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Development and Technical Performance Evaluation of Mobile Goods Delivery Tracking System Using User Acceptance Testing

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Abstract: The rapid growth of digital logistics services has increased the demand for mobile-based parcel tracking systems capable of providing real-time, accurate, and accessible shipment information. Most previous studies have primarily focused on developing web-based applications and conducting functional testing, while studies integrating technical performance evaluation with user acceptance assessment remain limited. This study aims to evaluate the technical performance and user acceptance of a mobile-based parcel tracking system. The system was developed using the **Waterfall** software development model. Functional verification was conducted through **Black Box Testing**, while user acceptance was evaluated using **User Acceptance Testing (UAT)** involving 82 respondents, including administrators, couriers, members, and customer service personnel. The UAT instrument consisted of 15 assessment indicators measured using a five-point Likert scale. In addition, technical performance was assessed by measuring system latency, throughput, and mobile device resource utilization. The results demonstrate that all system functionalities operated according to user requirements. The application achieved an average latency of **1.50 seconds**, throughput of up to **45 requests per minute**, **18% CPU utilization**, **145 MB RAM consumption**, **4% battery usage per 30 minutes**, and **2.8 MB of network data usage per session**, indicating that the system performs efficiently and responsively on mobile devices. The UAT evaluation yielded an overall acceptance score of **87.43%**, categorized as **highly acceptable**, confirming that users positively perceived the system in terms of usability, tracking information clarity, operational efficiency, and support for logistics delivery activities. These findings provide empirical evidence that integrating technical performance evaluation with user acceptance assessment offers a comprehensive framework for developing mobile-based parcel tracking systems that are responsive, resource-efficient, and aligned with operational requirements in digital logistics services.

Keywords: mobile-based parcel tracking system; mobile application; User Acceptance Testing; technical performance evaluation; logistics information system.

INTRODUCTION

The rapid growth of digital transactions and e-commerce has significantly increased the demand for logistics services that provide fast, accurate, and easily accessible shipment information. In logistics operations, a parcel tracking system has become an essential component, as customers and service providers require not only reliable delivery services but also real-time visibility of shipment status, location, and delivery history throughout the distribution process. (Amelia, et al., 2025), (Dr. Noneng Nurjanah, 2025). Delivery operations that continue to rely on manual record-keeping, direct communication through administrative personnel, and non-real-time status updates are prone to information delays, recording errors, limited operational transparency, and difficulties in

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monitoring service performance. These limitations reduce operational efficiency and hinder stakeholders from obtaining timely and accurate shipment information, ultimately affecting service quality and customer satisfaction. (Ayub, Parman, & Rhoma, 2026); (Rizky, Rifda A, & Chairul, 2026); (Jelman, Khusnul, & Diki, 2023); (Ayya, Nabila, Nesya, & Muhammad, 2026),

Several previous studies have developed information systems for parcel delivery, freight transportation services, and web-based smart tracking applications. Although these studies have contributed to the digitalization of logistics operations, they primarily focus on web-based implementations and have paid limited attention to mobile-based systems, technical performance evaluation, and comprehensive user acceptance assessment. (Niko, Uce, Novia, & Mochamad, 2026) Developed a web-based shipment management information system to improve the efficiency of shipment data processing. (Jelman, Khusnul, & Diki, 2023) Applied the PIECES framework to analyze and improve a freight delivery information system by addressing the limitations of real-time shipment information. (Ahmad, Intan, & Carudin, 2026) Developed a web-based smart tracking system to improve the efficiency and accuracy of shipment operations, whereas the present study extends this approach by implementing a mobile-based tracking system integrated with technical performance evaluation and comprehensive user acceptance assessment. (Rizka & Dedi, 2024) Developed a web-based freight transportation information system and evaluated its usability. However, these studies have primarily focused on feature development and functional validation, while research integrating the technical performance analysis of mobile architectures with comprehensive user acceptance evaluation remains limited.

To overcome these limitations, this study proposes a mobile-based shipment tracking system that integrates shipment data entry, real-time status updates, parcel tracking, transaction history management, and seamless coordination among administrators, couriers, members, and customer service personnel within a unified information platform. The adoption of a mobile architecture enables greater flexibility for field operators by providing immediate access to operational information regardless of location. Furthermore, the proposed system minimizes dependence on manual record-keeping, accelerates real-time information exchange, improves data accuracy, strengthens operational transparency, and enhances the overall efficiency of logistics service delivery. (Sianturi & Puspasari, 2023); (Wulandari, Silvia, & Handayari, 2025).

