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Optimizing Spare Part Storage Efficiency in the Automotive Sector Using the PDCA Cycle: A Case Study at Manyar Automotive Companies

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Abstract
An inefficient spare parts storage system can disrupt the smooth operation of a company, increase logistics costs, and slow down customer service processes in the automotive sector. The purpose of this study is to evaluate the spare parts storage system at Automotif Company Manyar dealership using the PDCA (Plan-Do-Check-Act) approach as a continuous improvement approach. This study uses a descriptive qualitative approach with a case study method. Data was collected through observation, interviews, and documentation studies. The sample in this study used purposive sampling techniques. The results of this study indicate that the causes of inefficiency in the storage system include errors in estimating needs, lack of staff training, and inaccuracies in the spare parts location information system. The implementation of PDCA can effectively and successfully improve the effectiveness of the storage system through the renewal of work procedures, integration of information systems, and regular training for personnel. This study emphasizes the importance of applying a systematic approach to improve warehouse management quality and support the operational efficiency of automotive dealers.

Keywords: Storage System, spare parts, operational efficiency, PDCA.

Abstrak
Sistem penyimpanan spare part yang tidak efisien dapat menganggu kelancaran operasional perusahaan, terjadinya peningkatan biaya logistik serta akan memperlambat proses layanan pelanggan pada sector otomotif. Tujuan dalam penelitian ini adalah untuk mengevaluasi sistem penyimpanan komponen suku cadang di Perusahaan Otomotif Manyar dengan menggunakan pendekatan PDCA (Plan-Do-Check-Act) sebagai pendekatan perbaikan berkelanjutan. Penelitian ini menggunakan pendekatan kualitatif deskriptif dengan metode studi kasus. Data yang dikumpulkan melalui observasi, wawancara, dan studi dokumentasi. Sampel dalam penelitian ini menggunakan teknik purposive sampling. Hasil penelitian ini menunjukkan bahwa penyebab inefisiensi sistem penyimpanan meliputi kesalahan estimasi kebutuhan, minimnya

pelatihan staf, serta ketidaktepatan sistem informasi lokasi spare part. Implementasi penerapan PDCA dapat secara efektif dan berhasil dalam meningkatkan efektivitas sistem penyimpanan melalui pembaharuan prosedur kerja, integrasi sistem informasi serta pelatihan berkala bagi personel. Penelitian ini menegaskan pentingnya penerapan pendekatan sistematis dalam meningkatkan kualitas pengelolaan gudang dan mendukung efisiensi operasional dealer otomotif.

Keywords: Sistem penyimpanan, *spare parts*, *efisiensi operasional*, PDCA.

Introduction

The automotive industry plays a vital role in Indonesia's economic development, with the increasing number of vehicles driving greater demand for reliable after-sales services—particularly in the area of spare part management. An efficient spare part storage system is essential not only for reducing logistical costs but also for enhancing service responsiveness and ensuring smooth operational continuity (Christopher, 2016; Wild, 2002).[1]

However, internal data from the Manyar Automotive Company dealership in early 2024 revealed a significant accumulation of dead stock, especially between January and April. Interviews with warehouse heads and technicians identified several root causes, including inaccurate demand forecasting, insufficient training for partmen, the absence of standardized and integrated storage procedures, and inefficiencies in the use of the Electronic Parts Catalogue (EPC) system. Observations further revealed delays in part retrieval and unstructured documentation processes, which disrupted day-to-day operations.

While recent studies have addressed inventory optimization, many have focused primarily on procurement strategies or ERP-based system integration. For example, Yadav and Jain (2021)[2] explored optimization in

[1] Christopher, M. (2016). *Logistics & Supply Chain Management*. Pearson.
Krajewski, L. J., Malhotra, M. K., & Ritzman, L. P. (2019). *Operations Management: Processes and Supply Chains*. Pearson

[2] Yadav, V. S., Singh, A. R., Raut, R. D., & Cheikhrouhou, N. (2021). Design of multi-objective sustainable food distribution network in the Indian context with multiple delivery channels. *Computers & Industrial Engineering*, 160, 107549.

the aftermarket supply chain, while Mohamed (2020)[3] applied the PDCA method for warehouse auditing within a manufacturing environment. Although valuable, these studies often overlook internal dealership-level storage systems, where real-time coordination and operational agility are essential. Hassan et al. (2020)[4] demonstrated that the PDCA cycle can improve inventory data accuracy, but their work was limited to a manufacturing logistics context.[5]

To address this research gap, the present study evaluates the internal spare part storage system at the dealership level using the Plan-Do-Check-Act (PDCA) method. This approach aims to identify root problems and implement sustainable, practical improvements.

