording errors, returned goods, damaged goods, defective goods, slow-moving goods, and possible misappropriation. Informant 1 explained that expired goods may arise from slow-moving allocated products, while misappropriation may occur if goods are taken without proper procedure (Rodrigues et al., 2025). These risks indicate that inventory control must not only focus on recording stock quantities, but also on identifying operational weaknesses that may affect stock accuracy and

product quality. Prior studies show that weak supervision, incomplete documentation, limited monitoring, and poor risk response may increase the possibility of stock discrepancies, fraud, and unreliable inventory data.

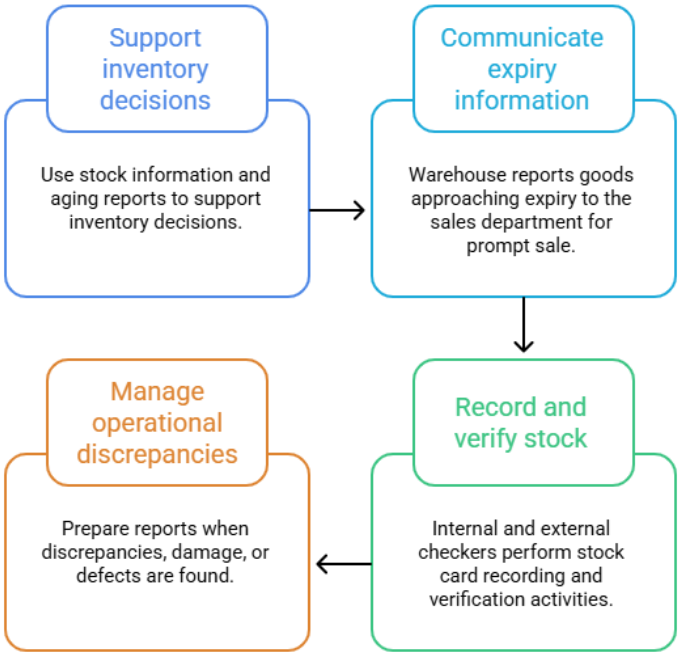


Figure 2. Inventory Control and Verification Process

The sixth finding concerns information and communication in inventory control. The company uses stock information and aging reports to support inventory decisions, particularly for goods approaching expiry, which are reported by the warehouse and communicated to the sales department so they can be sold promptly. This practice indicates that warehouse information is used not only for recording purposes but also to support operational decision-making. In addition, the checker duty document shows that internal and external checkers are involved in stock card recording and verification activities, including checking picking results, verifying returned goods, checking incoming goods during unloading, checking outgoing goods during loading, conducting handover with drivers, and preparing reports when discrepancies, damage, or defects are found.

However, due to company data access limitations, the researcher was only permitted to record information and documents provided by the company, such as interview results, non-food inventory data, checker duty descriptions, receiving and issuing documents, and other available supporting records. The company did not provide detailed reconciliation reports, numerical stock discrepancy data, formal records of warehouse card update delays, or complete follow-up reports comparing manual warehouse cards, system balances, and physical stock. Therefore, this study does not claim that recording delays or actual discrepancies among manual records, system balances, and physical stock were empirically proven. Instead, the weakness identified is the limited documentary evidence available to verify the timeliness, accuracy, and follow-up of inventory information (Freund & van Ryzin, 2025). Thus, although information and communication practices have been implemented, they still need to be strengthened through complete batch/expiry recording, periodic reconciliation between warehouse cards, system balances, and physical stock, and formal follow-up documentation for stock discrepancies, returned goods, damaged goods, defective goods, and items approaching expiry. This is consistent with studies showing that inventory information systems, warehouse modernization, and reliable documentation are essential for improving decision-making and inventory accuracy.

The seventh finding concerns monitoring. The company conducts stock opname by matching physical stock with system data and correcting differences when errors are found. This monitoring mechanism supports the reliability of inventory balances. Stock opname is important because it helps detect discrepancies between physical stock and recorded inventory data. However, monitoring at PT Mitra Kencana Distribusindo should be strengthened through written documentation of stock opname results, inspection frequency, discrepancy causes, and corrective actions. If stock differences are corrected without complete written follow-up, the company may have difficulty identifying recurring causes of discrepancies and preventing similar problems in the future. This finding is consistent with studies showing that periodic checking, stock opname, audit or inspection activities, and corrective documentation are needed to maintain inventory accuracy and reduce inventory record inaccuracy.

