Jurnal Kecerdasan Buatan dan Teknologi Informasi
Vol. 5, No. 3, September 2026, pp. 526–534
e-ISSN: 2964-2922, p-ISSN: 2963-6191

Open access

Original Research

Optimization of Spare Parts Stock Control Using Safety Stock and Reorder Point Approach with Laravel

Dimas Sanjaya [a], R. Wisnu Prio Pamungkas [b*], Fried Sinlae [c]

[a,b,c] Department of Informatics, Faculty of Computer Science, Universitas Bhayangkara Jakarta Raya, Jakarta, Indonesia

*Corresponding Author: Wisnu.prio@dsn.ubharajaya.ac.id

ABSTRACT

Inventory management is a critical aspect of ensuring business operational continuity, particularly in maintaining spare parts availability for automotive workshops. Bengkel Mo Gerzz, a Vespa Matic specialist workshop, handles 1 to 10 vehicles daily with over 100 types of spare parts managed manually through simple records and verbal communication, leading to real-time stock monitoring limitations and reorder inaccuracies. This study develops a web-based inventory management system built with the Laravel framework, integrating the Safety Stock (SS) and Reorder Point (ROP) methods based on lead time to optimize spare parts stock control. The system was developed using the Waterfall methodology through seven sequential phases: planning, analysis, design, development, testing, implementation, and maintenance. The proposed SS formula calculates buffer stock as $SS = (D_{\text{max}} \times L_{\text{max}}) - (D_{\text{avg}} \times L_{\text{avg}})$, while ROP is determined by $ROP = (D_{\text{avg}} \times L) + SS$. The system was evaluated using Black Box Testing across six modules, achieving a 100% pass rate across 24 test scenarios. Calculation results for 21 spare part types showed that Oli Mesin Ipone Scooter 10W-40 Premium recorded the highest SS value of 14.97 and ROP of 18, indicating the greatest demand variability. The system provides automated restock notifications when stock reaches the ROP threshold, enabling more structured and data-driven procurement decisions at Bengkel Mo Gerzz.

How to Cite:
D. Sanjaya, R. W. P. Pamungkas, and F. Sinlae, "Optimization of Spare Parts Stock Control Using Safety Stock and Reorder Point Approach with Laravel," *J. Kecerdasan Buatan dan Teknol. Inf.*, vol. 5, no. 3, pp. 526–534, 2026.
Doi: `https://doi.org/10.69916/jkbti.v5i3.563`

KEYWORDS

Safety Stock
Reorder Point
Inventory Management
Laravel
Spare Parts

ARTICLE INFO

Received: June 29, 2026
Accepted: August 17, 2026
Available Online: September 1, 2026

1. INTRODUCTION

Inventory management is a critical aspect of maintaining smooth business operations, particularly in ensuring the availability of goods in accordance with operational needs. Poor inventory management can lead to imbalances between stock availability and storage costs, thereby affecting operational efficiency. Stock shortages (stockout) can hamper customer service, while excess stock (overstock) results in wasted costs and capital freezing [1]. Therefore, an inventory management system capable of controlling stock effectively and accurately is essential for businesses with high spare parts turnover.

Bengkel Mo Gerzz is a Vespa Matic specialist workshop that services approximately 1 to 10 vehicles daily with a diverse range of spare parts requirements exceeding 100 types of components. Currently, inventory management at this workshop is still conducted manually through simple record-keeping and verbal communication. This condition limits real-time stock monitoring and increases the risk of data discrepancies. Furthermore, Bengkel Mo Gerzz does not yet possess a web-based inventory system capable of supporting structured spare parts stock monitoring [2]. The absence of an automated system causes delays in procurement decisions and increases the risk of operational disruptions.

Previous research on web-based inventory systems has generally focused on digital stock management and inventory monitoring. Kusuma et al. [3] demonstrated that a web-based inventory management system improved stock management accuracy and reduced manual recording errors. Similarly, Muzdhalifatul Ijfi et al. [4] showed that a web-based system could manage stock data in a structured manner, though without implementing Safety Stock and Reorder Point methods. Sanatin et al. [5] and Irawan et al. [6] applied the Safety Stock method in pharmacy and product monitoring contexts, proving its effectiveness in reducing stockout risks and supporting real-time availability monitoring.

