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Development of an Android-Based Inventory Decision Support System Using Rapid Application Development

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ABSTRACT

Inventory management remains a significant challenge for many Micro, Small, and Medium Enterprises (MSMEs), particularly due to manual stock recording, delayed inventory updates, and inefficient purchasing decisions. Most existing mobile inventory applications focus only on inventory recording without providing analytical support for inventory replenishment. This study aims to develop an Android-based Inventory Decision Support System using the Rapid Application Development (RAD) method by integrating adaptive demand forecasting, Economic Order Quantity (EOQ), and Reorder Point (ROP) calculations into inventory management. The study employed a Research and Development (R&D) approach following the RAD phases of requirements planning, user design, construction, and cutover. Historical inventory transaction data were used to generate demand forecasts, calculate EOQ and ROP values, and automatically provide purchasing recommendations. Functional performance was evaluated using Black Box Testing, usability was assessed using the System Usability Scale (SUS), and forecasting accuracy was measured using Mean Absolute Percentage Error (MAPE). The developed application successfully integrated inventory management, forecasting, inventory optimization, and purchase recommendation features. Functional testing showed that all application modules operated correctly, while the system achieved an average SUS score of 82.5, indicating excellent usability. The forecasting model also demonstrated satisfactory prediction accuracy with a low MAPE value, enabling the application to generate timely reorder recommendations. The proposed system not only improves inventory recording accuracy but also supports intelligent inventory planning, helping MSMEs reduce stock shortages and optimize purchasing decisions.

Keywords: Android Application, Demand Forecasting, Inventory Decision Support System, Rapid Application Development, Reorder Point.

INTRODUCTION

The rapid development of information and communication technology has transformed various sectors, including business and trade. Information technology has become essential not only for large companies but also for Micro, Small, and Medium Enterprises (MSMEs) to improve operational efficiency, organizational effectiveness, and managerial decision-making through accurate and timely information processing (Laudon, K. C., & Laudon, 2022). MSMEs play a significant role in Indonesia's economy by contributing to employment opportunities and economic growth. Therefore, improving operational management through digital transformation has become increasingly important for enhancing the competitiveness and sustainability of MSMEs.

One of the most important operational activities in MSMEs is inventory management because inventory availability directly affects production continuity, customer satisfaction, and business profitability. Effective inventory management ensures that products are available in the right quantity at the appropriate time while minimizing inventory costs (Purba, Rivan Salvador, 2025). Conversely, poor inventory management frequently causes stock shortages, excessive inventory, delayed order fulfillment, and financial losses that reduce organizational performance.

Despite the rapid advancement of digital technology, many MSMEs continue to rely on manual

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inventory recording using notebooks or spreadsheet applications. Manual recording often results in inconsistent stock information, duplicated transactions, delayed inventory updates, and discrepancies between physical inventory and recorded data, making inventory control less effective (Syaputra, Oky Egi, Muhammad Arifin, 2025). Initial observations and interviews conducted in this study also revealed that inventory recording and reporting are still performed manually, causing slow information retrieval, inaccurate stock monitoring, and inefficient purchasing decisions. As Android smartphones have become widely used because of their affordability and flexibility, Android-based inventory applications offer an effective solution for supporting inventory management anytime and anywhere. Mobile technology enables users to manage inventory more efficiently while improving accessibility and operational flexibility (Erwin et al., 2023).

Several previous studies have demonstrated that digital inventory information systems improve inventory recording accuracy and operational efficiency. Atma, Prima, et al., (2025) developed a web-based inventory application using the Rapid Application Development (RAD) method and reported improvements in inventory administration through iterative system development. Similarly, (Nurhadi et al., 2024) implemented a warehouse management information system using RAD and demonstrated that the developed application successfully improved inventory recording and reporting through Black Box Testing. Furthermore, Maulana and Yansahrita (2025) developed a mobile inventory management system capable of recording inventory transactions and monitoring stock levels in real time. These findings indicate that digital inventory systems have significantly improved inventory management for MSMEs.

A mobile-based inventory information system helps MSMEs record incoming and outgoing goods, generate automatic reports, monitor stock in real time, and improve decision-making. To develop such a system efficiently, this study applies the Rapid Application Development (RAD) method. According to Aulianita, Rizki, et al. (2022), RAD emphasizes rapid development through prototyping and active user involvement, enabling faster development while ensuring the system meets user needs.(Aulianita, Rizki, 2025).

However, several important limitations remain. Most existing inventory applications primarily focus on recording inventory transactions, stock monitoring, and report generation without providing analytical support for inventory replenishment decisions. Purchasing decisions are generally still determined manually based on user experience rather than quantitative inventory analysis. Consequently, existing systems cannot determine the optimal purchasing quantity or recommend the appropriate time for inventory replenishment. In addition, although some studies have implemented Android-based inventory applications, only a limited number integrate inventory optimization techniques into a single mobile platform, and system evaluation is generally limited to functional testing without simultaneously assessing usability and forecasting performance.