The eighth finding concerns FIFO implementation as part of operational inventory monitoring. Interview evidence indicates that the company applies FIFO to maintain inventory circulation, while aging reports are used to identify goods approaching expiry and communicate them to the sales department for faster selling. This practice is relevant to the Non-Food Warehouse because the inventory consists of various consumer products, such as Dettol, Shinzui, Harpic, Stella, Hit, Vanish, Polytex, rat glue, trash bags, and cling wrap, which may have different storage periods, product conditions, and expiry-related risks. However, the available documentary and observational evidence remains limited. The researcher was only permitted to record documents and information approved by the company, including non-food inventory data, receiving and issuing documents, interview results, and checker duty descriptions. The company did not provide detailed batch tracking records, complete expiry control reports, warehouse layout maps, or written FIFO compliance records. Therefore, this study does not claim that FIFO violations were empirically proven, but identifies limited batch/expiry documentation, limited evidence of warehouse layout control, and limited written FIFO follow-up as weaknesses that may reduce FIFO traceability. Operationally, if batch and expiry information are incomplete or if the warehouse layout does not clearly support the movement of older goods first, the company may face the risk of older stock being retained, items approaching expiry not being prioritized, and FIFO implementation becoming difficult to verify. Thus, although FIFO has been implemented, its effectiveness should be strengthened through complete batch/expiry recording, clearer FIFO-based storage layout, periodic FIFO compliance checks by warehouse personnel and checkers, and written follow-up documentation for slow-moving or near-expiry goods. This finding is consistent with recent studies showing that FIFO, inventory record accuracy, batch/expiry control, warehouse layout, and monitoring of goods with storage-duration risks are important for maintaining inventory reliability and preventing outdated stock

Overall, the effectiveness assessment indicates that internal control over inventory using FIFO is sufficiently effective. The company has met several important control indicators, including SOPs, segregation of duties, transaction documentation, authorization, checker functions, warehouse cards, FIFO application, stock opname, and aging reports (Bao & Yu, 2026). However, it cannot yet be considered fully optimal because risks related to expired goods, stock discrepancies, recording errors, damaged or defective goods, returned goods, and possible misappropriation remain. In addition, batch/expiry completeness, FIFO-based physical layout, stock opname documentation, and follow-up reports need improvement. These findings support recent studies stating that inventory control must be evaluated continuously to protect assets, improve stock accuracy, strengthen documentation, and enhance operational performance.

Table 2. Effectiveness Assessment of Inventory Internal Control

Assessment Aspect	Condition at PT Mitra Kencana Distribusindo	Result
Receiving and issuing SOPs	Procedures exist for inventory receiving and issuing.	Fulfilled
Segregation of duties	Receiving, recording, storing, preparing, and checking duties are separated.	Fulfilled
Transaction documents	Incoming and outgoing goods are supported by documents.	Fulfilled
Authorization	Inventory transactions require approval from responsible parties.	Fulfilled
Checker function	Internal and external checkers support layered examination.	Fulfilled
Warehouse cards	Manual warehouse cards are used for control and accountability.	Fulfilled; periodic matching needed
FIFO	FIFO is used to maintain item circulation.	Fulfilled; batch/expiry and layout need strengthening
Stock opname	Physical stock is matched with system data.	Fulfilled; documentation and frequency need strengthening
Aging report	Goods approaching expiry are reported to sales.	Fulfilled
Inventory risks	Expired goods, discrepancies, recording errors, and misappropriation risks remain.	Needs improvement

The table indicates that most inventory internal control aspects at PT Mitra Kencana Distribusindo have been fulfilled. The company has implemented receiving and issuing SOPs, segregation of duties, transaction documents, authorization, internal and external checker functions, warehouse cards, FIFO procedures, stock opname, and aging reports. These findings show that the basic control structure for inventory management is already in place and supports accountability in receiving, storing, checking, and issuing goods. However, the table also shows that fulfillment of control elements does not automatically indicate that the control system is fully optimal. Several aspects still require improvement, particularly warehouse card reconciliation, batch/expiry recording, FIFO-based warehouse layout, stock opname documentation, and corrective follow-up records. Warehouse cards need to be periodically reconciled with system data and physical stock to maintain balance accuracy and reduce inventory record inaccuracy (Dalalah, 2025). FIFO implementation also needs stronger batch/expiry documentation and clearer storage arrangements to ensure that older goods or goods approaching expiry are prioritized for release. Although stock opname has been conducted, its frequency, documentation, discrepancy analysis, and follow-up records need to be strengthened because periodic checking is essential for detecting stock differences and improving inventory reliability. In addition, inventory risks such as expired goods, stock discrepancies, recording errors, returned goods, damaged or defective goods, and possible misappropriation remain important weaknesses that require systematic corrective action. Therefore, the overall control system can be categorized as sufficiently effective, but not yet fully optimal, because several controls still depend on stronger documentation, monitoring, reconciliation, and follow-up procedures.