Research objectives, to analyze inefficiencies in the current spare part storage system. To apply the PDCA cycle in enhancing warehouse management processes and to assess the impact of these improvements on overall operational efficiency. The PDCA cycle, introduced by Shewhart and later popularized by Deming (1986), promotes continuous improvement through a structured and iterative process. In the context of warehouse operations, PDCA supports adaptability, quality assurance, and consistent performance over time (Imai, 1986; Slack et al., 2016). This study builds on previous findings, such as those by Aslamiyah (2023)[6], who emphasized the importance of structured SOPs and regular training for warehouse personnel to reduce inefficiencies. She also noted that poor coordination between technical and logistics departments can lead to errors in estimating part requirements, resulting in surplus stock. However, her

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[3] Mohamed, Y. H., Abdul Rahim, A. R., & Ma'aram, A. (2020). The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia. *Journal of Islamic Marketing*, *12*(9), 1734-1750.

[4] Hassan, A., Elamer, A. A., Fletcher, M., & Sobhan, N. (2020). Voluntary assurance of sustainability reporting: Evidence from an emerging economy. *Accounting Research Journal*, *33*(2), 391-410.

[5] Slack, N., Brandon-Jones, A., & Johnston, R. (2016). *Operations Management* (8th ed.). Pearson Education.

[6] Aslamiyah, S., & Santoso, R. A. (2023, August). Implementasi Strategi Pemasaran Pada PT. Bank Perkreditan Rakyat (BPR) MCM. UMMagelang Conference Series (pp. 61-78).

study did not fully integrate the PDCA approach into its evaluation. Therefore, this research seeks to fill that gap by providing a more comprehensive and systematic assessment of spare part storage practices through the application of the PDCA cycle.

Literature Review

Effective inventory management plays a pivotal role in determining the overall efficiency and responsiveness of supply chains, particularly within highly dynamic and customer-driven sectors such as the automotive industry. As emphasized by Chopra and Meindl (2007)[7], inventory management is not merely a logistical concern but a strategic component that significantly affects both the cost structure and the quality of after-sales services provided to customers.

In the context of automotive operations, the management of spare part inventories is especially critical. Efficient storage and inventory control systems for spare parts contribute to substantial cost savings by minimizing excess stock and reducing carrying costs. Furthermore, such systems enhance operational agility by shortening lead times and improving the responsiveness to customer demands, thereby directly influencing service quality and customer satisfaction. Optimized inventory systems also support better utilization of warehouse space, streamline parts retrieval processes, and reduce the likelihood of service delays due to part unavailability.

Thus, improving spare parts inventory management is not only essential for operational continuity but also serves as a competitive advantage in ensuring superior service delivery in the automotive after-sales landscape.

[7] Chopra, S., & Meindl, P. (2007). *Supply chain management. Strategy, planning & operation* (pp. 265-275). Gabler.

Inventory Management in the Automotive Sector

Inventory management is a critical component of supply chain performance, particularly in the automotive industry, where it directly impacts both service quality and operational cost efficiency (Chopra & Meindl, 2008)[8]. An effective inventory system ensures the timely availability of spare parts, supports rapid service delivery, and minimizes excess stock. Within dealerships, inventory efficiency is especially vital, given the direct relationship between part availability and customer satisfaction.

Spare Part Storage Efficiency

Spare part storage plays a pivotal role in ensuring smooth dealership operations. An efficient storage system minimizes retrieval time, optimizes physical space, and reduces operational costs. Wild (2002)[9] emphasizes that inefficient storage layouts and systems can lead to part congestion, delayed service, and increased overhead. Christopher (2016)[10] further notes that effective storage management should account for item rotation speed, part criticality, and system integration. Dealerships must adopt storage strategies that not only manage space but also respond swiftly to dynamic market demands.