The significance of this study lies in the need to evaluate the success of a shipment tracking system not only from the perspective of functional correctness but also in terms of technical performance and end-user acceptance. A functionally complete system cannot be considered effective if it exhibits high latency, low throughput, excessive resource utilization, or fails to satisfy user requirements. Therefore, evaluating mobile application performance through latency, throughput, and device resource utilization is essential for assessing the system's responsiveness, transaction-processing capability, and operational efficiency under real-world conditions. In addition, user acceptance evaluation using User Acceptance Testing (UAT) is crucial to determine whether the proposed system meets user expectations and is suitable for practical deployment in logistics operations. By integrating technical performance analysis with user acceptance evaluation, this study provides a more comprehensive assessment framework for mobile-based shipment tracking systems, thereby addressing an important gap in previous research. (Aliyah., Nahrun, & Asrul, 2025); (Lutfi, Murhadi, & Wahyu, 2025); (Nambela, Rudi, Setyo, Friska, & Muhammad, 2025); (Mensah & Mwakapesa, 2025).

The proposed system was empirically validated through User Acceptance Testing (UAT) involving 82 respondents and 15 evaluation indicators. The system achieved a score of **5,377** out of **6,150**, corresponding to an overall user acceptance rate of **87.43%**, which is categorized as **highly acceptable**. The findings indicate that the system effectively meets user requirements in terms of accessibility, real-time shipment tracking, responsiveness, and operational suitability. These results support the reliability and practical applicability of the proposed system and are consistent with previous studies emphasizing quantitative UAT as an effective approach for validating information systems. (Kusuma, 2025); (Putri, Afriansyah, & Prayesy, 2025); (Santoso & Gunawan, 2025).

This study addresses the limited integration of technical performance analysis, user acceptance evaluation, and comparative analysis of existing systems within a unified evaluation framework. To fill this gap, it proposes an integrated framework combining mobile system performance analysis, User Acceptance Testing (UAT), and comparative evaluation of functionality and process efficiency. The study aims to evaluate the technical performance and user acceptance of a mobile-based shipment tracking system, providing empirical evidence to support the development of responsive, resource-efficient, and user-centered mobile logistics information systems..

LITERATURE REVIEW

Previous studies on shipment information systems have primarily focused on improving data management efficiency, enhancing service transparency, and streamlining operational processes. (Gustiawan & Rian, 2023) Developed a web-based shipment management information system to streamline shipment data processing, from order entry to delivery. The study demonstrated improved data accuracy and reporting efficiency but remained limited to a web platform, restricting mobile accessibility for couriers and field personnel.

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(Nasri, Khoiriyah, & Romadoni, 2023) Applied the PIECES framework to develop a web-based freight delivery information system. The study improved real-time shipment information and service efficiency but did not evaluate technical performance metrics, such as latency, throughput, and resource utilization.
A subsequent study by **(Udmah & Santoso, 2024)** Implemented a web-based smart tracking system for shipment management, improving shipment monitoring and data management efficiency. However, the study was limited to a web-based platform and did not address the mobile accessibility requirements of administrators, couriers, members, and customer service personnel.**(Wulandari., Silvia., & Handayari, 2025)** Another study developed a web-based freight transportation information system using the Waterfall model and evaluated it through Black Box Testing and the System Usability Scale (SUS). The results demonstrated good usability and user acceptance. However, the evaluation focused on general usability, whereas the present study employs User Acceptance Testing (UAT) to assess user acceptance based on shipment tracking-specific operational indicators..
In contrast**, (Hermansah, Murhadi, & Saputro, 2025)** Meanwhile, another study evaluated user acceptance of a soft skills training information system using User Acceptance Testing (UAT), demonstrating its effectiveness in assessing system acceptance based on functionality, usability, efficiency, and productivity. However, the study did not integrate UAT with mobile system performance analysis or comparative evaluation. Overall, previous studies have primarily focused on web-based shipment information and tracking systems, leaving limited attention to the integrated evaluation of mobile-based tracking systems, technical performance, user acceptance, and comparative process efficiency. To address this gap, the present study proposes a unified evaluation framework that combines latency, throughput, resource utilization, UAT, and comparative analysis of the existing and proposed systems.