CONCLUSION

This study concludes that internal control over merchandise inventory using FIFO at PT Mitra Kencana Distribusindo is sufficiently effective. The company has implemented basic controls through receiving and issuing SOPs, transaction documents, authorization, segregation of duties, checker functions, warehouse cards, stock opname, aging reports, and FIFO-based circulation. These controls help the company trace inventory movement, support accountability, and reduce the risk of uncontrolled warehouse activity.

The COSO-based assessment shows that the control environment is reflected in function separation and layered checking; risk assessment is reflected in the recognition of expired goods, stock discrepancies, recording errors, and possible misappropriation; control activities are reflected in SOPs, documents, authorization, checker functions, and warehouse cards; information and communication are reflected in stock information and aging reports delivered to sales; and monitoring is reflected in stock opname and discrepancy correction. FIFO has been implemented to support inventory circulation, but it needs to be strengthened through complete batch/expiry data, clearer warehouse layout, and consistent documentation.

The practical implication of this study is that the company should require complete batch/expiry recording on every receiving document, improve FIFO-based storage layout, update warehouse cards promptly, conduct stock opname more frequently for high-risk and slow-moving goods, document discrepancy causes and corrections, and use aging reports more actively in sales decisions. Future studies may add quantitative data such as the number of stock discrepancies, expired items, loss values, and stock opname frequency, or compare internal control between food and non-food warehouses.

DECLARATION OF AI AND AI ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

During the preparation of this manuscript, the author used AI-assisted writing support to help restructure the thesis into an article format and improve language consistency. After using this tool, the author reviewed and edited the content as needed and takes full responsibility for the content of the publication.

AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Project administration; Validation; Writing - review and editing.

Author 2: Conceptualization; Data curation; In-vestigation.

Author 3: Data curation; Investigation.

Author 4: Formal analysis; Methodology; Writing - original draft.

DECLARATION OF COMPETING INTEREST

The author declares that there are no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

REFERENCES

Ahmadkhan, K., Ahmadirad, Z., Karaminezhad, K., SeyedKhamoushi, F., Karimi, K., & Khakpash, F. (2026). A novel blockchain-based approach for enhanced food supply chain traceability and waste mitigation. *British Food Journal*, *128*(1), 426–466. https://doi.org/10.1108/BFJ-05-2024-0430

Ai, L., Zhao, Q., & Wu, Z. (2026). An inventory-routing problem for end-of-life traction batteries considering incentive-dependent returns and storage time limitations. *Expert Systems with Applications*, *301*, 130306. https://doi.org/10.1016/j.eswa.2025.130306

Akbari, A. H., Jafari, M., & Akhavan, P. (2026). A Data-Driven Multi-Objective optimization framework for dynamic job shop scheduling with order Acceptance, inventory and Energy-Aware decisions. *Computers & Industrial Engineering*, *214*, 111886. https://doi.org/10.1016/j.cie.2026.111886

Alkhedher, M. J. (2026). A stochastic inventory model with elastic demand and random lead time. *Journal of Engineering Research*. https://doi.org/10.1016/j.jer.2026.06.017

Arunadevi, E., & Umamaheswari, S. (2026). Dynamic inventory optimization for three-warehouse: Balancing freshness-driven demand and preservation investments. *Expert Systems with Applications*, *297*, 129233. https://doi.org/10.1016/j.eswa.2025.129233

Asghari, M., Jaber, M. Y., Afshari, H., & Searcy, C. (2026). Deteriorating inventory models: A comprehensive review. *Computers & Industrial Engineering*, *216*, 111993. https://doi.org/10.1016/j.cie.2026.111993

Bao, L., & Yu, Y. (2026). Managing perishable production systems with extended shelf life: The role of sustainability. *European Journal of Operational Research*. https://doi.org/10.1016/j.ejor.2026.05.024

Cuong, T. N., Kim, H.-S., Bao Long, L. N., You, S.-S., & Tan, N. D. (2025). Deep learning-enhanced quantum optimization for integrated job scheduling in container terminals. *Engineering Applications of Artificial Intelligence*, *148*, 110431. https://doi.org/10.1016/j.engappai.2025.110431

Dalalah, D. (2025). Optimal order quantities of a multi-period inventory of compatible products. *Computers & Industrial Engineering*, *207*, 111338. https://doi.org/10.1016/j.cie.2025.111338