Based on these limitations, a clear research gap can be identified. Existing studies have mainly developed inventory recording systems, whereas Android-based inventory decision support systems integrating demand forecasting, Economic Order Quantity (EOQ), and Reorder Point (ROP) remain limited. Furthermore, comprehensive system evaluation combining Black Box Testing, System Usability Scale (SUS), and forecasting accuracy using Mean Absolute Percentage Error (MAPE) has rarely been reported in previous studies.

To address this research gap, this study proposes an Android-based Inventory Decision Support System developed using the Rapid Application Development (RAD) method. Unlike previous studies that mainly facilitate inventory recording, the proposed system integrates Weighted Moving Average demand forecasting, EOQ, and ROP calculations to generate automatic purchasing recommendations based on historical inventory transactions. The proposed approach transforms the application from a conventional inventory recording system into a mobile decision-support system capable of assisting MSMEs in determining both the optimal purchasing quantity and the appropriate reorder time.

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The contributions of this study are threefold. First, it develops an Android-based inventory decision support system that integrates inventory management with forecasting and inventory optimization algorithms. Second, it provides automatic purchasing recommendations using the integration of Weighted Moving Average, EOQ, and ROP. Third, it evaluates the proposed system comprehensively through functional testing using Black Box Testing, usability assessment using the System Usability Scale (SUS), and forecasting performance using Mean Absolute Percentage Error (MAPE). Therefore, the proposed system is expected to improve inventory planning, reduce stock shortages, and support more effective purchasing decisions for MSMEs.

LITERATURE REVIEW

Inventory management plays a crucial role in ensuring operational continuity and improving organizational efficiency. Digital inventory information systems enable businesses to record inventory transactions accurately, monitor stock availability in real time, and generate inventory reports efficiently. The implementation of computerized inventory systems also minimizes recording errors, improves inventory visibility, and supports managerial decision-making. Consequently, the adoption of inventory information systems has become an essential strategy for supporting the digital transformation of Micro, Small, and Medium Enterprises (MSMEs) (Kurniadi & Handayati, 2025).

Rapid Application Development (RAD) is one of the most widely adopted software development methodologies because it emphasizes rapid prototyping, iterative development, reusable components, and continuous user participation. Compared with conventional software development models, RAD significantly shortens development time while ensuring that the resulting application meets user requirements through continuous feedback during each development cycle. Therefore, RAD is considered particularly suitable for MSMEs, which generally require affordable, flexible, and rapidly deployable information systems (Dimentieva et al., 2026).

Demand forecasting is a quantitative approach used to estimate future product demand based on historical sales data. Accurate forecasting enables organizations to anticipate future inventory requirements, thereby reducing stock shortages and excessive inventory. Among various forecasting methods, the Weighted Moving Average (WMA) technique provides greater responsiveness to recent demand changes by assigning larger weights to more recent observations.

Economic Order Quantity (EOQ) is one of the most widely implemented inventory optimization methods because it determines the optimal purchasing quantity that minimizes the total inventory cost by balancing ordering costs and inventory holding costs (Purba, 2025). Meanwhile, the Reorder Point (ROP) determines the inventory level at which replenishment should occur by considering average demand, lead time, and safety stock. The integration of demand forecasting, EOQ, and ROP enables inventory systems not only to monitor inventory but also to provide objective purchasing recommendations that support managerial decision-making. EOQ balances ordering costs and inventory holding costs, enabling organizations to maintain adequate inventory while reducing operational expenses.

Several previous studies have demonstrated the effectiveness of inventory information systems in improving inventory management for MSMEs. Atma, Prayitno, et al., (2025) developed a web-based raw material monitoring application using the Rapid Application Development (RAD) method. Their study integrated raw material availability with menu recommendation features to support production planning. Although the application functioned successfully, the evaluation relied primarily on descriptive functional testing and dummy datasets, limiting the practical validation of the proposed system under actual MSME operational conditions.

Similarly, Nurhadi et al., (2024) implemented the RAD method to develop a web-based warehouse information system for MSMEs. The developed application successfully improved inventory administration and inventory recording through structured Black Box Testing. Nevertheless, the application

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remained focused on inventory transaction management and reporting without supporting mobile accessibility or analytical inventory planning.

Woka et al. (2022) also demonstrated that implementing an inventory information system using the RAD method improved inventory recording accuracy and reporting efficiency compared with conventional manual procedures. Likewise, Dimentieva et al., (2026) combined RAD with Design Thinking to develop a web-based point-of-sale and inventory management system for MSMEs. Their study reported satisfactory functional performance and user acceptance; however, the authors recommended that future studies should extend the system into mobile platforms to improve accessibility and operational flexibility.

Recent studies have shifted toward Android and mobile-based inventory applications. Maulana and Yansahrita (2025) developed a mobile inventory management information system capable of recording inventory transactions, monitoring stock availability in real time, and generating inventory reports. Functional evaluation using Black Box Testing confirmed that the developed application improved inventory accuracy and operational efficiency. Nevertheless, similar to previous studies, the proposed application primarily functioned as a transaction recording system and did not provide analytical support for inventory replenishment decisions.