METHOD

Research Design

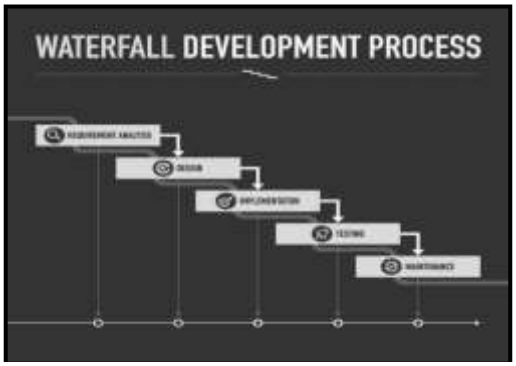

Figure 1. Waterfall Development Model

This study adopted the Waterfall software development model to design, implement, and evaluate a mobile-based shipment tracking information system. The Waterfall model was selected because it provides a structured and sequential development process consisting of five phases: requirements analysis, system design, implementation, testing, and maintenance**,** as illustrated in Figure 1.

The proposed system was evaluated from two complementary perspectives. Functional correctness was verified using Black Box Testing, while user acceptance was assessed through User Acceptance Testing (UAT)**.** In addition, the technical performance of the mobile application was evaluated by measuring **latency,** throughput, CPU utilization, memory consumption, battery usage, and network data usage. This integrated evaluation provides a comprehensive assessment of both system performance and user acceptance.

RESULT

Requirements Analysis

During the requirements analysis phase, functional and non-functional requirements were identified through observations, interviews with stakeholders, and literature review. The collected requirements were documented in the **Software Requirements Specification (SRS)** to ensure that the developed system addressed operational needs, including shipment registration, real-time tracking, status updates, transaction history, and user management.
Unlike previous studies that primarily focused on functional development, this study also incorporated technical performance and user acceptance as evaluation criteria to assess the effectiveness of the proposed system after implementation.

System Design

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The proposed system was designed using **Unified Modeling Language (UML)** to represent the system architecture and user interactions. The design artifacts included Use Case Diagram to describe user roles and system functionalities, Activity Diagram to illustrate business process workflows, Class Diagram to model the relationships among system entities.

1) Use Case Diagaram

The Use Case Diagram of the proposed system is presented in **Figure 2**.

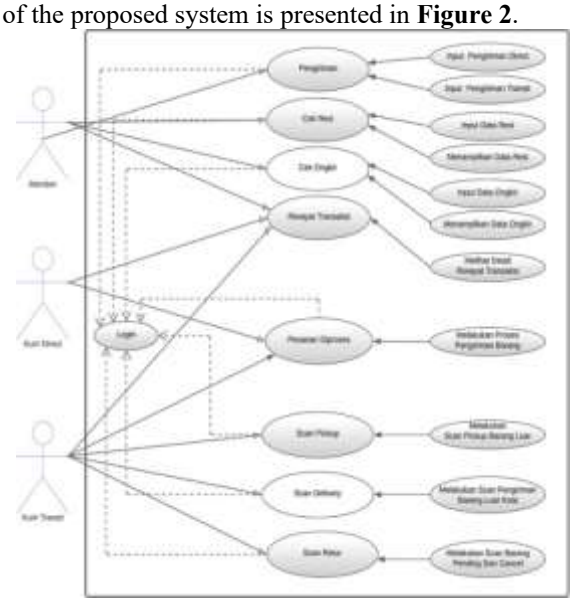
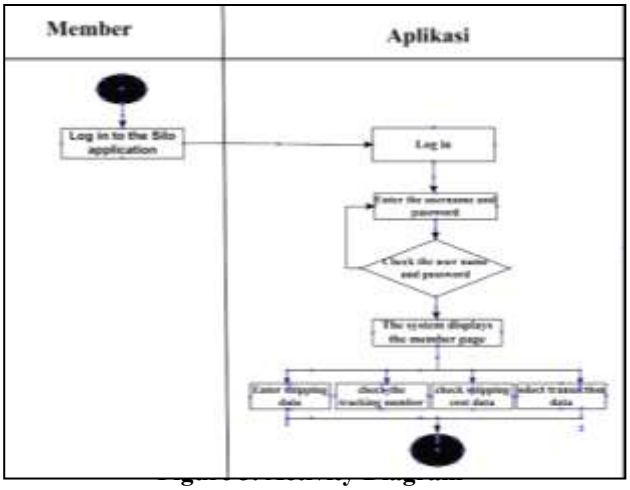