Inventory Classification Methods

One widely adopted strategy to enhance inventory control is the ABC classification method, which segments inventory based on its financial contribution or usage frequency. Category A items, which are high in value or critical to operations, require tighter controls, whereas Category C items, with lower value or impact, can be managed less intensively. Siregar and Situmorang (2020)[11] demonstrated that integrating ABC classification with the Economic Order Quantity (EOQ) model led to more accurate purchasing and reduced storage inefficiencies. This dual approach allows for better resource allocation and improves the overall effectiveness of warehouse management.

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[8] Roehrich, J. (2008). Supply chain management: Strategy, planning & operations, by Chopra, S. and Meindl, P. *Journal of Purchasing & Supply Management*, *14*(4), 273-274.

[9] Wild, T. (2002). *Best Practice in Inventory Management.* Elsevier Science.
Chopra, S., & Meindl, P. (2019). *Supply Chain Management: Strategy, Planning, and Operation.* Pearson.)

[10] Christopher, M. (2016). *Logistics & Supply Chain Management.* Pearson. Krajewski, L. J., Malhotra, M. K., & Ritzman, L. P. (2019). *Operations Management: Processes and Supply Chains.* Pearson

[11] Siregar, F., & Situmorang, R. (2020). Analisis Pengendalian Persediaan Barang Menggunakan Metode EOQ dan ABC pada PT XYZ. Jurnal Manajemen dan Organisasi, 11(2), 123-134.

Rotation Systems and Lean Inventory

Stock rotation and lean inventory principles are also key to storage efficiency. FIFO (First-In, First-Out) ensures older inventory is used before newer stock, reducing the risk of item obsolescence. In parallel, the Just-In-Time (JIT) approach minimizes excess inventory by procuring items only when needed. Putri and Wibowo (2021)[12] found that the integration of FIFO and JIT significantly reduced storage volume and improved space utilization without compromising part availability. These methods collectively support cost efficiency and inventory agility, which are essential in fast-paced dealership environments.

The PDCA Cycle in Warehouse Optimization

The Plan-Do-Check-Act (PDCA) cycle, introduced by Shewhart and further developed by Deming (1986)[13], offers a structured framework for continuous improvement. Imai (1986) and Slack et al. (2016)[14] affirm that PDCA enhances organizational adaptability, systematizes problem-solving, and drives sustainable operational improvements. Within warehouse settings, PDCA enables structured diagnostics (Plan), targeted implementation (Do), performance evaluation (Check), and institutionalization of successful practices (Act). This iterative model not only supports responsive and data-driven warehouse management but also holds the promise of significant improvements in spare part storage efficiency.

Aslamiyah (2025)[15] reinforced the importance of operational discipline by highlighting that structured Standard Operating Procedures (SOPs) and routine training for partmen and technical personnel significantly reduce warehouse inefficiencies. Her findings also pointed to weak coordination between technical and logistics departments as a contributor to inaccurate spare part forecasts, ultimately leading to surplus or dead stock. However, while her study provided valuable insights into organizational practices, it did not explicitly incorporate the PDCA methodology as a comprehensive improvement framework. This research

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[12] Putri, A. D., & Wibowo, R. A. (2021). *Evaluasi Sistem Manajemen Inventori di Gudang Spare Part Menggunakan Metode FIFO dan Just In Time*. Jurnal Logistik dan Supply Chain, 9(1), 22–31.

[13] Deming, W. E. (1986). Out of the Crisis. MIT Press.

[14] Slack, N., Brandon-Jones, A., & Johnston, R. (2016). Operations Management. Pearson. Yin, R. K. (2018). Case Study Research and Applications: Design and Methods. SAGE Publications.

[15] Saputra, M. R. B., & Aslamiyah, S. (2025). Analisis penerapan six sigma untuk mengurangi defect pupuk pt. Petrokopindo cipta selaras. Jursima, 12(2).

addresses that gap by integrating PDCA to systematically evaluate and enhance spare part storage processes at the dealership level.