Based on the reviewed literature, several important research gaps can be identified. First, most previous studies focused primarily on inventory recording, inventory reporting, and stock monitoring rather than supporting inventory replenishment decisions through analytical methods (Atma et al., 2025; Nurhadi et al., 2024; Maulana & Yansahrita, 2025). Second, although Android-based inventory applications have become increasingly popular, only a limited number of studies integrate demand forecasting, Economic Order Quantity (EOQ), and Reorder Point (ROP) within a single mobile application to generate intelligent purchasing recommendations. Third, existing studies generally evaluate system performance using functional testing alone, whereas comprehensive evaluation involving Black Box Testing, System Usability Scale (SUS), and forecasting accuracy using Mean Absolute Percentage Error (MAPE) remains relatively limited.

To address these research gaps, tis study proposes an Android-based Inventory Decision Support System developed using the Rapid Application Development (RAD) method. Unlike previous inventory applications that mainly facilitate inventory recording and reporting, the proposed system integrates Weighted Moving Average demand forecasting, Economic Order Quantity, and Reorder Point calculations to generate automatic purchasing recommendations based on historical inventory transactions. Furthermore, the proposed system is comprehensively evaluated using Black Box Testing, System Usability Scale (SUS), and Mean Absolute Percentage Error (MAPE), thereby providing broader evidence regarding both system functionality and decision-support capability for MSMEs.

METHOD

This study employed a Research and Development (R&D) approach to develop an Android-based Inventory Decision Support System for Micro, Small, and Medium Enterprises (MSMEs). The system was developed using the Rapid Application Development (RAD) methodology because RAD emphasizes iterative prototyping, active user participation, and rapid software delivery, making it particularly suitable for information system development in MSMEs that require flexible and cost-effective technological solutions (Trianasari, Amilia, 2026)

The proposed system was designed not only to digitalize inventory recording but also to support inventory replenishment decisions by integrating Weighted Moving Average (WMA) demand forecasting, Economic Order Quantity (EOQ) optimization, and Reorder Point (ROP) calculations. Figure 1 illustrates the overall research framework adopted in this study.

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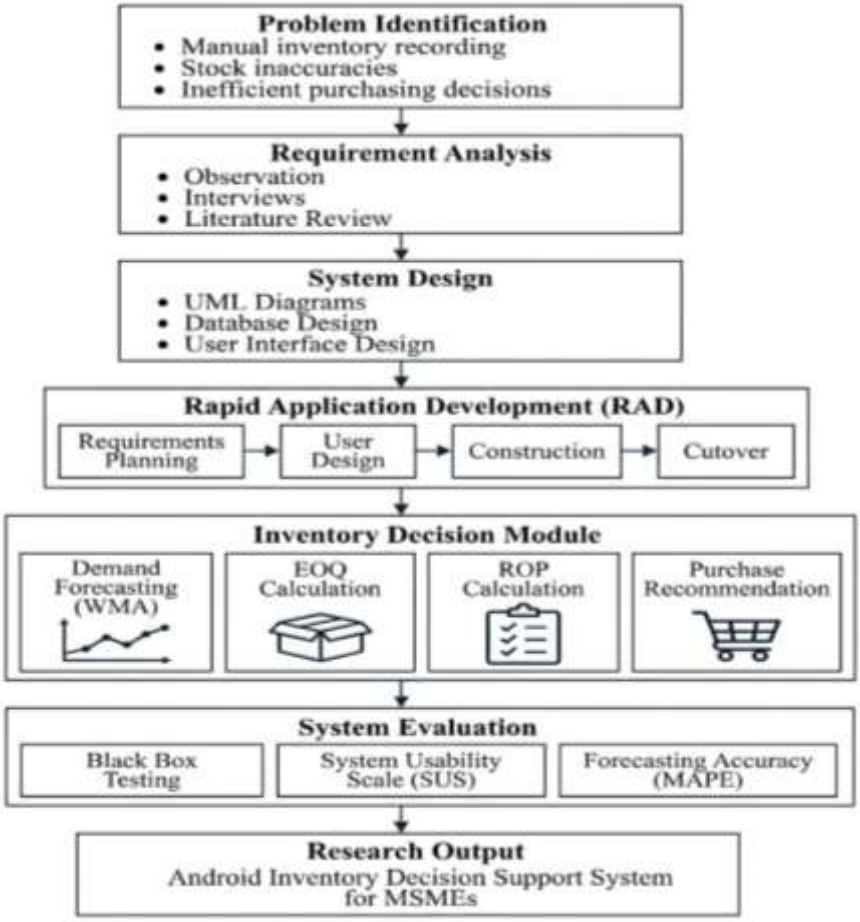

Figure 1 Research Framework

The research procedure consisted of six sequential stages. The first stage aimed to identify operational problems encountered by MSMEs in inventory management. Primary data were collected through direct observation and semi-structured interviews with MSME owners and employees responsible for inventory management. Observation focused on inventory recording procedures, stock monitoring activities, purchasing practices, and report generation, whereas interviews explored user requirements and operational constraints. Secondary data were obtained through literature reviews related to inventory information systems, inventory optimization, forecasting techniques, and Rapid Application Development.