Figure 2. Use Case Diagram

The Use Case Diagram illustrates the interactions between users and the proposed shipment tracking system. The system involves three primary actors: **Member**, **Direct Courier**, and **Transit Courier**, each assigned distinct roles and access privileges according to their operational responsibilities. This model defines the system's functional requirements and describes how each actor interacts with the system to support shipment tracking operations

2) Activity

The business processes of both the existing and proposed systems were modeled using an **Activity Diagram**. This diagram provides a dynamic representation of the workflow by illustrating the sequence of activities, decision flows, and interactions among system actors. Furthermore, it facilitates the identification of potential process bottlenecks, enabling the proposed business process to be designed in a more efficient and structured manner. The Activity Diagram of the proposed system is presented in **Figure**



The Activity Diagram illustrates the sequence of activities performed by each actor within the proposed shipment tracking system. It provides a dynamic representation of the workflow, decision-making processes, and interactions among system actors according to their respective roles and responsibilities. This model facilitates a systematic understanding of the operational workflow and serves as a reference for system implementation and functional evaluation. The proposed Activity Diagram is presented in **Figure 3**.

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Class Diagram

The structural design of the proposed shipment tracking system is represented using a **Class Diagram**, which models the static architecture of the system by defining the main classes, their attributes, operations, and relationships. This model provides a comprehensive representation of the system structure and serves as the foundation for database design and application implementation. The proposed Class Diagram is presented in Figure 4.

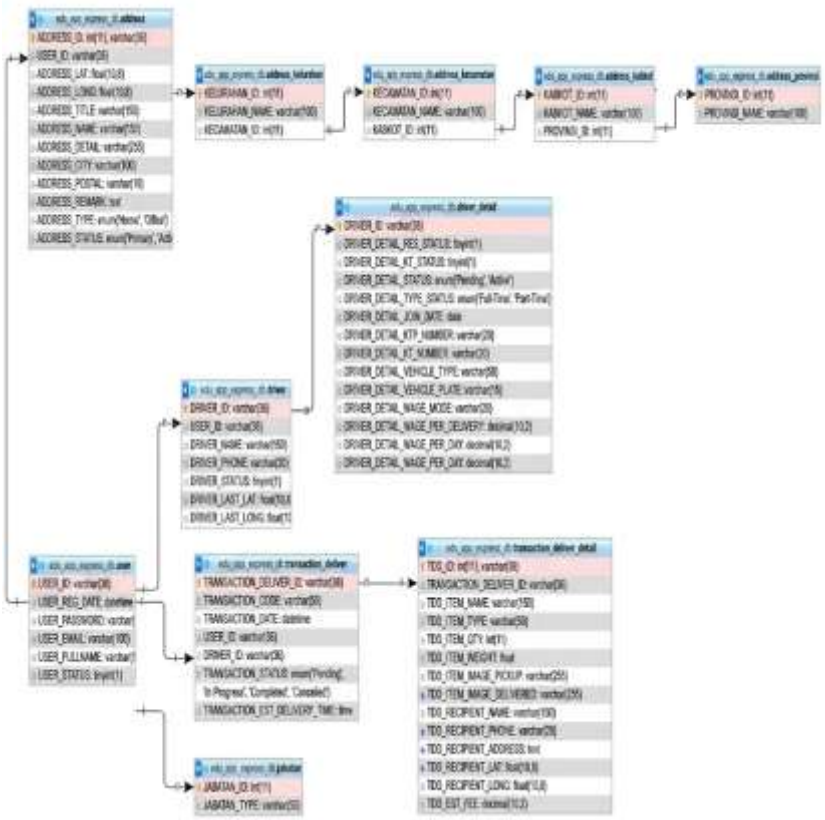

Figure 4. Class Diagram

Figure 4 illustrates the Class Diagram of the proposed shipment tracking system. The diagram consists of several core classes, including **Users**, **Members**, **Couriers**, **Delivery Transactions**, **Delivery Status**, **Payments**, and other supporting entities. The relationships among these classes define the data structure and interactions required to support shipment registration, transaction processing, real-time tracking, status updates, and payment management. This model ensures data consistency, maintains referential integrity, and supports the efficient implementation of the proposed mobile-based shipment tracking system.