Furthermore, Laravel has become one of the most widely adopted PHP frameworks for web-based information system development because it provides a structured architecture, simplifies application development, and supports scalability through its MVC implementation. Previous studies have shown that Laravel enhances development and maintenance efficiency for complex information systems [7].

Research by Maulidi and Listianti [8] and Fathurrohman and Nugraha [9] demonstrated that the Reorder Point method effectively determines optimal reorder points, improving procurement decision accuracy. Regarding lead time, Faizol et al. [10] confirmed that lead time accuracy directly influences inventory control effectiveness and reorder timing. Vikaliana [11] further showed that lead time variability affects distribution smoothness and supply chain efficiency. However, these studies have not integrated lead time as a dynamic variable within a web-based inventory system that automatically computes SS and ROP in real time. Based on the review of prior studies, a research gap exists: no existing work has fully integrated the Safety Stock and Reorder Point methods based on lead time into a web-based inventory system specifically designed for automotive workshops with automated real-time restock notifications. Most prior systems either implement digital inventory management without optimization algorithms, or apply SS and ROP in non-automated contexts. This gap limits the applicability of existing solutions for small-to-medium automotive service businesses [12].

This study proposes the development of a web-based spare parts inventory management system at Bengkel Mo Gerzz using the Laravel framework, integrating the Safety Stock (SS) and Reorder Point (ROP) methods based on lead time. The novelty lies in the automated, real-time calculation of SS and ROP embedded directly into the web application, enabling instant restock alerts for workshop administrators. The system addresses three core objectives: (1) designing and building a web-based spare parts inventory system for Bengkel Mo Gerzz; (2) implementing Safety Stock to determine optimal buffer stock quantities; and (3) applying ROP based on lead time to automate reorder point determination.

2. RESEARCH METHODS

This research employed the Waterfall methodology for system development, combined with observational data collection, structured interviews, and literature review conducted at Bengkel Mo Gerzz Vespa Matic, Jakarta. The system was developed using the Laravel PHP framework with MySQL as the database management system and Tailwind CSS for the user interface.

2.1. Research Framework

The inventory management system was developed using the Waterfall methodology due to its linear, structured, and sequential workflow [13]. This model requires each phase to be fully completed before proceeding to the next, making it highly effective for software with clearly defined requirements [14].

Figure 1 presents the seven phases of the Waterfall methodology used in this study: planning, requirements analysis, system design, development, testing, implementation, and maintenance. Each phase is completed sequentially before moving on to the next, ensuring a systematic development process. In this study, these phases were applied to design, develop, test, implement, and maintain an inventory management system for the Mo Gerzz Vespa Matic Workshop [15].

2.2. Dataset and Data Collection

Data was collected through three approaches: (1) direct observation of the current manual inventory process; (2) structured interviews with the workshop owner and administrator to capture daily usage data and supplier lead times; and (3) literature review to validate the SS and ROP formulas. The dataset consists of 21 types of spare parts with daily usage records (D_{max} and D_{avg}) and lead time data (L_{max} and L_{avg} in days). The database comprises four interrelated tables: users, products, suppliers, and transactions.