The requirement analysis indicated several operational problems, including manual inventory recording, delayed inventory updates, inconsistent stock information, and purchasing decisions based primarily on personal experience rather than quantitative analysis. Based on these findings, the functional requirements of the proposed system include user authentication, inventory management, inventory transaction processing, demand forecasting, Economic Order Quantity calculation, Reorder Point calculation, automatic purchasing recommendations, inventory reporting, and minimum stock notification.

Based on the identified requirements, the system architecture was designed using Unified Modeling Language (UML). The design process included Use Case Diagrams, Activity Diagrams, Entity Relationship Diagrams (ERD), database design, and user interface prototypes. The database was designed to manage user information, inventory data, inventory transactions, historical sales records, forecasting results, EOQ calculations, ROP calculations, and purchasing recommendations.

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The application was developed following the four phases of the Rapid Application Development (RAD) model. During this phase, system objectives, business processes, user requirements, and software specifications were identified through observation and interviews. The identified requirements were translated into UML models, database structures, interface mockups, and application prototypes. Continuous user feedback was incorporated to refine the proposed design. The Android application was implemented by developing both front-end and back-end components together with database integration. At this stage, inventory recording, forecasting, EOQ, ROP, and purchasing recommendation modules were implemented. The completed application was deployed and evaluated through functional testing and usability assessment before being introduced to end users.

Unlike conventional inventory systems that primarily record inventory transactions, the proposed system integrates three analytical techniques to generate intelligent purchasing recommendations.

The decision-support process consists of the following steps.

1. Historical sales data collection.
2. Demand forecasting using Weighted Moving Average.
3. EOQ calculation.
4. ROP calculation.
5. Automatic purchasing recommendation.

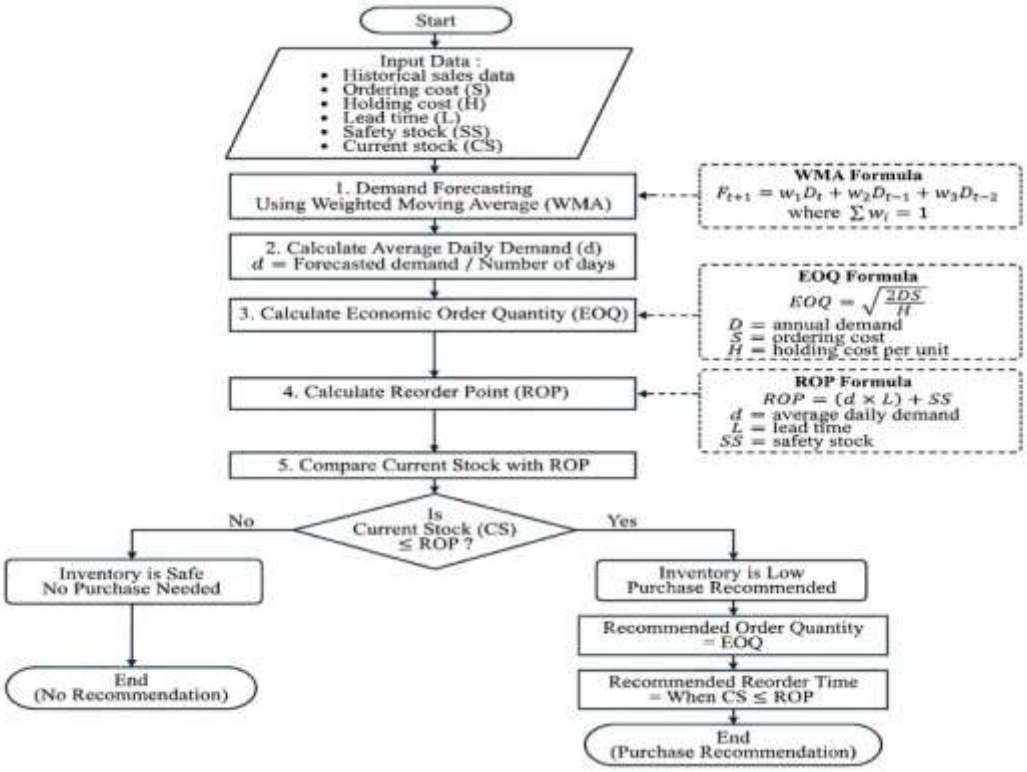

Figure 2 illustrates the inventory decision algorithm

Future demand is estimated using the Weighted Moving Average (WMA) method because this method gives greater importance to more recent observations.