4.3. System Implementation

The mobile-based shipment tracking system was implemented based on the approved system design. The application integrates shipment registration, real-time tracking, shipment status updates, transaction history, and communication among administrators, couriers, members, and customer service personnel within a single platform.

1). Form Login

The login interface provides secure access to the proposed shipment tracking system. Users are required to authenticate by entering their username, password, and selecting the appropriate user role before accessing the system. The login interface is presented in Figure 5

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Figure 5. Login Interface

Figure 5 shows the login interface of the proposed system. This interface authenticates users based on their credentials and assigned roles, ensuring that administrators, couriers, members, and customer service personnel can securely access the system according to their respective access privileges.

2. Member Shipment Page

This interface is used by members to manage shipment activities, including entering shipment data, selecting delivery types, and viewing shipment details. The display of the member shipment page is presented in Figure 5 and Figure 6

Figure 5. Shipment Process

Figure 6. Order Message Page

3) Member History

The shipment history and tracking modules provide users with access to completed shipment records and detailed delivery progress. These interfaces support real-time monitoring by presenting transaction history and shipment status in a structured manner. Figures 9 and 10 show the shipment history and tracking interfaces.

Figure 9 Transaction history

Figure 10Detailed transaction history

Figures 9 and 10 present the shipment history and tracking interfaces. The shipment history module displays completed delivery records, while the tracking module provides chronological status updates throughout the delivery process. Together, these modules improve shipment visibility, facilitate real-time monitoring, and enhance transparency for both service providers and customers.

4.4 System Evaluation

The proposed system was evaluated through functional testing, technical performance analysis, and user acceptance evaluation.

1) Black box Testing

Black Box Testing was conducted to verify that all functions of the proposed mobile-based shipment tracking system operated in accordance with the specified functional requirements identified during the requirements analysis phase. This testing approach evaluates system functionality by examining input-output behavior without considering the internal implementation of the source code. The results confirmed that all functional modules performed as expected, demonstrating the system's readiness for subsequent

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user acceptance evaluation through User Acceptance Testing (UAT) and technical performance assessment.

Table 1 Black Box Testing Results

No	Scenario	Test Result	Information
1	Enter valid data in the username and password fields, then click the login button.	Displays the Home page as the main menu of the application. 	**Successful**
2	Enter an invalid username and password, then click the login button.	Displays an error message dialog stating, **"Data Not Found."** 	**Successful**
3	Leave the username and password fields empty, then click the login button	Displays a warning message stating, **"Username cannot be empty."** 	**Successful**
4	Enter the correct username and password.	Displays a popup message stating, **"Login Successful."**	**Successful**

The functional validation of the proposed system was conducted using Black Box Testing to ensure that each module operated according to the predefined functional requirements. Representative test scenarios, expected outputs, and testing outcomes are summarized in Table 1.

2) User Acceptance Testing (UAT)

User Acceptance Testing (UAT) was performed to assess user acceptance of the proposed mobile-based shipment tracking system using a five-point Likert scale. The questionnaire was administered through Microsoft Forms. The assessment scale is presented in Table 2

a. UAT Instrument

- Respondent Characteristics

The User Acceptance Testing (UAT) involved 82 valid respondents representing the primary users of the proposed mobile-based shipment tracking system, including members, couriers, administrators, and customer service personnel. Respondent characteristics were analyzed based on gender, age, and user role to ensure that the evaluation reflected diverse user perspectives. As shown in Table X, male respondents (44 participants) slightly outnumbered female respondents, although the difference was not substantial, indicating a balanced representation of both genders. In terms of age, most respondents were between 23 and 28 years old (41 respondents, 50.00%), followed by those older

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than 28 years (24 respondents, 29.27%) and those aged 17–22 years (17 respondents, 20.73%). This distribution indicates that the majority of participants belonged to the productive age group and were familiar with mobile technologies, making them well suited for evaluating the proposed application.