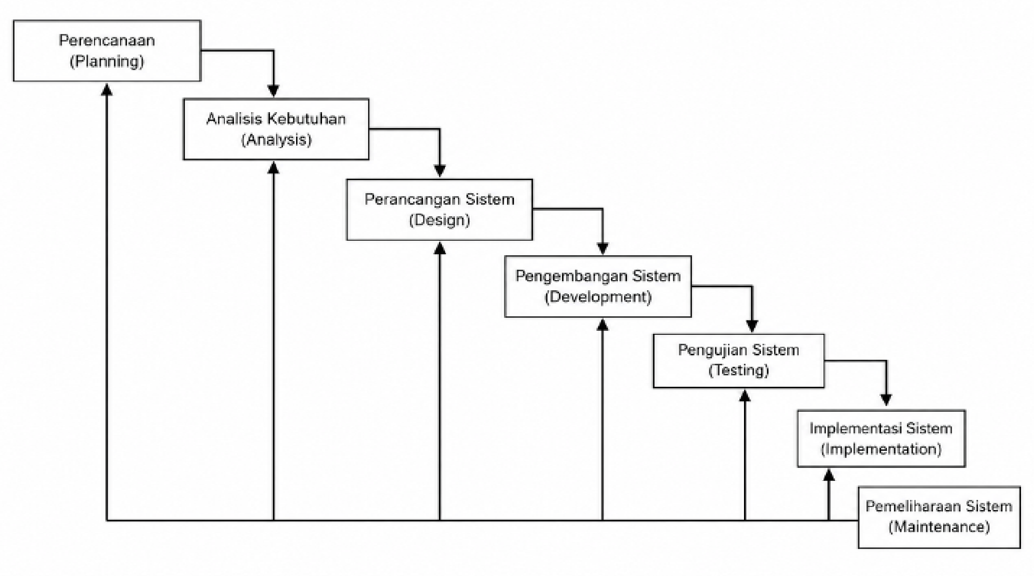

Figure 1. Waterfall Development Phase for the Inventory Management System

2.3. Proposed Method, Safety Stock and Reorder Point

Safety Stock (SS) is an inventory buffer designed to absorb demand fluctuations and lead time variability, ensuring that service levels remain optimal despite supply chain uncertainties [16]. In this study, SS is calculated using the formula based on maximum and average usage during lead time [16]:

$$SS = (D_{\max} \times L_{\max}) - (D_{\text{avg}} \times L_{\text{avg}}) \tag{1}$$

Where:

- SS = Safety Stock (units)
- $D_{\max}$ = Maximum daily usage per period
- D_{avg} = Average daily usage per period
- $L_{\max}$ = Maximum lead time (days)
- L_{avg} = Average lead time (days)

Reorder Point (ROP) indicates the stock level at which a new order must be placed to avoid stockout during the procurement period. ROP is determined by the average usage rate, lead time, and the computed Safety Stock [13]:

$$ROP = (D_{\text{avg}} \times L_{\text{avg}}) + SS \tag{2}$$

Where:

- ROP = Reorder Point (units)
- D_{avg} = Average daily usage per period
- L_{avg} = Average lead time (days)
- SS = Safety Stock

Both formulas are implemented as automated calculations within the Laravel system. When a spare part's current stock reaches or falls below its ROP value, the system automatically flags it as requiring restock and displays an alert on the dashboard and Restock Report page.

2.4. System Architecture

This system is built upon the Model-View-Controller (MVC) architecture using Laravel, which provides features such as modular development, routing, authentication, and database migration that simplify web application development while enhancing maintainability and scalability [17]. Previous studies have demonstrated that

Laravel is effective for developing complex web-based information systems due to its organized architecture and comprehensive ecosystem [18].

2.5. Evaluation Metrics

System evaluation was conducted using Black Box Testing to verify functional correctness across all modules [19, 20]. The test covered six modules: Login, Dashboard, Spare Parts CRUD, Incoming Goods Transaction, Outgoing Goods Transaction, and Stock Monitoring & Restock, comprising 24 test scenarios. The accuracy of SS and ROP computation results was also validated by comparing system-generated values against manual calculations for all 21 spare part types.

3. RESULTS AND DISCUSSION

3.1. System Implementation

The developed system provides six core functional modules accessible through a single-user authentication interface. The Login page serves as the access control gateway requiring valid credentials. Upon successful authentication, the Dashboard displays real-time inventory summaries including total products, daily transactions, and spare parts that have reached their ROP threshold, along with a critical stock list showing current stock, SS, ROP values, and stock status for each item.

The Spare Parts Master page enables full CRUD management with automatic display of computed SS and ROP values. The Transaction module handles both incoming and outgoing goods: incoming transactions automatically increment stock levels, while outgoing transactions decrement them and trigger safety stock warnings when stock falls at or below the SS value. The Restock Report page consolidates all items at or below ROP, displaying item counts, estimated order quantities, average lead time, and providing export options in PDF and Excel formats.