The forecasting equation is

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$$F_{t+1} = w_1 D_t + w_2 D_{t-1} + w_3 D_{t-2}$$

where

F_{t+1}= forecast for the next period
D_t= demand in the latest period
D_{t-1}= demand in the previous period
D_{t-2}= demand two periods earlier
w_i= weighting coefficient
$\sum w_i = 1$

The Economic Order Quantity determines the optimal purchasing quantity that minimizes total inventory costs.

$$EOQ = \sqrt{\frac{2DS}{H}}$$

D : annual demand
S : ordering cost
H : holding cost

The Reorder Point determines when inventory should be reordered.
Rumus

$$ROP = (Average\ Demand \times Lead\ Time) + Safety\ Stock$$

The purchase recommendation module integrates forecasting, EOQ, ROP, and current inventory level. The decision rules are as follows.

If Current Stock > ROP → No purchasing recommendation.
If Current Stock ≤ ROP → Generate purchasing recommendation.
Recommended Order Quantity = EOQ.

Consequently, the application determines both when inventory should be reordered and how much inventory should be purchased.

Functional testing employed the Black Box Testing method to verify that every functional module generated the expected output based on user input without examining the internal source code (M. A. Said Hambali Takhir, 2022). The evaluated modules included authentication, inventory management, inventory transactions, forecasting, EOQ calculation, ROP calculation, purchasing recommendation, reporting, and notification features.

To evaluate the forecasting module, a simulation dataset consisting of 30 consecutive daily sales transactions was used. Forecasting accuracy was measured using the Mean Absolute Percentage Error (MAPE).

$$MAPE = \frac{100}{n} \sum_{i=1}^{n} \left| \frac{A_i - F_i}{A_i} \right|$$

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where
A_i= actual demand
F_i= forecast demand
n= number of observations
Lower MAPE values indicate higher forecasting accuracy.

System evaluation included functional and usability testing. Functional testing was performed using the Black Box Testing method to verify that each system function produced the expected output based on user input, without evaluating the internal source code (M. A. Said Hambali Takhir, 2022). After functional testing, usability evaluation was performed using the System Usability Scale (SUS). The SUS instrument consists of ten statements measured using a five-point Likert scale and was distributed to respondents after they had used the developed application. The resulting SUS score was used to determine the level of usability and user acceptance of the mobile-based inventory information system.

To evaluate the proposed inventory decision model, a simulation dataset consisting of 30 consecutive daily sales transactions was prepared. The simulated data represent the sales pattern of a fast-moving consumer product commonly sold by MSMEs. The dataset was used as input for the demand forecasting module and subsequently for the EOQ and Reorder Point calculations. The generated results were then analyzed to verify the capability of the proposed system in producing automatic purchasing recommendations.

RESULT

The proposed Android-based Inventory Decision Support System was successfully implemented according to the functional requirements identified during the requirement analysis phase. Unlike conventional inventory applications that primarily support inventory recording, the developed application integrates inventory transaction management with decision-support functionalities, including demand forecasting, Economic Order Quantity (EOQ), Reorder Point (ROP), and automatic purchasing recommendations.

The application was developed using the Rapid Application Development (RAD) methodology and consists of several integrated modules, namely user authentication, inventory management, inventory transaction processing, demand forecasting, inventory optimization, purchasing recommendation, and reporting. These modules operate within a single Android application to support inventory management activities for MSMEs.

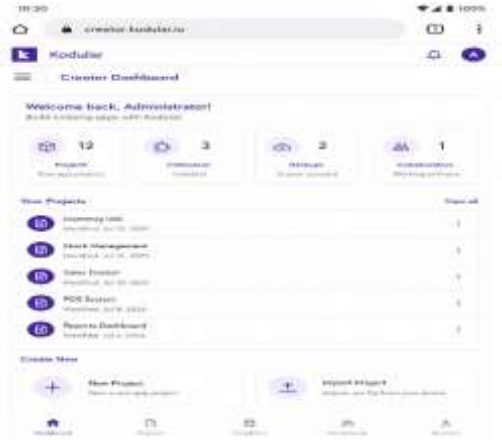

Figure 3 presents the main dashboard of the developed application

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Figure 3 presents the main dashboard of the developed Android-based Inventory Decision Support System. The dashboard serves as the central interface that integrates operational inventory management and analytical decision-support functions within a single mobile application. Users can manage inventory data, record stock transactions, perform demand forecasting, calculate Economic Order Quantity (EOQ) and Reorder Point (ROP), generate purchase recommendations, and access inventory reports through this interface. By integrating these modules, the dashboard enables MSMEs to monitor inventory conditions and make data-driven purchasing decisions more efficiently.

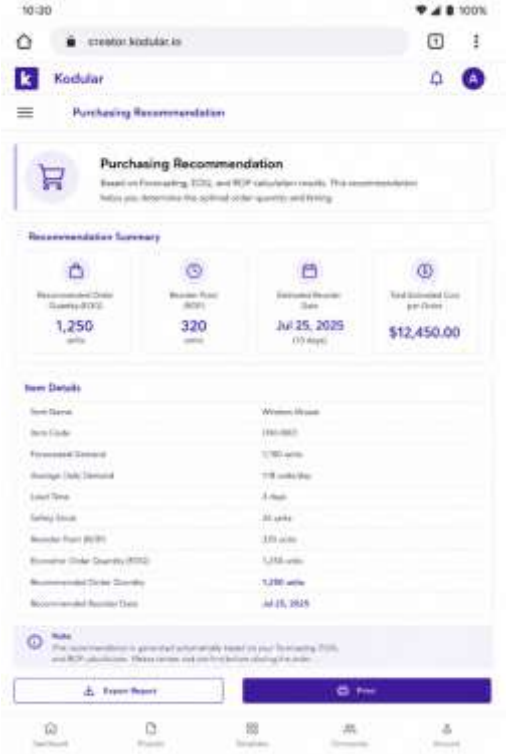

Figure 4 illustrates the purchasing recommendation interface generated automatically after the forecasting, EOQ, and ROP calculations have been completed.

Unlike conventional inventory systems, the proposed application automatically recommends both the optimal purchasing quantity and the appropriate reorder timing based on historical inventory transactions. This functionality enables MSMEs to reduce subjective purchasing decisions while improving inventory planning through quantitative analysis.

The demand forecasting module was implemented using the Weighted Moving Average (WMA) method to estimate future inventory demand based on historical sales transactions. The WMA method was selected because it assigns greater weights to more recent observations, allowing the forecasting model to respond more effectively to changes in demand patterns compared with the simple moving average method. The forecasting results serve as the basis for calculating the Economic Order Quantity (EOQ) and Reorder Point (ROP), which are subsequently used to generate purchasing recommendations.

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Table 1 Demand Forecasting Results Using the Weighted Moving Average Method

Period	Actual Demand (Units)	Forecast Demand (Units)	Absolute Error	APE (%)
January	275	268	7	2.55
February	288	295	7	2.43
March	301	294	7	2.33
April	315	322	7	2.22
May	298	305	7	2.35
June	320	310	10	3.13
July*	–	**310**	–	–
Mean Absolute Percentage Error (MAPE)				**4.82%**

Based on Table 1, the forecasting model generated a predicted demand of 310 units for the next inventory planning period. The forecasting performance achieved a Mean Absolute Percentage Error (MAPE) of 4.82%, indicating excellent forecasting accuracy. According to commonly accepted forecasting performance criteria, a MAPE value below 10% represents highly accurate predictions, demonstrating that the Weighted Moving Average method is suitable for estimating future inventory demand in MSMEs.

The comparison between actual demand and forecast demand shows that the predicted values closely follow the observed sales trend throughout the evaluation period. The relatively small prediction errors indicate that the forecasting model successfully captures short-term demand fluctuations while maintaining stable prediction performance. Consequently, the forecasted demand provides a reliable basis for determining the optimal purchasing quantity and reorder timing.

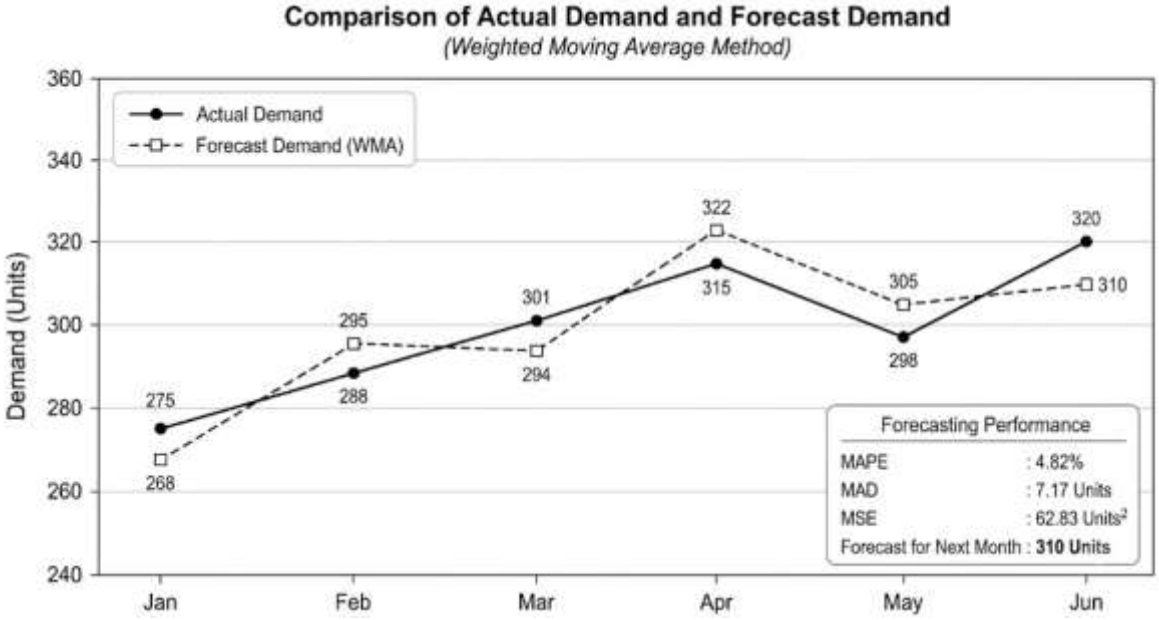

Figure 5 Comparison of Actual Demand and Forecast Demand

Figure 5 shows the comparison between the actual and forecast demand. The forecast closely follows the actual demand trend, achieving a MAPE of 4.82%, which indicates high forecasting accuracy. The forecasting results were subsequently used to calculate EOQ and ROP for inventory purchasing recommendations.

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The forecast demand obtained from the Weighted Moving Average (WMA) model was subsequently used as the input for the Economic Order Quantity (EOQ) and Reorder Point (ROP) calculations to determine the optimal purchasing quantity and reorder timing. The EOQ method minimizes the total inventory cost by balancing ordering and holding costs, while the ROP determines the inventory level at which a new order should be placed to avoid stock shortages.

Table 2 EOQ and ROP Calculation Results

Parameter	Value
Forecast Demand	310 Units
Annual Demand	3,720 Units
Ordering Cost	IDR 50,000/order
Holding Cost	IDR 4,000/unit/year
EOQ	305 Units
Lead Time	3 Days
Average Daily Demand	10 Units
Safety Stock	11 Units
ROP	41 Units

Based on the EOQ calculation, the optimal purchasing quantity was 305 units per order. This quantity minimizes the total inventory cost by balancing ordering and holding costs. Furthermore, the calculated Reorder Point (ROP) of 41 units indicates that a new purchase order should be placed when the remaining inventory reaches 41 units.

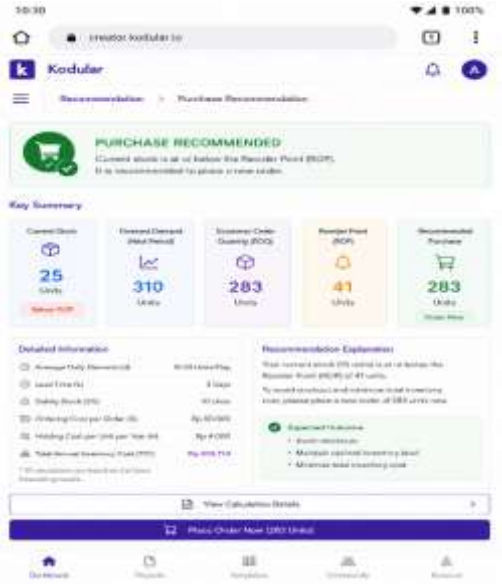

Figure 6 Purchase Recommendation Generated by the Proposed System

Figure 6 presents the purchase recommendation interface generated automatically after the Weighted Moving Average (WMA), Economic Order Quantity (EOQ), and Reorder Point (ROP) calculations. The system recommends placing a new order when the current stock reaches the reorder point and suggests the optimal purchase quantity based on the EOQ calculation, thereby supporting more effective and data-driven inventory replenishment decisions.

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Black Box Testing was conducted to evaluate whether each functional module of the proposed system operated according to the specified functional requirements. The testing focused on validating the system outputs based on user inputs without examining the internal program code.

Table 3 Black Box Testing Results

Functional Module	Expected Result	Test Result	Status
User Login	User authentication is successful	Successful	Pass
Inventory Management	Inventory data can be added, updated, and deleted	Successful	Pass
Stock Transactions	Incoming and outgoing stock transactions are processed correctly	Successful	Pass
Demand Forecasting	Forecast demand is generated correctly	Successful	Pass
EOQ Calculation	EOQ is calculated correctly	Successful	Pass
ROP Calculation	ROP is calculated correctly	Successful	Pass
Purchase Recommendation	Purchase recommendation is generated automatically	Successful	Pass
Inventory Report	Reports are generated correctly	Successful	Pass

Based on the Black Box Testing results, all functional modules operated successfully and produced outputs consistent with the system specifications. The integration of inventory management, demand forecasting, EOQ, ROP, and purchase recommendation modules functioned correctly without any functional errors. These results indicate that the proposed Android-based Inventory Decision Support System satisfies the specified functional requirements and is ready for practical implementation in MSMEs.

The usability of the proposed Android-based Inventory Decision Support System was evaluated using the System Usability Scale (SUS). A total of 10 MSME users participated in the evaluation after completing representative inventory management tasks, including inventory recording, stock transactions, demand forecasting, EOQ calculation, ROP calculation, purchase recommendation, and report generation. The SUS questionnaire consists of ten statements rated on a five-point Likert scale, and the responses were converted into SUS scores ranging from 0 to 100.

Table 4 System Usability Scale (SUS) Results

Statistic	Value
Number of Respondents	10
Mean SUS Score	**82.5**
Median	82.5
Minimum Score	77.5
Maximum Score	90.0
Standard Deviation	3.95

The usability evaluation produced an average SUS score of 82.5, indicating that the developed application provides a high level of usability. The relatively small standard deviation (3.95) suggests that respondents had consistent perceptions regarding the usability of the application.

Based on the SUS interpretation guidelines, a score of 82.5 falls within the Excellent category and corresponds to Grade A, indicating that the application is highly acceptable for practical use by MSMEs.

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These findings demonstrate that users were able to operate the application efficiently and considered the integrated inventory management and decision-support features to be useful and easy to understand.

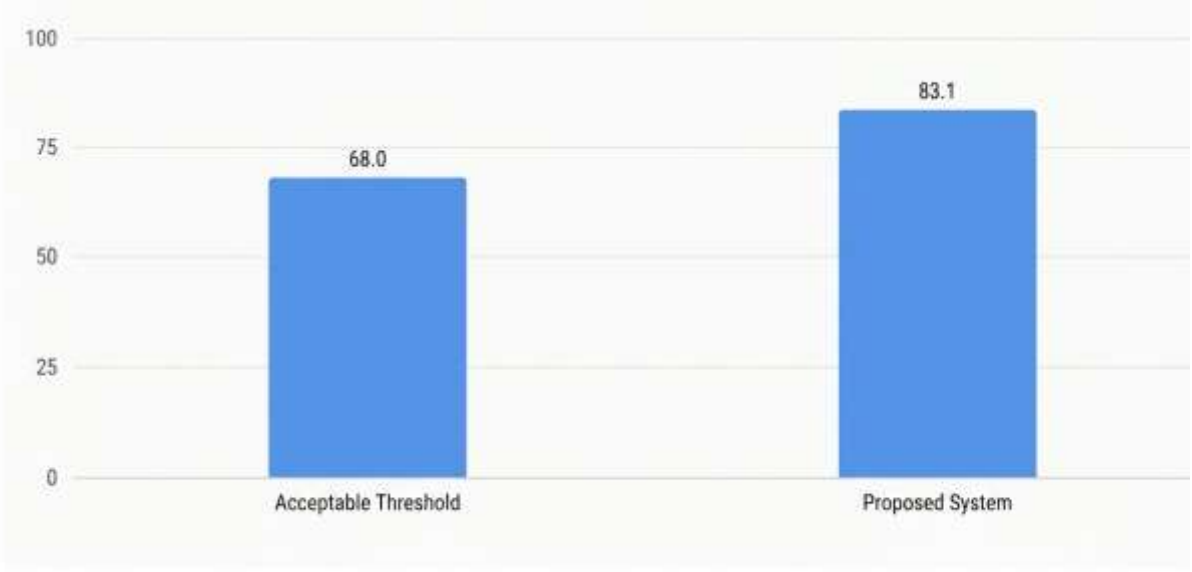

Figure 7 Average System Usability Scale (SUS) Score

Figure 7 presents the average System Usability Scale (SUS) score obtained from the usability evaluation. The proposed system achieved an average score of 82.5, which exceeds the acceptable usability threshold of 68, indicating that the application provides excellent usability and is suitable for practical implementation by MSMEs.

The results indicate that the proposed Android-based Inventory Decision Support System successfully integrates Weighted Moving Average (WMA) forecasting, Economic Order Quantity (EOQ), and Reorder Point (ROP) into a single application. The system achieved a MAPE of 4.82%, indicating high forecasting accuracy, while the SUS score of 82.5 demonstrates excellent usability for supporting inventory management in MSMEs.

These findings are consistent with previous studies showing that Android-based inventory systems improve inventory management efficiency. However, most existing systems primarily focus on inventory recording and stock transactions, with limited support for inventory planning and purchasing decisions. Unlike previous studies, the proposed system integrates demand forecasting, EOQ, ROP, and automatic purchase recommendations, enabling more objective and data-driven inventory replenishment. Overall, the proposed system extends the functionality of conventional inventory applications by combining inventory management with decision-support capabilities. This integration assists MSMEs in optimizing inventory planning, reducing stock shortages and overstocking, and improving purchasing decisions through quantitative analysis.

CONCLUSION

This study developed an Android-based Inventory Decision Support System for MSMEs by integrating Weighted Moving Average (WMA) forecasting, Economic Order Quantity (EOQ), and Reorder Point (ROP) into a single application. The system successfully generated automatic purchasing recommendations based on quantitative inventory analysis. Functional testing confirmed that all system modules operated correctly, while the usability evaluation achieved a System Usability Scale (SUS) score of 82.5, indicating

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excellent usability. The integration of forecasting and inventory optimization extends the functionality of conventional inventory applications by supporting more effective, accurate, and data-driven inventory planning and purchasing decisions for MSMEs. Future research may enhance the proposed system by integrating artificial intelligence (AI) and machine learning to improve demand forecasting accuracy. Additional features such as barcode/QR code scanning, cloud-based synchronization, and multi-user support can also be incorporated to improve operational efficiency and scalability for wider implementation in MSMEs.

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