Regarding user roles, members constituted the largest group (36 respondents, 43.90%), followed by couriers (22 respondents, 26.83%), administrators (13 respondents, 15.85%), and customer service personnel (11 respondents, 13.41%). This distribution adequately represents the key stakeholders involved in shipment operations, ensuring that the proposed system was evaluated from multiple operational perspectives. The diversity of respondents strengthens the credibility of the user acceptance evaluation by reflecting the experiences and requirements of all primary user groups. The detailed demographic characteristics of the respondents are presented in Table 2.

Table 2. Characteristics of UAT Respondents (n = 82)

Characteristic	Category	requency (n)	Percentage (%)
Gender	Male Female	44 38	53,66 46,34
Age	17-22 Year 23-28 Year >28	38 41 24	20,73 50,00 29,27
User Role	Member Courier Administrator Customer Service	36 22 13 11	43,90 26,83 15,85 13,41

- valuation Indicators

The UAT questionnaire consisted of 15 evaluation indicators designed to assess user acceptance of the proposed mobile-based shipment tracking system. The indicators cover key aspects of usability, functionality, information quality, operational support, and overall system acceptance. The complete list of evaluation indicators is presented in Table 3.

Table 3. User Acceptance Testing (UAT) Evaluation Indicators

No	Code	Evaluation	Statement
1	P1	Accessibility	The application is easy to access and use on mobile device
2	P2	User Interface	The application's user interface is clear and easy to understand.
3	P3	Login Functionality	The login process is simple and functions properly
4	P4	Shipment Data Entry	The shipment data entry feature is easy to use.
5	P5	Shipment Status Informatio	Shipment status information is presented clearly
6	P6	Shipment Tracking	The tracking feature makes it easy to monitor shipment location and delivery status
7	P7	Transaction Histo	Shipment transaction history is easy to access and understand.
8	P8	Data Accuracy	The system helps reduce errors in shipment data recording.
9	P9	Process Efficiency	The system improves the efficiency of shipment processing and tracking activities.
10	P10	Notification	The notification feature provides timely updates on shipment status.
11	P11	System Responsiveness	The application responds quickly during operation.
12	P12	Functional Suitability	The system features meet users' operational requirements.
13	P23	Operational Support	The application effectively supports the operational activities of administrators, couriers, and members

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14	P14	Information Clarity	Shipment information is displayed clearly and is easy to understand
15	P15	Overall System Acceptance	Overall, the application is suitable for supporting mobile-based shipment tracking operations.

The evaluation indicators provide a comprehensive assessment of user acceptance by measuring users' perceptions of system accessibility, functionality, tracking capability, information quality, operational efficiency, and overall suitability for logistics operations.

- User Acceptance Testing (UAT) Results

The UAT responses were analyzed by calculating the actual score and percentage for each evaluation indicator. The overall user acceptance level was determined based on the aggregated scores obtained from all respondents. The detailed UAT results are presented in Table 4

Table 4. User Acceptance Testing (UAT) Results

Code	Evaluation Indicator	Actual Score	Percentage (%)
P1	Accessibility	349	85,12
P2	User Interface	349	85,85
P3	Login Functionality	357	87,07
P4	Shipment Data Entry	354	86,34
P5	Shipment Status Information	356	86,83
P6	Shipment Tracking	353	86,10
P7	Transaction History	354	86,34
P8	Data Accuracy	356	86.83
P9	Process Efficiency	367	89,51
P10	Notification	361	88,05
P11	System Responsiveness	362	88,29
P12	Functional Suitability	359	87,56
P13	Operational Support	368	89,76
P14	Information Clarity	363	88,54
P15	Overall System Acceptance	366	89,27
Overall	User Acceptance	5,377	87,43

As presented in Table 4, all evaluation indicators achieved acceptance levels above 85%, indicating a consistently high level of user satisfaction with the proposed system. The highest score was obtained for Operational Support (89.76%), suggesting that the application effectively supports logistics activities involving administrators, couriers, and members. Process Efficiency also received a high score (89.51%), demonstrating that the proposed system improves shipment processing and tracking activities. Overall, the system achieved a UAT score of 87.43%, indicating a **Highly Acceptable** level of user acceptance. These findings confirm that the proposed mobile-based shipment tracking system meets users' functional and operational requirements

Figure 7 presents the User Acceptance Testing (UAT) results for each evaluation indicator. The assessment involved 82 valid respondents and 15 evaluation indicators covering system accessibility, usability, functionality, responsiveness, operational support, and overall system feasibility. Each indicator was evaluated using a four-point Likert scale, and the results are expressed as percentages of the maximum possible score.