3.2. Sample Safety Stock and Reorder Point Calculations

To illustrate the application of Equations (1) and (2), detailed step-by-step calculations are presented for five representative spare parts — two original Piaggio parts (GEN-) and three aftermarket parts (MOD-) — selected based on demand volume and supplier category diversity.

Sample 1: Filter Oli Mesin Piaggio (GEN-82635R) | Original — $L_{\max} = 4$ days, $L_{\text{avg}} = 3$ days

- Input: $D_{\max} = 5$ unit/day, $D_{\text{avg}} = 2$ unit/day
- $SS = (5 \times 4) - (2 \times 3) = 20 - 6 = 14$ units
- $ROP = (2 \times 3) + 14 = 6 + 14 = 20$ units

Sample 2: Kampas Rem Depan Standard Piaggio (GEN-651356) | Original — $L_{\max} = 4$ days, $L_{\text{avg}} = 3$ days

- Input: $D_{\max} = 2$ unit/day, $D_{\text{avg}} = 2$ unit/day
- $SS = (2 \times 4) - (2 \times 3) = 8 - 6 = 2$ units
- $ROP = (2 \times 3) + 2 = 6 + 2 = 8$ units

Sample 3: Oli Mesin Ipone Scooter 10W-40 Premium (MOD-OLIPM) | Aftermarket — $L_{\max} = 2$ days, $L_{\text{avg}} = 1$ day

- Input: $D_{\max} = 9$ unit/day, $D_{\text{avg}} = 3$ unit/day
- $SS = (9 \times 2) - (3 \times 1) = 18 - 3 = 15$ units
- $ROP = (3 \times 1) + 15 = 3 + 15 = 18$ units

Sample 4: Baut Proti Titanium Variasi (MOD-BTPRT) | Aftermarket — $L_{\max} = 2$ days, $L_{\text{avg}} = 1$ day

- Input: $D_{\max} = 4$ unit/day, $D_{\text{avg}} = 3$ unit/day
- $SS = (4 \times 2) - (3 \times 1) = 8 - 3 = 5$ units
- $ROP = (3 \times 1) + 5 = 3 + 5 = 8$ units

Sample 5: Kampas Rem Aftermarket Zelioni / Malossi (MOD-KMZEL) | Aftermarket — $L_{\max} = 2$ days, $L_{\text{avg}} = 1$ day

- Input: $D_{\max} = 3$ unit/day, $D_{\text{avg}} = 1$ unit/day
- $SS = (3 \times 2) - (1 \times 1) = 6 - 1 = 5$ units
- $ROP = (1 \times 1) + 5 = 1 + 5 = 6$ units

The sample calculations highlight a key finding: original parts (GEN-) consistently produce higher ROP values than aftermarket parts even with lower demand, solely due to the longer supplier lead time. For example, Filter Oli Mesin Piaggio ($D_{\max} = 5$, GEN-) achieves $ROP = 20$, while Oli Mesin Ipone Premium ($D_{\max} = 9$, MOD-) achieves $ROP = 18$ despite much higher demand, because the shorter aftermarket lead time ($L_{\text{avg}} = 1$ day) substantially reduces the required buffer. This confirms that supplier-category-based lead time differentiation is a critical determinant of inventory threshold accuracy.

3.3. Safety Stock and Reorder Point Calculation Results

The system automatically calculated SS and ROP values for all 21 spare part types registered in the Bengkel Mo Gerzz inventory. Table 1 presents the complete computation results based on collected usage and lead time data.