Hypothesis Development

While existing literature underscores the importance of classification strategies, lean practices, and structured process improvement in inventory management, there is a significant gap in the research. Few studies have examined the combined effect of these approaches using a structured framework like PDCA, particularly within dealership-level warehouse systems. This research aims to fill that gap and contribute to a more comprehensive understanding of inventory management in the automotive sector. This study proposes that implementing the PDCA method can significantly improve the efficiency of spare part storage systems at the dealership level, a hypothesis that promises to shed new light on warehouse optimization in the automotive sector.

Research Methods

This study adopts a descriptive qualitative case study approach, drawing on the methodological guidance of Aslamiyah, to explore operational inefficiencies and systematically evaluate potential interventions using the PDCA (Plan-Do-Check-Act) continuous improvement framework. This design enables an in-depth examination of real-world practices within a specific organizational setting, allowing for rich contextual insights that are often overlooked in quantitative approaches.

The primary objective of the research is to identify and analyze the underlying causes of inefficiencies in warehouse operations, particularly those affecting inventory control, responsiveness, and overall service performance. By employing the PDCA cycle as an analytical lens, the study provides a structured pathway to assess current processes, implement targeted improvements, monitor outcomes, and iterate solutions in a sustainable manner.

Ultimately, this methodology supports the development of evidence-based, actionable recommendations that are grounded in

empirical observation and reflective evaluation. The case study design also facilitates organizational learning, offering insights not only into the symptoms of operational challenges but also into the systemic and procedural factors that perpetuate them.

Research Design

A descriptive qualitative approach was adopted to gain an in-depth understanding of the phenomena studied. This case study design allows for a comprehensive exploration of processes, behaviours, and interactions within their real-life context at Manyar Automotive Company.

Sampling Technique

This study applied purposive sampling to select informants who have direct involvement and responsibility in spare part management processes. Four informants participated in this research. One warehouse manager, one part men, six technician. These individuals were chosen due to their expertise and roles related to spare part estimation, ordering, and storage management.

Data Collection Techniques

Data were collected using the following techniques:

Semi-Structured Interviews; Interviews were conducted with warehouse staff to identify existing problems, operational challenges, and potential solutions within the current system. The semi-structured format allowed flexibility to explore emerging issues during discussions. Direct Observation; Daily operational activities within the storage facility were observed directly to identify bottlenecks, delays, inefficiencies, and non-standardized practices that hinder optimal performance. Document Analysis ; Relevant documents such as inventory records, EPC (Electronic Parts Catalog) logs, and standard operating procedures (SOPs) were reviewed to assess their consistency and alignment with actual practices in the warehouse.

Research Site

The research was conducted at Manyar Automotive Company, where all data collection activities took place to ensure contextual relevance and validity of the findings. The selection of informants in this study used purposive sampling, which involves the deliberate choice of subjects based on their roles, positions, and

knowledge of the processes under investigation. This purposive sampling approach aligns with the method used by Aslamiyah (2021)[16], who emphasized selecting informants based on the depth of their experience and the relevance of their positions within the work system being studied.

In this study, the selection of the warehouse manager, part man, and mechanics as key informants enabled the collection of both technical and strategic data. The main criteria for informant selection included:

Having primary responsibility for operational management and storage system policies. Providing comprehensive insights into the effectiveness of existing Standard Operating Procedures (SOPs). Serving as technical executors in the spare part estimation and ordering processes. Acting as direct liaisons between the warehouse and workshop. Being directly involved in identifying part needs and validating estimations. Offering field-level perspectives on how distribution systems and part availability affect workshop workflows. Based on these criteria, the informants in this study consisted of One warehouse manager, One part man, Six mechanics**.** A total of eight informants were interviewed. This number was considered sufficient to achieve data saturation, consistent with qualitative research principles.

Data Analysis Techniques

Data analysis followed the model of Miles, Huberman, & Saldana (2014)[17], consisting of: Data Reduction, Data were systematically reduced to focus on critical issues such as delays, errors, and system gaps, enabling concentration on information relevant to the research objectives. Data Display, Processed data were presented using tables and visual tools, including Fishbone Diagrams, to clearly illustrate the root causes of identified problems and to facilitate systematic analysis. Conclusion Drawing and Verification, Conclusions were drawn and verified based on the PDCA framework stages, resulting in specific, practical recommendations for operational improvements.