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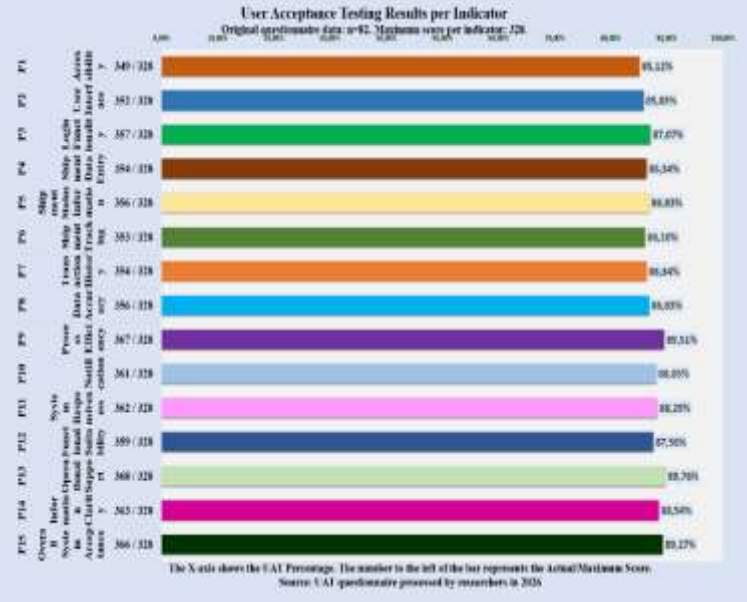

Figure 7. Graph of UAT Results per Indicator

As shown in Figure 7, all evaluation indicators achieved scores exceeding 85%, demonstrating a consistently high level of user acceptance. Operational Support (P13) received the highest score (89.76%), followed by Process Efficiency (P9) (89.51%) and Overall System Feasibility (P15) (89.27%). Although Mobile Accessibility (P1) obtained the lowest score (85.12%), it remained within the Highly Acceptable category. These results indicate that the proposed mobile-based shipment tracking system satisfies user requirements across all evaluated dimensions, supporting its suitability for operational deployment.

- Moble Achitecture Performance Mobile

The mobile architeckture performace Evaluasi was conducted to assess the technical performance of the proposes mobile-based shipment tracking system. The evaluation focused on three key performance matrics, namely latency, throughput, and resource consumption, to determine the system's responsiveness, processing capacity, and efficiency during operational use. Latensi testing was performed to measure the system response time for each major application feature during uses interaction. Tehe evaluation aimed to determine the system's ability to process user requests efficiently within shipment operations. Tehe latency result are presented in Table 5.

Table 5. Average Latency of Mayor System Features

Feature	Average Latency
Login	1,20 s
Shipment Data Entry	1,85 s
Shipment Tracking	1,45 s
Shipment History	1,30 s
Status Update	1,70 s

The results show that all major features achieved an average latency of less than 2 seconds, with an overall average latency of 1.50 seconds.

Throughput testing was conducted to measure the system's capacity to process user requests during operational activities. The throughput value represents the average number of successful requests processed per minute for each major application feature. The measurement results are presented in Table 6.

Table 6 Thoughput Test Result

Feature	Thoughput
Login	45 requests/min
Shipment Data Entry	32 requests/min
Shipment Tracking	40 requests/min
Shipment History	42requests/min
Status Update	35 requests/min

As presented in Table 6, the Login feature recorded the highest throughput of 45 requests per minute, followed by Shipment History (42 requests/min), Shipment Tracking (40 requests/min), Status Update (35

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requests/min), and Shipment Data Entry (32 requests/min). These values represent the average throughput obtained during the performance evaluation of each major application feature.

Resource consumption testing was performed to evaluate the efficiency of the application in utilizing mobile device resources during operation. The evaluation included CPU utilization, RAM usage**,** battery consumption**, and** mobile data usage. The results are presented in Table 7.