Table 1. Safety Stock and Reorder Point Calculation Results for 21 Spare Parts

No	Spare Part Name	$D_{\max}$	D_{avg}	$L_{\max}$ (days)	L_{avg} (days)	SS	ROP
1	Oli Mesin Ipone 10W-40 Premium	9	3.03	2	1	14.97	18
2	Filter Oli Mesin Piaggio	5	1.70	3	1	19.90	25
3	Baut Proti Titanium (Eceran)	4	3.25	1	1	4.75	8
4	Kampas Rem Aftermarket Zelioni	3	1.30	1	2	4.70	6
5	Roller Racing BRT/Kawahara (Set)	3	1.56	1	2	4.44	6
6	Kampas Rem Depan Standard Piaggio	2	1.50	3	5	5.50	10
7	Paket V-Belt & Per CVT Racing	3	1.20	1	2	4.80	6
8	Roller Assembly Standard Piaggio	1	1.00	3	5	2.00	5
9	Handgrip Aftermarket Harris/Domino	2	1.20	1	2	2.80	4
10	Busi Racing Iridium NGK/Denso	1	1.00	1	2	1.00	2
11	Filter Udara Standard Piaggio	1	1.00	3	5	2.00	5
12	Knalpot Racing Shijiro/Prospeed	2	1.20	1	2	2.80	4
13	Lampu LED Utama + Ring Bezel	2	1.25	1	2	2.75	4
14	Flyscreen/Windshield Mika Retro	2	1.25	1	2	2.75	4
15	Gantungan Barang (Hook) CNC	2	1.25	1	2	2.75	4
16	Busi Standard NGK CR8EB Piaggio	1	1.00	3	5	2.00	5
17	V-Belt Standard Piaggio	1	1.00	3	5	2.00	5
18	Crashbar Pelindung Body Vespa	1	1.00	1	2	1.00	2
19	Spion Bar End / Tangkai Pendek	1	1.00	1	2	1.00	2
20	Shockbreaker Aftermarket YSS/Scarlet	1	1.00	1	2	1.00	2
21	Filter Udara Racing Ferrox	1	1.00	1	2	1.00	2

The results in Table 1 demonstrate that each spare part exhibits distinct SS and ROP values reflecting its unique demand and lead time characteristics. Oli Mesin Ipone Scooter 10W-40 Premium recorded the highest SS value of 14.97 and ROP of 18, attributed to its high daily maximum usage ($D_{\max} = 9$) and relatively short average lead time of 1 day. This indicates that engine oil is the most critical spare part requiring the largest safety buffer to prevent service disruptions. Filter Oli Mesin Piaggio follows with $SS = 19.90$ and $ROP = 25$, driven by a lead time maximum of 3 days combined with moderate daily usage of up to 5 units. Spare parts with lower demand variability, such as Crashbar Pelindung Body Vespa, Spion Bar End, Shockbreaker YSS/Scarlet, and Filter Udara Racing Ferrox, all recorded $SS = 1$ and $ROP = 2$, reflecting minimal daily turnover and short lead times. These results align with the principle that SS magnitude is proportional to demand variability and lead time range, consistent with findings by Nurcahyawati et al. [21] and Fathurrohman and Nugraha [9].

3.4. System Testing Results

To verify functional correctness, Black Box Testing was conducted across the six system modules using 24 test scenarios. Table 2 summarizes the testing results. All scenarios produced outputs consistent with the expected results, yielding a 100% pass rate. The Login module tests confirmed that the authentication gateway accepts valid credentials and rejects invalid credentials with an appropriate error message. The Dashboard tests verified the real-time display of inventory summaries and the critical stock list. The Spare Parts CRUD tests confirmed successful create, read, update, and delete operations with automatic display of the computed SS and ROP values. The Incoming and Outgoing Goods Transaction tests verified automatic stock increment and decrement, including the safety stock warning trigger when stock falls at or below the SS value. Finally, the Stock Monitoring & Restock tests confirmed that items at or below the ROP threshold are flagged automatically and that the restock report can be exported in PDF and Excel formats.