Douaa, E. G., Lina, A., & Maria, L. (2026). A simulation-driven (r, Q) replenishment policy for perishable blood inventory management. *7th International Conference on Industry of the Future and Smart Manufacturing (Former International Conference on Industry 4.0 and Smart Manufacturing)*, *277*, 484–493. https://doi.org/10.1016/j.procs.2026.02.090

Freund, D., & van Ryzin, G. (2025). Pricing fast and slow: Limitations of dynamic pricing mechanisms in ride-hailing. *Transportation Research Part C: Emerging Technologies*, *181*, 105314. https://doi.org/10.1016/j.trc.2025.105314

Hajej, Z., & Gharbi, A. (2026). An optimal production control for stochastic manufacturing systems under perishable products. *Journal of Quality in Maintenance Engineering*, *32*(2), 357–390. https://doi.org/10.1108/JQME-09-2025-0111

Hasiloglu-Ciftciler, M., & Kaya, O. (2025). Dynamic inventory control and pricing strategies for perishable products considering both profit and waste. *Computers & Operations Research*, *181*, 107103. https://doi.org/10.1016/j.cor.2025.107103

Hosseini-Motlagh, S.-M., Samani, M. R. G., & Kordhaghi, H. (2026). A possibilistic programming approach in an integrated fuzzy periodic review model and clustering strategy for optimizing platelet supply chain. *Expert Systems with Applications*, *298*, 129539. https://doi.org/10.1016/j.eswa.2025.129539

Imeri, A., Fikar, C., & Reiner, G. (2025). Unveiling Shelf-life and Consumer Behavior Dynamics in Perishable Inventory Planning. *11th IFAC Conference on Manufacturing Modelling, Management and Control MIM 2025*, *59*(10), 2856–2861. https://doi.org/10.1016/j.ifacol.2025.09.480

Jahan, I., Kamal, K. T., Bhattacharjee, P., Taqi, H. Md. M., & Ali, S. M. (2025). Improving consumer awareness for reducing food waste using partial least squares structural equation modelling (PLS-SEM) approach. *Cleaner and Responsible Consumption*, *17*, 100282. https://doi.org/10.1016/j.clrc.2025.100282

Kandasamy, J., Vimal, K. E. K., Singh, A. P., Magnani, A., Gokhale, A., & Jagtap, S. (2025). Analysis of key challenges to implementation of FEFO in perishable food supply chain. *Journal of Agriculture and Food Research*, *21*, 101848. https://doi.org/10.1016/j.jafr.2025.101848

Kouki, C., Drent, M., Babai, M. Z., & Drent, C. (2026). Dedicated maintenance and repair shop control for spare parts networks. *European Journal of Operational Research*, *331*(3), 809–822. https://doi.org/10.1016/j.ejor.2025.10.044

Kuo, H.-A., Hong, T.-Y., & Chien, C.-F. (2025). A deep reinforcement learning based digital twin framework for resilient production planning under demand uncertainty and an empirical study in semiconductor wafer fabrication. *Computers & Industrial Engineering*, *208*, 111389. https://doi.org/10.1016/j.cie.2025.111389

Lunet, M., Buisman, M., Neves-Moreira, F., & Amorim, P. (2026). Aged products spillover effect and the value of holding inventory under stochastic demand: The case of Port wine. *International Journal of Production Economics*, *297*, 110007. https://doi.org/10.1016/j.ijpe.2026.110007

Melesse, T. Y., Sanna, J., Braggio, M., Peer, M. S., & Orrù, P. F. (2026). Simulation-Based Assessment of Warehouse Logistics: A Case Study in Beverage Distribution. *7th International Conference on Industry of the Future and Smart Manufacturing (Former International Conference on Industry 4.0 and Smart Manufacturing)*, *277*, 3531–3539. https://doi.org/10.1016/j.procs.2026.02.388

Mohamadi, N., Transchel, S., & Fransoo, J. C. (2025). Coordinate or collaborate? Reducing food waste in perishable-product supply chains. *European Journal of Operational Research*, *323*(3), 795–809. https://doi.org/10.1016/j.ejor.2024.12.039

Najafi, M., & Zolfagharinia, H. (2024). A Multi-objective integrated approach to address sustainability in a meat supply chain. *Omega*, *124*, 103011. https://doi.org/10.1016/j.omega.2023.103011

Niedermayr, D., Wolfartsberger, J., Bokor, B., Seiringer, W., & Altendorfer, K. (2026). VISP: Using Virtual Reality to Teach Production Process Optimization through Gamified Simulation. *7th International Conference on Industry of the Future and Smart Manufacturing (Former International Conference on Industry 4.0 and Smart Manufacturing)*, *277*, 3205–3213. https://doi.org/10.1016/j.procs.2026.02.356