Table 7. Average Resource Consumption

Parameter	Average Value
CPU Usage	18%
RAM Usage	145 MB
Batteery Consumption	4 %/30 min
Mobile data Usage	2,8 MB/session

As presented in Table 7, the measured resource consumption consists of CPU utilization (18%), RAM usage (145 MB), battery consumption (4% per 30 minutes), and mobile data usage (2.8 MB per session). These values represent the average resource utilization recorded during the performance evaluation of the proposed mobile-based shipment tracking system.

DISCUSSION

User Acceptance Evaluation

The User Acceptance Testing (UAT) results indicate a high level of user acceptance of the proposed mobile-based shipment tracking system. Operational Support achieved the highest score (89.76%), suggesting that the system effectively facilitates coordination among administrators, couriers, members, and customer service personnel through an integrated mobile platform. Likewise, the high score for Process Efficiency (89.51%) indicates that users perceived the system as simplifying shipment management and improving information exchange compared with conventional manual procedures.

Although Mobile Accessibility (85.12%) and User Interface (85.85%) received relatively lower scores than the other evaluation indicators, both remained within the Highly Acceptable category. These findings suggest that future development should focus on improving interface consistency, navigation design, and compatibility across different Android devices to further enhance the user experience.

The findings are consistent with previous studies reporting that digital logistics systems improve operational efficiency and user satisfaction through real-time information services. However, unlike previous studies that primarily evaluated functionality or usability, this study employs User Acceptance Testing (UAT) to assess user perceptions while integrating the evaluation with technical performance analysis, thereby providing a more comprehensive assessment of the proposed mobile-based shipment tracking system.

Technical Performance Evaluation

The technical performance evaluation demonstrates that the proposed mobile application provides satisfactory operational performance. The system achieved an average latency of **1.50 s**, stable throughput across all evaluated features, and low resource consumption, indicating that the application operates efficiently on mobile devices during routine logistics activities.

These technical results are consistent with the UAT findings, particularly for System Responsiveness (88.29%), Status Notifications (88.05%), and Shipment Tracking (86.10%). The consistency between objective performance measurements and subjective user evaluations suggests that users perceived the system as responsive and reliable during shipment management activities.

Overall, integrating technical performance evaluation with user acceptance assessment provides stronger empirical evidence for evaluating the effectiveness of mobile logistics applications. This integrated evaluation represents the primary contribution of this study, demonstrating that the proposed shipment tracking system not only fulfills functional requirements but also delivers efficient technical performance and achieves a high level of user acceptance, thereby supporting its practical implementation in logistics operations.

Comparative Analysis of the Existing and Proposed Systems

To evaluate the contribution of the proposed system, a comparative analysis was conducted between the existing and proposed systems based on their functionality and operational efficiency. The comparison focused on shipment recording, shipment tracking, courier notifications, transaction history, and shipment status updates.
Table 8. Comparison of the Existing and Proposed System

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Aspect	Existing System	Proposed System
Shipment Recording	Manual	Integrated mobile-based system
Shipment Trackin	Limited	Real-time tracking
Courier Notification	Through administrator	Automatic via the application
Transaction History	Manual records	Stored in the system
Status Updates	Waiting for courier reports	Updated directly by the courier

CONCLUSION

This study developed and evaluated a mobile-based shipment tracking system to support logistics operations through real-time tracking, shipment status updates, transaction history, and coordination among administrators, couriers, members, and customer service personnel. Black Box Testing confirmed that all system functions operated as intended. The technical evaluation showed that the system achieved an average latency of **1.50 s**, stable throughput, and efficient resource utilization, including **18% CPU usage**, **145 MB RAM consumption**, **4% battery usage per 30 minutes**, and **2.8 MB mobile data usage per session**. Furthermore, the User Acceptance Testing (UAT) produced an overall score of **87.43%**, indicating that the system is **Highly Acceptable** for operational use.

The main contribution of this study is the integration of **technical performance evaluation** and **user acceptance assessment** within a single evaluation framework, providing a more comprehensive assessment of mobile-based shipment tracking systems. Nevertheless, the study was conducted in a single operational environment with **82 respondents**. Future research should evaluate system scalability through load and stress testing, improve application accessibility, and compare the proposed system with other logistics tracking platforms.

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