Table 2. Black Box Testing Results

No	Module	Test Scenarios	Result	Status
1	Login	3	Valid	Pass
2	Dashboard	4	Valid	Pass
3	Spare Parts CRUD	5	Valid	Pass
4	Incoming Goods Transaction	4	Valid	Pass
5	Outgoing Goods Transaction	4	Valid	Pass
6	Stock Monitoring & Restock	4	Valid	Pass
	Total	**24**		**100%**

In addition to functional testing, the accuracy of the SS and ROP computations was validated by comparing the system-generated values against manual calculations based on Equations (1) and (2) for all 21 spare part types. All system outputs matched the manual calculations exactly, achieving 100% computational accuracy. This confirms that the automated computation engine embedded in the Laravel application correctly implements the proposed Safety Stock and Reorder Point formulas. These results demonstrate that the system functions correctly according to its design specifications and is ready for operational deployment at Bengkel Mo Gerzz.

3.5. Discussion

The integration of SS and ROP into a web-based Laravel system addresses the core limitations identified at Bengkel Mo Gerzz. Prior to system implementation, reorder decisions were made based on experience and verbal communication, frequently leading to stockouts for high-demand items like engine oil and oil filters. The automated system eliminates subjective judgment by computing scientifically-derived thresholds from real usage data, consistent with findings of Irawan et al. [6] and Maulidi and Listianti [8] who demonstrated that algorithm-based systems significantly outperform manual approaches in stock control accuracy.

Compared to prior related works, this system's key contribution lies in the real-time integration of lead time as a dynamic variable within an automated web platform. Research by Faizol et al. [10] confirmed lead time's significance for reorder accuracy, but remained at the theoretical level. This study operationalises that principle in a functional system. Unlike Sanatin et al. [5] and Kusuma et al. [3] who developed web-based inventory systems without full SS+ROP+lead time integration, the proposed system unifies all three elements with instant dashboard notifications and exportable restock reports. In terms of limitations, the current system is designed for single-user (admin) access only and operates on a local server environment without cloud-based deployment. The system also does not cover financial transactions or accounting integration, which are outside the defined research scope [22]. These constraints provide clear directions for future development to extend system applicability.

4. CONCLUSION

This study successfully designed and developed a web-based spare parts inventory management system for Bengkel Mo Gerzz using the Laravel framework with integrated Safety Stock and Reorder Point methods based on lead time. The system encompasses six functional modules built through seven sequential Waterfall phases. Black Box Testing conducted across all modules produced a 100% pass rate over 24 test scenarios, confirming that the system functions correctly according to its design specifications. The automated SS and ROP calculations effectively eliminate the subjective manual reorder decisions that previously characterized inventory management at the workshop.

The SS and ROP calculation results for 21 spare part types revealed meaningful differences in safety buffer requirements. Oli Mesin Ipone Scooter 10W-40 Premium required the highest Safety Stock of 14.97 units and Reorder Point of 18 units, reflecting its high demand variability and critical operational role. Items with stable, low-volume demand required only $SS = 1$ and $ROP = 2$, demonstrating that the formula appropriately scales buffer requirements to each item's actual risk profile. These values provide Bengkel Mo Gerzz with a data-driven foundation for procurement planning, replacing the previous experience-based approach that frequently led to stockouts for high-demand components. Future research is recommended to extend the system with multi-role access for owners and suppliers, cloud-based deployment for remote monitoring, and integration with supplier management for automated purchase order generation. Additionally, incorporating Economic Order Quantity (EOQ) alongside SS and ROP could further optimize inventory costs by determining the ideal order quantity per procurement cycle, offering a more comprehensive spare parts stock management solution for small-to-medium automotive workshops.

DECLARATIONS

Author Contributions:
Dimas Sanjaya: Conceptualization, Methodology, Software, Writing–original draft. R. Wisnu Prio Pamungkas: Supervision, Methodology, Writing–review & editing. Fried Sinlae: Validation, Writing–review & editing.

Funding:
The authors received no financial support for the research, authorship, and/or publication of this article.

Conflicts of Interest:
The authors declare that they have no competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability:
The datasets and source code generated during the current study are available from the corresponding author upon reasonable request.

AI Use Statement:
During the preparation of this manuscript, the authors used OpenAI's ChatGPT (GPT) to assist with sentence construction and English language editing. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Additional Information:
No additional information is available for this paper.

REFERENCES

REFERENCES

[1] R. Dalimunthe, Yahfizham, and M. Alda, "Sistem Informasi Inventory Obat Berbasis Web Dengan Menggunakan Metode Safety Stock Dan Reorder Point," *JEKIN - J. Tek. Inform.*, vol. 4, no. 2, pp. 324–334, Jun. 2024, doi: 10.58794/jekin.v4i2.800.

[2] G. A. K. Wana and M. R. Adiwati, "ANALISIS PENGELOLAAN PERSEDIAAN BARANG UNTUK MENINGKATKAN KETEPATAN PENGADAAN PADA PT. INDOBISMAR," *CENDEKIA J. Ilmu Pengetah.*, vol. 6, no. 1, pp. 196–205, Jan. 2026, doi: 10.51878/cendekia.v6i1.8890.

[3] R. R. Kusuma, H. Maulana, and R. D. Supriatman, "SISTEM INFORMASI MANAJEMEN INVENTARIS BERBASIS WEB DI PANADA COFFEE MENGGUNAKAN METODE RAPID APPLICATION DEVELOPMENT," vol. 2, 2025.

[4] I. Muzdhalifatul Ijfi, M. Furqoon Khalilullah, Z. Putri Leri, V. Farezy, and E. Arribe, "PERANCANGAN SISTEM INFORMASI INVENTARIS BARANG BERBASIS WEB: STUDI KASUS: TOKO JAKARTA DECOR," *JATI J. Mhs. Tek. Inform.*, vol. 9, no. 1, pp. 275–283, Dec. 2024, doi: 10.36040/jati.v9i1.12173.

[5] S. Sanatin, M. Asfi, A. Amroni, and C. Nas, "Perancangan Sistem Informasi Persediaan Stok Obat Dengan Metode Safety Stok Dan ROP Di Apotek Pasuketan Cirebon," *J. Manaj. Sist. Inf.*, vol. 1, no. 2, pp. 75–80, Jun. 2023, doi: 10.51920/jurminsi.v1i2.145.

[6] Y. Irawan, R. Aji, and N. Susanti, "Sistem Informasi Monitoring Stok Produk Dengan Metode Safety Stock dan Reorder Point pada CV Alief Jaya," vol. 4, no. 2, 2023.

[7] D. Tri Bakti Purba, H. Tawaqal, R. Fachrudin, and F. Sinlae, “Design Database Pada Sistem Informasi Reservasi Hotel,” *J. Siber Multi Disiplin*, vol. 2, no. 2, pp. 144–151, Jul. 2024, doi: 10.38035/jsmd.v2i2.188.

[8] R. Maulidi and P. Listianti, “Optimasi Pengendalian Persediaan dengan Metode Reorder Point dalam Pengembangan Aplikasi Kontrol Stok Berbasis Web,” *J. Appl. Inform. Comput.*, vol. 7, no. 1, pp. 36–43, Jul. 2023, doi: 10.30871/jaic.v7i1.5204.

[9] L. R. Fathurrohman and A. A. Nugraha, “Penerapan Pengendalian Persediaan Menggunakan Metode Safety Stock dan Reorder Point untuk Meningkatkan Efisiensi Biaya Persediaan Barang Jadi: (Studi Kasus pada PT. Medal Queenindo),” *Indones. Account. Lit. J.*, vol. 5, no. 2, pp. 210–227, Mar. 2025, doi: 10.35313/ialj.v5i2.5021.

[10] A. Faizol, N. P. Sari, C. F. Nur Aini, and U. Nafiah, “PENGARUH KETEPATAN WAKTU TUNGGU PEMESANAN DALAM PENERAPAN METODE REORDER POINT TERHADAP TERCIPTANYA KELANCARAN MANAJEMEN PERSEDIAAN BAHAN BAKU DAN KEPUASAN PELANGGAN,” *Journal Econ. Policy Stud.*, vol. 2, no. 1, pp. 20–31, Aug. 2021, doi: 10.21274/jeps.v2i1.4668.

[11] R. R. Putra and R. Vikaliana, “Pengaruh Defect dan Lead Time pada Lini Distribusi di PT Lasindo Jaya Bersama,” 2021.

[12] W. A. Ubaidi and R. Heryanto, “Perancangan Sistem Manajemen Stok Barang dan Servis Bengkel Berbasis Android pada Bengkel 3 Putra,” *J. Ilm. Sist. Inf. Dan Ilmu Komput.*, vol. 6, no. 1, pp. 526–537, Mar. 2026, doi: 10.55606/juisik.v6i1.2232.

[13] T. Makhfiroh, Mugiarso, and R. W. Prio Pamungkas, “Sistem Pengendalian Persediaan Stok Barang Pada Toko Hafiz Menggunakan Metode EOQ (Economic Order Quantity),” *J. Stud. Res. Comput. Sci.*, vol. 3, no. 1, pp. 39–50, May 2022, doi: 10.31599/jsrcs.v3i1.1150.

[14] R. W. P. Pamungkas et al., “PENERAPAN WATERFALL DALAM MEMBANGUN SISTEM INFORMASI PEMESANAN STUDIO UBHARA,” *J. Sist. Inf. Bisnis JUNSIBI*, vol. 6, no. 1, pp. 1–8, Apr. 2025, doi: 10.55122/junsibi.v6i1.1114.

[15] C. Rizal, B. Fachri, and M. Hasanuddin, “WATERFALL METHODE DALAM RANCANG BANGUN SISTEM INFORMASI POTENSI WISATA BERBASIS WEB,” 2021.

[16] J. H. Heizer, B. Render, and C. Munson, *Operations Management: Sustainability and Supply Chain Management*, 14th ed., Global ed. Harlow, England: Pearson, 2024.

[17] R. W. P. Pamungkas and R. Khalida, “DESIGN AND DEVELOPMENT OF AN EARLY WARNING SYSTEM THROUGH CONTINUOUS AUDITING AND CONTINUOUS MONITORING IN PUBLIC SECTOR PROCUREMENT,” *J. Kecerdasan Buatan dan Teknol. Inf.*, vol. 5, no. 2, pp. 137–142, May 2026, doi: 10.69916/jkbti.v5i2.445.

[18] F. Sinlae, P. Steno Birama, D. Ardian Nugraha Siregar, W. Safriadi, and H. Tawakal, “Design dan Implementasi Sistem Informasi Pembelian Properti Berbasis Web Menggunakan Framework Laravel,” *J. Siber Multi Disiplin*, vol. 2, no. 2, pp. 152–157, Jul. 2024, doi: 10.38035/jsmd.v2i2.189.

[19] H. Azkia, D. Sugiarto, and E. R. Subhiyakto, “Pengujian Black-Box Dengan Teknik State Transition pada Sistem Appoinment Klinik Berbasis Web Citra Medica,” *Pixel J. Ilm. Komput. Graf.*, vol. 18, no. 2, pp. 148–159, Dec. 2025, doi: 10.51903/pixel.v18i2.3282.

[20] F. Julianifa Putri, D. Febriyanti, D. Wulansari, K. Ramadhani, A. Wicaksono, and G. Parasti Mindara, “ANALISIS PENERAPAN BLACK BOX TESTING BERBASIS DECISION TABLE TERHADAP FUNGSIONALITAS WEBSITE FISHCO,” *JATI J. Mhs. Tek. Inform.*, vol. 10, no. 1, pp. 585–591, Jan. 2026, doi: 10.36040/jati.v10i1.16836.

[21] V. Nurcahyawati, R. A. Brahmantyo, and J. Wibowo, “Manajemen Persediaan Menggunakan Metode Safety Stock dan Reorder Point,” *J. Sains Dan Inform.*, pp. 89–99, Aug. 2023, doi: 10.34128/jsi.v9i1.431.

[22] E. Z. Christyani and A. Susanti, "Management Inventory Produk Cat Menggunakan Metode Safety Stock dan Reorder Point Pada TB Gamping Pilihan Sukoharjo," *J. Ilm. Manaj. Ekon. Dan Akunt.*, vol. 5, no. 2, pp. 112–126, Jul. 2025, doi: 10.55606/jurimea.v5i2.919.