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[16] Aslamiyah, Suaibatul; Saffaanatuzaqiya, Sazsabilla; Rizqi, Maulidyah Amalina. Strategi Peningkatan Kinerja Guru MTs. Ihyaul Ulum Ujung Pangkah Gresik Melalui Pelatihan, Motivasi dan Kepuasan Kerja. In: UMMagelang Conference Series. 2021. p. 239-246.

[17] Michael Huberman and Matthew B. Miles, *The Qualitative Researcher's Companion* <https://books.google.co.id/books?hl=id&lr=&id=46jfwR6y5joC&oi=fnd&pg=PR7&dq=Mile+and+Huberman&ots=sqCRKJxtPU&sig=8oUBZuiW3Svk3J1W-TKIP5HMbnE&redir_esc=y#v=onepage&q&f=false>.

Data Triangulation and Member Checks

Data triangulation was implemented through cross-verification of data obtained from interviews, direct observations, and document analyses to ensure credibility and reliability. Additionally, member checks were conducted by confirming the research findings with informants to ensure that the interpretations accurately reflected their perspectives and experiences.

Research Results

Manyar Automotive Company is transforming its previous website to an e-commerce platform for selling cars, spare parts, and official accessories of the Company in Indonesia. It started as a sales, maintenance, repair, and spare parts supply service network established in 1975. In 1989, it changed its name to become a business entity fully managed by the National Automotive Parent Company. This research was conducted at Manyar Automotive Company from September 23, 2024 to February 23, 2025. During this period, the researcher carried out observations and in-depth interviews, supported by company data, with directly involved parties such as the Head of Warehouse, Partman, and Mechanics.

At the planning stage of this research, problem identification was carried out through observation, semi-structured interviews, and document study[18]. Data was collected from the Head of Warehouse, Partman, and Mechanics to identify the root causes of the problems occurring. Based on observations of the storage system at Manyar Automotive Company by examining the detailed process flow activities in the Spare Parts Warehouse, several root causes of inefficiencies in spare parts management were identified, as shown in the table below:

Informant	Thematic Attribute	Explanation
Head of Warehouse	Inaccuracy in Demand Estimation	Part demand estimates are often inaccurate due to the lack of regular training and the absence of standardized SOPs as technical guidelines for part ordering.
Partman	Inaccuracy of Information System	Lack of technical training causes partmen and technicians to face difficulties in ordering the correct parts.

[18] S Bahri, *Metodologi Penelitian Bisnis – Lengkap Dengan Teknik Pengolahan Data SPSS* (Andi Offset, 2018).

Mechanic	Limited Technical Training and Coordination	Lack of technical training and poor coordination among divisions (mechanics, partmen, and warehouse) result in incorrect part selection and inefficient distribution.

The data reduction table above summarizes the interview results from the Head of Warehouse, Partman, and Mechanics, indicating that inefficiencies in the spare parts storage system are caused by inaccurate demand estimations, an ineffective part location information system, and insufficient training and coordination among divisions.

Data presentation is done in table form to make it easier to understand and analyze.

Informant	Main Problems
Head of Warehouse	Inaccurate part demand estimation, no standardized SOPs
Partman	Lack of technical training, incorrect part ordering
Mechanic	Limited training and coordination between divisions, inefficient spare part distribution

Inventory turnover

NO	MONTH	MOVING STOCK	OVER STOCK	DEAD STOCK	TOTAL STOCK	RPN
1	Januari	95.790.975	30.782970	5.328.870	131.902.815	4,04%
2	Februari	139.137.946	15.994.890	4.852.080	159.984.916	3,03%
3	Maret	121.726.775	21.341.700	3.657.690	146.726.165	2,49%
4	April	125.789.415	48.130.640	3.550.740	177.470.795	2,00%

Analysis

Based on observations of the storage system at the Manyar automotif company dealership, specifically by examining the detailed process flow of activities in the Spare Part Warehouse, several weaknesses were identified that contribute to inefficiencies in spare part management. These issues are summarized in the table below:

Causes of Problems in the Storage System at Manyar automotif company Dealership

Cause of the problem	Validation
Partman ordering errors due to lack of technical assistance from mechanics during the estimation process.	Ensuring the correctness of ordered parts
Limited training for warehouse staff regarding spare part classification and recording.	Lack of partman education in part selection
Inaccurate part information and location in the EPC system, leading to delays in locating and issuing parts.	Ensuring systemized part location
Absence of a standardized SOP for recording and validating part order estimates.	Mechanic assistance needed during estimation

The findings from this analysis clearly underscore that the efficiency of the storage system is not solely determined by technical infrastructure or physical layout, but is also critically influenced by several interrelated organizational factors. Chief among these are the level of coordination between departments, the competency and training quality of operational personnel, and the robustness and reliability of the company's information management system.

Effective interdepartmental coordination ensures seamless communication between warehouse, procurement, service, and inventory control units—minimizing delays, reducing redundancy, and aligning operational priorities. In parallel, well-trained staff equipped with the necessary technical and procedural knowledge are essential for accurate inventory handling, error minimization, and efficient workflow execution.

Equally important is the role of a reliable and integrated information system, which supports real-time data tracking, inventory forecasting, and performance monitoring. Without such a system, even well-coordinated teams may face significant challenges in executing timely and data-driven decisions.

Thus, improving storage system efficiency requires a holistic organizational approach that combines technological capability, human resource development, and cross-functional collaboration to create a resilient and adaptive operational environment.

Identified Issues

From January to April 2024, internal inventory reports showed decreasing but persistent dead stock rates, In January: 4.04%, in February: 3.03%, in March: 2.49% and in April: 2.00%. Based on observations and interviews revealed that the cause of problem is:

1. Lack of training and unclear SOPs.
2. Inaccurate EPC location data.
3. No standardized documentation for part requests.

Risk Evaluation Based on Risk Priority Number (RPN)

The Risk Priority Number (RPN) is used to measure the level of risk related to dead stock. From January to April 2024, the RPN steadily decreased, showing that inventory risks at Manyar Automotif Company became more controlled. This decline suggests that improvements were made in inventory processes. Actions such as EPC system validation, staff training, and better estimation likely contributed to the reduced risk.

In January, dead stock made up 4.04% of total inventory. By April, it had dropped to 2.00%. This trend reflects better inventory turnover and fewer unused items. Most inventory each month was categorized as moving stock. For example, in January, moving stock made up 72.6% of total inventory. A high proportion of moving stock indicates improved inventory flow.

The reduction in dead stock and Risk Priority Number (RPN) reflects the effectiveness of the PDCA framework in improving inventory management at Manyar Automotive Company. This aligns with the Kaizen concept proposed by Imai (1986), where continuous, incremental improvements reduce operational risk and increase efficiency. In short, this

dealership's measurable progress demonstrates how structured interventions and ongoing evaluation can strengthen inventory control, optimize parts availability, and support long-term operational excellence.

Discussion

The PDCA approach successfully uncovered and addressed systemic inefficiencies. The declining dead stock percentages support this, affirming the findings Nurhayati & Ramadhan (2019)[19]. EPC system training and SOP standardization also align with Rizal & Hidayat's (2018) emphasis on information integration. Unlike earlier studies focused on macro-level inventory controls, this research explores micro level, operational improvements within a dealership environment highlighting the importance of staff coordination, real-time systems, and continuous evaluation.

The implementation of the PDCA (Plan–Do–Check–Act) framework at Manyar Automotive Company has proven effective in uncovering and systematically addressing key inefficiencies in spare parts storage management. Drawing on observations conducted from September 2024 to February 2025, as well as in-depth interviews with the Head of Warehouse, Partman, and Mechanics, the study reveals that the root causes of inventory inefficiency are predominantly organizational rather than purely technical in nature.

One of the most prominent findings is the lack of standardized SOPs, which has led to inconsistent estimation practices and inaccuracies in part ordering. This is reinforced by feedback from the Head of Warehouse, who cited the absence of technical guidelines and training as major contributors to demand estimation errors. Partmen and mechanics also reported challenges in using the EPC system due to insufficient technical training, which resulted in the misidentification of parts and delays in inventory turnover.

[19] Ramadhan, A. N., & Nurhayati, I. K. (2019). Konsep Diri Anggota Komunitas Motor Di Kota Bandung (Studi Fenomenologi Pada Komunitas Verza Rider Community Indonesia (Vrci) Region Bandung). eProceedings of Management, 6(2).

The data further highlights the critical role of interdepartmental coordination, where weak communication between warehouse personnel, partmen, and mechanics led to the misalignment of inventory needs and supply. These issues are symptomatic of a deeper need for integrated processes and real-time information sharing. In this regard, the EPC system, while available, had not been fully optimized due to outdated location data and fragmented access, limiting its potential to support timely and accurate part retrieval.

Despite these initial inefficiencies, the application of the PDCA cycle has led to measurable operational improvements, as evidenced by inventory turnover data. From January to April 2024, the proportion of dead stock decreased from 4.04% to 2.00%, accompanied by a consistent drop in the Risk Priority Number (RPN). This trend reflects both a reduction in operational risks and an enhancement in inventory responsiveness, aligning with the principles of continuous improvement championed by Imai (1986) under the Kaizen philosophy.

The training interventions, validation of EPC system data, and standardization of SOPs have had a clear impact. By April 2024, moving stock accounted for the majority of inventory, indicating improved rotation and a more efficient use of storage space. For instance, in January, moving stock constituted approximately 72.6% of total inventory value—an encouraging sign that the system was beginning to prioritize operationally relevant items over stagnant inventory.

These results substantiate prior research by Nurhayati & Ramadhan (2019), who emphasized that structured interventions lead to decreased inventory waste, and by Rizal & Hidayat (2018), who highlighted the importance of information system integration in driving warehouse performance. Unlike prior macro-level studies that focused on aggregate inventory metrics across supply chains, this research contributes a micro-level perspective by offering an in-depth case study of how local dealership

operations can benefit from PDCA-based analysis and iterative improvement. Manyar Automotive Company's experience serves as a compelling example of how continuous improvement frameworks, when applied rigorously and supported by leadership commitment, can drive meaningful transformation in operational efficiency at the dealership level.

Conclusion

This study evaluated the spare part storage system at Manyar Automotif Company using the PDCA method. Inefficiencies stemmed from lack of training, SOPs, and EPC inaccuracies. The implementation of PDCA improved storage efficiency, reduced dead stock, and enhanced staff performance. The hypothesis is supported: PDCA significantly improves operational efficiency through structured diagnosis and intervention. This framework offers a replicable model for other dealerships facing similar challenges.

Management at Manyar Automotif Company should continue formalizing SOPs and reinforcing EPC training programs. Cross-functional collaboration between partmen, technicians, and service advisors must be institutionalized to enhance demand estimation accuracy. Future research may integrate quantitative efficiency metrics and explore PDCA combined with ERP systems for broader scalability.

References

Aslamiyah, S., & Santoso, R. A. (2023, August). Implementasi Strategi Pemasaran Pada PT. Bank Perkreditan Rakyat (BPR) MCM. *UMMagelang Conference Series (pp. 61-78).*

Atmaja, I. R. (2022). Analisis Penyebab Deadstock Spare Part Pada Pt. X. *Arthavidya Jurnal Ilmiah Ekonomi*, *24*(1), 81-95.

Bungin, B. (2011). *Metodologi penelitian kualitatif: Aktualisasi metode ke arah ragam varian kontemporer*. Jakarta: RajaGrafindo Persada.

Christopher, M. (2016). *Logistics & Supply Chain Management*. Pearson. Krajewski, L. J., Malhotra, M. K., & Ritzman, L. P. (2019). *Operations Management: Processes and Supply Chains*. Pearson

Yadav, V. S., Singh, A. R., Raut, R. D., & Cheikhrouhou, N. (2021). Design of multi-objective sustainable food distribution network in the Indian context with multiple delivery channels. *Computers & Industrial Engineering*, 160, 107549

Mohamed, Y. H., Abdul Rahim, A. R., & Ma'aram, A. (2020). The effect of halal supply chain management on halal integrity assurance for the food industry in Malaysia. *Journal of Islamic Marketing*, *12*(9), 1734-1750.

Creswell, J. W., & Creswell, J. D. (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* SAGE Publications.

Hassan, A., Elamer, A. A., Fletcher, M., & Sobhan, N. (2020). Voluntary assurance of sustainability reporting: Evidence from an emerging economy. *Accounting Research Journal*, *33*(2), 391-410.

Chopra, S., & Meindl, P. (2007). *Supply chain management. Strategy, planning & operation* (pp. 265-275). Gabler.

Roehrich, J. (2008). Supply chain management: Strategy, planning & operations, by Chopra, S. and Meindl, P. *Journal of Purchasing & Supply Management*, *14*(4), 273-274.

Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Deming, W. E. (1986). *Out of the Crisis*. MIT Press.

Deming, W. Edwards. (1986). *Out of the Crisis*. MIT Press.Imai, Masaaki. (1986). *Kaizen: The Key to Japan's Competitive Success.*

Goh, M., & Lim, Y. F. (2014). Centralizing slow-moving items in a retail network: A case study. *International Journal of Production Economics*, 150, 40–50. https://doi.org/10.1016/j.ijpe.2013.11.022

Imai, M. (1986). *Kaizen: The Key to Japan's Competitive Success*. McGraw-Hill.

Johnson, R; Schoonenboom, J. (2017). *How to Construct a Mixed Methods Research Design*. *Kolner Z Soz Sozpsychol*.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Beverly Hills, CA: SAGE Publications.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Molina-Azorín, J. F. (2016). Mixed methods research: An opportunity to improve our studies and our research skills. *European Journal of Management and Business Economics*, 25(2), 37–38. https://doi.org/10.1016/j.redeen.2016.05.001

Putri, A. D., & Wibowo, R. A. (2021). *Evaluasi Sistem Manajemen Inventori di Gudang Spare Part Menggunakan Metode FIFO dan Just In Time*. Jurnal Logistik dan Supply Chain, 9(1), 22–31.

Richards, G. (2017). *Warehouse Management: A Complete Guide to Improving Efficiency and Minimizing Costs in the Modern Warehouse.* Kogan Page.

Aslamiyah, Suaibatul; Saffaanatuzaqiya, Sazsabilla; RIZQI, Maulidyah Amalina. Strategi Peningkatan Kinerja Guru MTs. Ihyaul Ulum Ujung Pangkah Gresik Melalui Pelatihan, Motivasi dan Kepuasan Kerja. In: UMMagelang Conference Series. 2021. p. 239-246.

Rizal, M., & Hidayat, A. (2018). *Pengaruh Sistem Informasi Inventory Terhadap Efisiensi Manajemen Gudang*. Jurnal Sistem Informasi dan Teknologi, 7(2), 45–53.

Saputra, M. R. B., & Aslamiyah, S. (2025). Analisis penerapan six sigma untuk mengurangi defect pupuk PT. Petrokopindo cipta selaras. Jursima, 12(2).

Siregar, F., & Situmorang, R. (2020). *Analisis Pengendalian Persediaan Barang Menggunakan Metode EOQ dan ABC pada PT XYZ*. Jurnal Manajemen dan Organisasi, 11(2), 123-134.

Slack, N., Brandon-Jones, A., & Johnston, R. (2016). *Operations Management.* Pearson. Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods.* SAGE Publications.

Slack, N., Brandon-Jones, A., & Johnston, R. (2016). *Operations Management* (8th ed.). Pearson Education.

Snyder, R. D. (2002). Forecasting sales of slow- and fast-moving inventories. *European Journal of Operational Research*, 140(3), 684–699. https://doi.org/10.1016/S0377-2217(02)00099-2

Sugiyono, P. D. (2010). Metode Peneliian. *Kuantitatif, Kualitatif, Dan R&D*.

Wild, T. (2002). *Best Practice in Inventory Management.* Elsevier Science. Chopra, S., & Meindl, P. (2019). *Supply Chain Management: Strategy, Planning, and Operation.* Pearson.)

Yin, R. K. (2018). *Case Study Research and Applications: Design and Methods.* SAGE Publications.

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