Olvera, V., Guerrero, C., & Segura, E. (2026). Control of a production–inventory system optimized with LQR for dynamic demand management. *International Journal of Production Economics*, *297*, 109713. https://doi.org/10.1016/j.ijpe.2025.109713

Poursoltani, H., Honarvar, M., & Abedsoltan, H. (2026). Developing an integrated model of hierarchical hub location and inventory control for perishable products in urban and rural areas: A case study in food supply chain. *Computers & Operations Research*, *192*, 107481. https://doi.org/10.1016/j.cor.2026.107481

Rautela, R., Sharma, V., & Agarkar, B. (2026). Chapter 36—Predictive modeling for demand forecasting and inventory management to minimize food waste. In T. Sarkar & A. Haldorai (Eds.), *Artificial Intelligence in Food Science* (pp. 687–700). Academic Press. https://doi.org/10.1016/B978-0-443-26468-9.00048-5

Rodrigues, G. de A., Junqueira, L., Vieira, J. G. V., Silva Júnior, O. S. da, & Cunha, C. B. da. (2025). Rural last-mile distribution using a hybrid heuristic-multi-criteria decision-making framework. *Expert Systems with Applications*, *289*, 128331. https://doi.org/10.1016/j.eswa.2025.128331

Saisud, D., & Kongkaew, W. (2026). A hybrid CORELAP-association rules and fuzzy AHP framework for plant layout optimization in the para rubber plywood industry. *Expert Systems with Applications*, *295*, 128766. https://doi.org/10.1016/j.eswa.2025.128766

Sharifi, M., Taghipour, S., Abhari, A., & Rysz, M. (2026). A novel mathematical model for the scheduling of a zero inventory production: An application of process scheduling in fog computing. *Computers & Operations Research*, *185*, 107284. https://doi.org/10.1016/j.cor.2025.107284

Temizöz, T., Imdahl, C., Dijkman, R., Lamghari-Idrissi, D., & van Jaarsveld, W. (2025). Deep Controlled Learning for Inventory Control. *European Journal of Operational Research*, *324*(1), 104–117. https://doi.org/10.1016/j.ejor.2025.01.026

Tolio, T., Magnanini, M. C., Gatti, G., Grieco, A., & Caricato, P. (2025). A resilient optimization methodology for integrated workforce scheduling and system configuration in manufacturing. *11th IFAC Conference on Manufacturing Modelling, Management and Control MIM 2025*, *59*(10), 1832–1837. https://doi.org/10.1016/j.ifacol.2025.09.308

Touzout, F. A., Ladier, A.-L., & Hadj-Hamou, K. (2026). Comparing four MILP formulations for the time-dependent inventory routing problem with FIFO-compliant travel times. *Computers & Operations Research*, *194*, 107577. https://doi.org/10.1016/j.cor.2026.107577

Verma, A., & Samanta, S. K. (2026). Analytical and simulation studies of GI/M/1 queue integrated with an (s,Q) inventory policy. *Mathematics and Computers in Simulation*, *246*, 591–620. https://doi.org/10.1016/j.matcom.2025.09.032

Vogt, T., Lowery, B., Sachs, A.-L., & Thonemann, U. W. (2026). Inventory control and picking behavior: The roles of sustainability messages and price discounts. *European Journal of Operational Research*, *331*(1), 156–169. https://doi.org/10.1016/j.ejor.2025.09.028

Wang, S., Kua, J., Jin, J., Wong, Y. W., Jayaraman, P. P., & Pang, Z. (2026). Assisting mission-critical traffic flows with Active Queue Management in Industrial Internet of Things. *Journal of Industrial Information Integration*, *53*, 101170. https://doi.org/10.1016/j.jii.2026.101170

Yu, V. F., Salsabila, N. Y., Gunawan, A., & Siswanto, N. (2025). A three-stage matheuristic for the blood stochastic inventory routing problem. *Transportation Research Part E: Logistics and Transportation Review*, *200*, 104143. https://doi.org/10.1016/j.tre.2025.104143

Zhao, X., Jia, P., Li, H., & Si, R. (2025). Allocating carbon emissions from crude oil tanker shipping: Full voyage lifecycle perspective. *Transportation Research Part D: Transport and Environment*, *147*, 104919. https://doi.org/10.1016/j.trd.2025.104919

Copyright Holder :
© Regina Luntungan et al. (2026).

First Publication Right :
© Journal Markcount Finance

This article is under:

