JRSSEM 2026, Vol. 5, No. 10, May
E-ISSN: 2807 - 6311
P-ISSN: 2807 - 6494

Development of a Web-Based Vehicle Monitoring and Reporting Information System to Support Logistics Operations at PT. Shopee Express's Ngaliyan Branch

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Keywords:
Information System; Vehicle Monitoring; Reporting; Web; Logistics

Abstract

This research aims to design and develop a Web-Based Vehicle Monitoring and Reporting Information System to support logistics operations at PT. Shopee Express Ngaliyan Branch. The main problem addressed in this research is the manual vehicle monitoring and travel reporting process, which may cause information delays, inaccurate data, and ineffective fleet supervision. This study applies a software engineering approach using the Waterfall system development method, consisting of requirement analysis, system design, implementation, testing, and maintenance stages. The system was developed as a web-based platform supported by a MySQL database and integrated with Google Maps API to display vehicle positions in real time. The results show that the developed system assists administrators in monitoring vehicle locations, managing driver and vehicle data, viewing travel histories, and generating operational reports automatically. In addition, drivers are able to update travel status, send location data, input travel reports, and upload delivery evidence through the system. System testing using Black Box Testing and User Acceptance Test indicates that the main features operate properly according to user needs. This system contributes to improving operational efficiency, data accuracy, driver performance transparency, and integrated fleet supervision. Therefore, the proposed system can serve as a practical digital solution for supporting logistics management and vehicle monitoring activities.

INTRODUCTION

In the rapidly growing ecosystem of the e-commerce industry, transportation is a key pillar in the logistics system that determines the success of a company's operations. PT. Shopee Express, as one of the leading delivery service providers, relies heavily on the efficiency of fleet movement to distribute packages from the warehouse to the end consumer. Transportation in this context is not just a transportation activity, but a crucial means that functions as the main *input* in maintaining the supply chain. Therefore, integrated transportation management is an absolute necessity for companies (Hasan et al., 2024; Upadhyay et al., 2023; Wedha, 2023; Yan & Wang, 2022).

The main mission of logistics operations at PT. Shopee Express is the delivery of goods with the principles of punctuality, proper location, and proper condition of goods (Jaafar & Hanim, 2023; Nasrudin, 2024). However, on a massive delivery scale, various operational challenges arise, such as the potential for loss of goods, fleet delays, and data mismatches in the number of goods. This problem is often exacerbated by fleet performance monitoring systems that are still manual or have not been integrated in real-time. Wijaya & Kusuma (2022)

emphasized that real-time monitoring in logistics transportation management is essential to minimize operational deviations that can lead to cost inefficiencies. These weaknesses in the control function not only lower the level of customer satisfaction but also lead to significant operational cost inefficiencies for the company (Lestari & Budiman, 2023).

Several previous studies have explored the use of information systems and GPS technology in the context of logistics and fleet monitoring (Alhwety & Elfadil, 2024; Comi & Russo, 2022; Gayialis et al., 2022; Kotsialos & Vassilakopoulou, 2023; Verma et al., 2024). Hidayat & Saputra (2023) examined the utilization of the Google Maps API for real-time tracking visualization in expedition companies, demonstrating that digital map integration can significantly improve the accuracy of vehicle position monitoring. Pratama & Jannah (2023) analyzed the implementation of distribution monitoring information systems in e-commerce companies and found that web-based systems accelerate the flow of information between drivers and operational management. Ramadhan & Pratama (2023) developed a web-based logistics application using the Laravel framework with the Agile method, concluding that the Laravel framework provides code structure and security suitable for logistics system development. Nugroho et al. (2024) investigated geospatial data integration for fleet management systems and highlighted the importance of combining GPS data with web platforms for comprehensive supervision. Furthermore, Suryana et al. (2024) developed a web-based information system for logistics performance monitoring and confirmed that automated reporting features reduce administrative workload and improve data accuracy. Pratiwi et al. (2024) studied the digitalization of monitoring systems to enhance supply chain transparency, emphasizing that centralized reporting dashboards facilitate objective evaluation of operational performance. Firmansyah & Az-Zahra (2026) further underscored the strategic importance of visualized reporting in modern logistics platforms for management decision-making. Gunawan & Pratama (2025) examined fleet management optimization for last-mile delivery in the e-commerce industry, identifying real-time tracking as a critical factor in reducing delivery delays.

Previous research has also addressed the technical aspects of logistics information system development. Bastian et al. (2026) conducted a scalability and performance analysis of the Laravel framework in large-scale logistics systems and found it suitable for handling growing data volumes. Fauzi & Nugraha (2025) reviewed security protocols in logistics information systems, emphasizing the importance of authentication mechanisms and data protection. Purnama & Sari (2025) analyzed the accuracy of GPS coordinates and the Google Maps API in transportation monitoring systems, concluding that environmental factors can still affect positional precision.

To overcome these obstacles, a system that is able to integrate supervision and reporting functions transparently is needed. Web-based information systems are a strategic solution because they allow central management to centrally monitor fleet movements, anytime, and anywhere without being limited to specific mobile devices. Through a web-based system, data visualization and report recapitulation can be done more comprehensively.

This research refers to the development of GPS (*Global Positioning System*) technology which has previously been researched in a study entitled *"Development of GPS-based Mobile Device Tracking and Tracking Systems on Android mobile platforms".* In contrast to the

previous system that used SMS as a coordinate transmission medium, this study developed a Web-Based Vehicle Monitoring and Reporting Information System. The proposed system maximizes the integration of the Google Maps API to visualize the position of the fleet in *real-time* and present it in the form of *systematic performance* reporting.

With the implementation of this web-based monitoring system, PT. Shopee Express is expected to increase the effectiveness of distribution supervision, minimize unnecessary costs, and have an accurate database to objectively evaluate the performance of each driver to support the smooth operation of the company's logistics operations.

Based on the background that has been presented, the formulation of the problem in this study is how to design and build a web-based vehicle monitoring and reporting information system that is able to integrate fleet location data in real-time and present performance reports to support logistics operations at PT. Shopee Express. More specifically, this study focuses on designing a real-time web-based vehicle monitoring information system that can support the logistics operational supervision process, as well as designing a real-time web-based vehicle reporting information system that is able to accurately present operational data and reports for PT. Shopee Express.

The goal to be achieved in this study is to design and build a web-based Monitoring Information System that can track the position of PT. Shopee Express in real-time. In addition, this research aims to integrate the reporting function or automatic reporting into the system in order to accurately present travel history data and the status of goods shipments. This system is also designed to optimize the function of monitoring logistics operations so that it can minimize the risk of delays, loss of goods, and non-conforming procedures in the field. In addition, this study aims to provide driver performance assessment parameters based on trip log data recorded in the system.

The benefits of this research can be seen from two perspectives, namely benefits for companies and academic benefits. For PT. Shopee Express, this research is expected to help improve operational efficiency through centralized monitoring of fleet distribution through a web dashboard, so that distribution coordination can be carried out more quickly and effectively. Additionally, these systems can help reduce additional costs that arise due to route inefficiencies or misuse of operational vehicles. This research also provides benefits in the form of data transparency through objective performance reports as a management evaluation material for driver and courier performance. With a good monitoring and reporting system, the company can also improve service quality and consumer trust through the certainty of delivery status that is monitored more optimally. Academically, this research is useful as a means of applying knowledge in the field of information system development, digital mapping through Google Maps API, and logistics management in real cases. In addition, the results of this research can be a scientific reference for future research related to web-based vehicle monitoring systems and the digitization of logistics systems in the e-commerce industry.

RESEARCH METHOD

A. Types of Research

The type of research used in this study is software engineering research. This research aims to design and build a Web-Based Vehicle Monitoring and Reporting Information System to support logistics operations. The approach used is descriptive, namely by systematically

describing the processes that occur in the management of logistics vehicles in the field, then developing it into a web-based system.

B. Research Location and Time

1. Research Location

This research was conducted at PT Shopee express, which is engaged in the distribution of logistics goods and services. The company has several fleets of operational vehicles that are used for shipping goods to various regions.

2. Research Time

The research was carried out in the period January 2026 – February 2026.

C. Data Collection Techniques

In this study, the data collection techniques used are as follows:

1. Observations

The author makes direct observations of the vehicle operational process at PT Shopee express, especially in recording vehicle trips and making reports.

The results of the observations show that:

- Vehicle monitoring is still carried out manually
- Operational reports still use record-keeping in a simple book or file
- Difficulty tracking vehicles in a timely manner

2. Interview

Interviews were conducted with:

- Logistics admin
- Driver

From the results of the interviews, information was obtained that a system is needed that can:

- Monitor vehicles in a timely manner
- Storing vehicle trip data
- Generate automated reports

3. Literature Study

The author collected references from:

- Information systems books
- Journal related to vehicle monitoring
- Internet resources

D. System Development Methods

The method used is Waterfall, because it provides clear and structured stages.

Waterfall Stages:

1. Requirement Definition
   - Observation: Directly observing the logistics operational process at PT. Shopee Express
   - Interview: Conducting Q&A with the admin and driver

   The results of this stage are:
   - The need for *a real-time vehicle monitoring system*
   - Need for a travel reporting system
   - Driver and vehicle data management needs
2. System and Software Design

At this stage, the system design is carried out based on the needs that have been analyzed.

Planning includes:

- Use Case Diagrams → illustrate the interaction between actors and systems
- Activity Diagram → depicts the flow of system processes
- Entity Relationship Diagram (ERD) → database design
- Interface Design (UI/UX) → a web-based system

3. Implementation and Unit Testing

The implementation stage is the process of creating a system based on the design that has been made. Activities at this stage include:

- Frontend creation (HTML, CSS, JavaScript)
- Backend creation (PHP/Node.js/framework)
- Integrate database (MySQL)

The output of this stage is a system that can be run according to needs.

4. Integration and System Testing

This stage is carried out to ensure that the system runs according to needs. The test methods used are:

- Black Box Testing → test system functionality without looking at program code
- User Acceptance Test (UAT) → testing by users (admin and driver)

Test purpose:

- Make sure all features run smoothly
- Identifying bugs
- Ensure the system meets the needs of the user

5. Operation and Maintenance

The maintenance stage is carried out after the system is used. Activities include:

- Bug fixes
- System feature updates
- Data backup and security

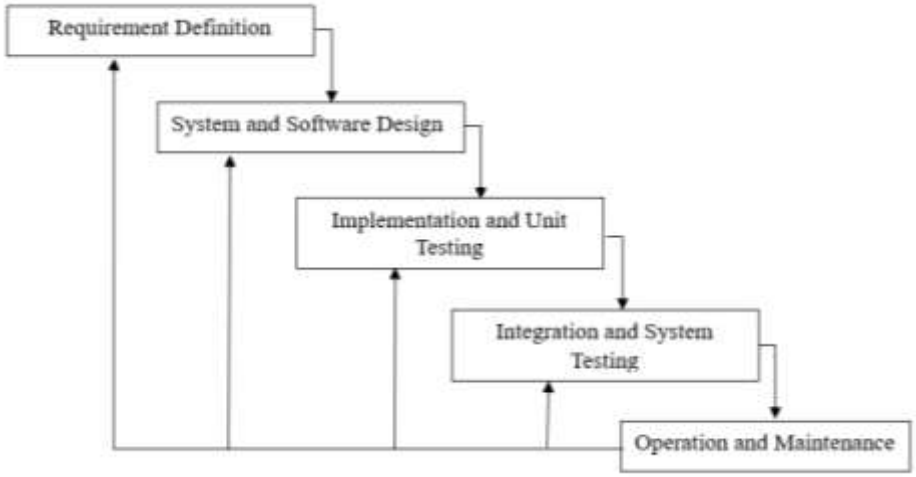


Figure 1. Use Case System Diagram

Source: Author's analysis and design results (2026)

E. Subjects and Objects of Research

1. Research Subject

   The subjects in this study are:

   - Operational admin
   - Delivery drivers

2. Research Object

   The research objects are:

   - Vehicle monitoring system
   - Logistics travel reporting system

F. System Needs Analysis

1. Functional Needs

a. Admin
   - Log in to the system
   - Manage driver data
   - Manage vehicle data
   - Monitoring the Position of the Vehicle
   - View trip reports
   - Print reports

b. Driver
   - Log in to the system
   - Travel status updates
   - Send location (GPS)
   - Input a trip report
   - Upload proof of delivery

2. Non-Functional Needs

a. Web-based system
b. Accessible via browser
c. Have a login system
d. The user interface is simple and easy to use
e. Using MySQL databases

G. System Flow (Overview)

The system workflow is as follows:

1. Driver logins to the system
2. Driver inputs ride status and location
3. Data is sent to the server
4. Admin monitors vehicles in a timely manner
5. Admin view and print reports

H. Research Tools and Materials

1. Hardware:
   - Laptop / PC
   - Smartphone (for drivers)

2. Software:
   - Operating System (Windows / Linux)
   - Web Browser (Chrome, Firefox)
   - Database (MySQL)
   - Programming Language (PHP/JavaScript)

RESULTS AND DISCUSSION

Research Results

1. System Overview

The result of this research is a Web-Based Vehicle Monitoring and Reporting Information System designed and developed to support logistics operational activities at Shopee Express Ngaliyan branch. This system was created as a solution to the company's needs in conducting operational vehicle supervision more effectively, quickly, and integrated. Before this system was implemented, the vehicle monitoring process was still carried out manually, causing delays in information, difficulties in recording trips, and suboptimal fleet supervision in the field

Through the developed system, the vehicle monitoring process can be carried out in real-time through the internet network so that the management can find out the vehicle's position, travel status, and operational activities directly. In addition, the system is also able to generate vehicle trip reports automatically based on data input by users. Thus, the administrative process becomes more efficient, accurate, and easily accessible at any time as needed.

This information system is built using a web-based platform so that it can be accessed through computers and mobile devices connected to the internet. The use of web-based systems was chosen because it has high flexibility, does not require special installation on the user's device, and facilitates future maintenance and development processes.

In its implementation, the system has two main actors who play roles according to their duties and authorities, namely Admin and Driver. Each actor has different access rights to ensure that data security and system workflows run smoothly.

a. Admin

Admin is a user who has full access rights to the system. The admin is responsible for managing all master data as well as supervising the activities of operational vehicles. Features that can be accessed by admins include:

- Log in to the system using your username and password.
- Manage operational vehicle data.
- Manage driver data.
- Monitor the vehicle's position in real-time.
- View the vehicle's travel history.
- Receive and verify travel reports.
- Print vehicle operational reports.
- Manage system user accounts.

With this feature, admins can supervise fleets in a more structured manner and simplify the operational decision-making process.

b. Driver

Drivers are users who are in charge of running operational vehicles and providing travel information through the system. Drivers have limited access as per the needs of the field. Features available to drivers include:

- Log in to the system using your respective account.
- View the data of the vehicle used.
- Input departure and arrival status.
- Send the location of the vehicle periodically.
- Fill out daily travel reports.
- Report vehicle problems if there is damage or obstacles on the way.
- Through this feature, drivers can provide information quickly to admins so that operational coordination becomes more effective.

2. Login Page View

The login page is the starting page that serves as the user's entry into the system. This page is designed with a simple, responsive, and easy-to-use look so that admins and drivers can quickly authenticate. On the login page, there is an input form in the form of a username and password that must be filled in according to the account data that has been registered in the system database.

The login process aims to maintain data security and limit user access according to their respective access rights. After the data entered is declared valid, users will be automatically directed to the dashboard page according to their role, namely the admin dashboard or driver dashboard. If there is an error in entering the username or password, the system will display a warning message so that the user can log in again.

With this login feature, system security is more guaranteed because only users who have an official account can access vehicle operational information.

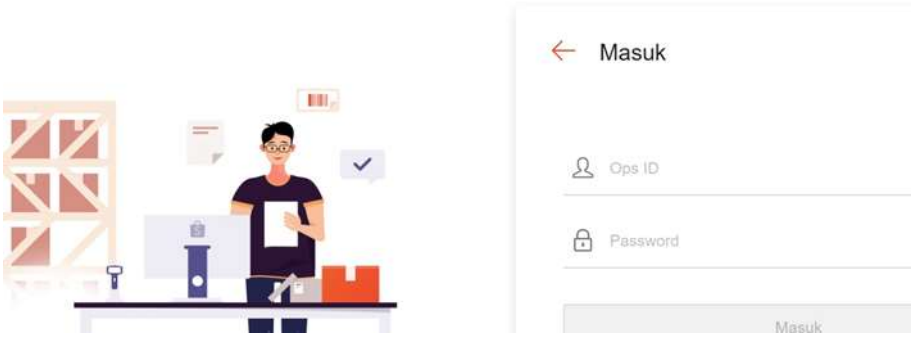


Figure 1. Login Page

Source: System development results, author's documentation (2026)

3. Dashboard Admin

The admin dashboard is the main page used by the administrator to monitor all operational vehicle activities. This page displays various important information in a concise and real-time manner to make it easier for admins to supervise logistics fleets.

The information available on the admin dashboard includes a map of direct vehicle monitoring, the number of active vehicles, the status of delivery, and a summary of daily

reports. Through the integration of API-based digital maps, admins can find out the position of vehicles that are in operation and their travel routes.

In addition, the dashboard also displays the status of the vehicle such as running, stopping, or having reached its destination. With this centralized view, admins can make quick decisions if there are obstacles in the field, such as delivery delays or changes in travel routes.

Gambar 2. Dashboard Admin

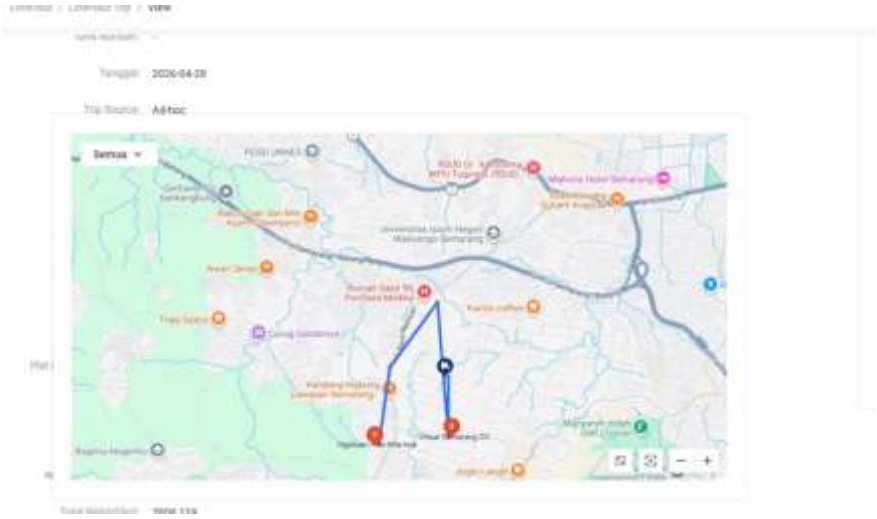
Source: System development results, author's documentation (2026)

4. Vehicle Monitoring Page

The vehicle monitoring page is the main feature in the system that functions to monitor the vehicle's position and activity in real-time. This page displays vehicle location information based on GPS coordinates that are sent periodically from the driver's device to the server.

In addition to the vehicle's position, the system also displays the identity of the driver on duty, the vehicle's travel status, and the travel route being taken. This information is very helpful for the admin in ensuring that the vehicle moves according to the schedule and route that has been determined.

Through this monitoring feature, companies can improve fleet operational supervision and minimize the risk of delivery delays. If there is a deviation from the route or the vehicle stops for too long, the admin can immediately follow up.



Gambar 3. Halaman Monitoring Kendaraan

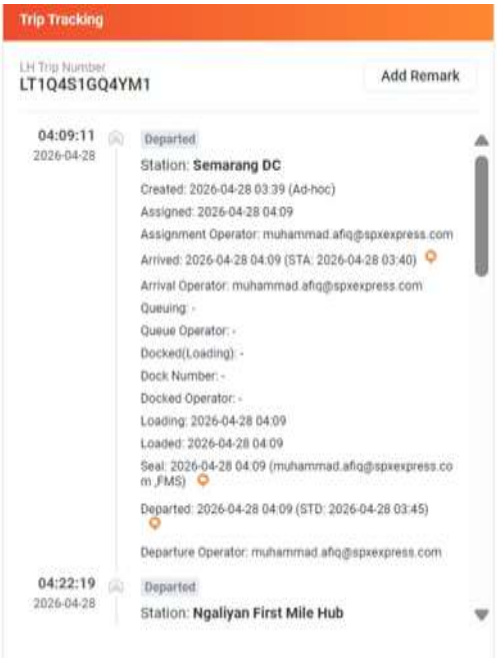
Source: System development results, author's documentation (2026)

5. Reporting Page

The reporting page is used to display and manage vehicle operational reports automatically. The system generates reports based on incoming trip data from vehicle activity and driver input during the delivery process.

The types of reports available include vehicle travel history, travel time, delivery status, and driver activity. All of this data is stored in the database so that it can be accessed again at any time for evaluation and company documentation needs.

The system also provides a report filter feature based on a specific date so that users can search for data more quickly and accurately. In addition, reports can be printed into specific formats as well as downloaded as per administrative needs. With this reporting feature, the process of making reports becomes more efficient than manual methods.



Gambar 4. Halaman Pelaporan

Source: System development results, author's documentation (2026)

6. Driver Page

The driver page is a page designed specifically for users with the role of an operational vehicle driver. This page provides features that support driver activities during delivery tasks.

Through this page, drivers can update their trip status, send GPS locations periodically, input trip reports, and upload proof of delivery to admins. Proof of delivery can be a photo or other supporting document showing that the goods have been received for their destination.

With the driver page, communication between drivers and admins becomes faster and integrated in one system. This helps to speed up the flow of information and increase the effectiveness of the company's logistics operations.

Gambar 5. Halaman Driver

Source: System development results, author's documentation (2026)

1. System Implementation

This Vehicle Monitoring and Reporting Information System is developed using web-based technology so that it is easily accessible from various devices. On the frontend side, the system uses HTML, CSS, and JavaScript to build an interactive and responsive interface.

On the backend side, the system is developed using the PHP programming language with the Laravel framework. The use of Laravel was chosen because it has a neat code structure, good security, and supports the development of MVC-based applications. Meanwhile, data management is carried out using a MySQL database.

The system architecture uses the Model-View-Controller (MVC) concept. This concept separates program logic, display, and data management so that the system is easier to develop, maintain, and update in the future.

2. System Testing

System testing is carried out to ensure that all features can run according to user needs. The testing methods used consisted of Black Box Testing and User Acceptance Test (UAT).

In Black Box Testing, testing is focused on the main functions of the system without looking at the program code. The test results show that the login feature is valid, real-time monitoring is working properly, the driver data input is successfully processed, and generating reports can be done without problems.

Next, a User Acceptance Test (UAT) is carried out by involving logistics admins and drivers as direct users of the system. Based on the test results, users consider that the system is easy to use, the monitoring process is faster than manual systems, and the reports produced are neater and more automatic.

The results show that the system has met the company's operational needs and is feasible to use.

3. System Advantage Analysis

Compared to the previous work method which was still manual, the system developed has several main advantages. First, the system is able to monitor vehicles in real-time so that admins can see the vehicle's position directly. This is very helpful in reducing the delay of information from the field.

Second, the system improves operational efficiency because the manual recording process can be reduced. Trip reporting becomes faster because the data is automatically stored directly into the system.

Third, the system improves the accuracy of the data because all the information is stored in the database. The risk of recording errors or data loss can be minimized compared to recording using paper.

Fourth, the system provides transparency on driver performance. Travel activities, travel time, and delivery status can be monitored objectively, facilitating the work evaluation process.

4. System Limitations

Although the system has many advantages, the study still has some limitations. First, the system relies heavily on an internet connection. If the network is unstable, then the process of sending location data and system access can be disrupted.

Second, GPS accuracy can be affected by environmental conditions such as tall buildings, bad weather, or areas with weak signals. This can cause inaccuracies in the vehicle's position on the monitoring map.

Third, the system is not equipped with automatic notification features such as vehicle delay notifications, vehicles out of route, or fleet service schedules. Therefore, further development is still needed so that the system becomes more optimal and according to the company's needs in the future.

CONCLUSION

Based on the results of the research and discussions that have been carried out, it can be concluded that the development of a Web-Based Vehicle Monitoring and Reporting Information System at PT. Shopee Express Ngaliyan branch was successfully designed and implemented according to the company's logistics operational needs. This system is able to help the vehicle monitoring process in real-time through the integration of GPS and Google

Maps API so that the position of the vehicle can be monitored directly by the admin. In addition, the system is also able to generate vehicle trip reports automatically so that the administration and reporting process becomes more effective, fast, and structured. The implementation of a web-based system provides easy access for admins and drivers because it can be used through various devices connected to the internet. The test results using the Black Box Testing and User Acceptance Test (UAT) methods show that all the main features of the system run well and according to the needs of the user. The presence of this system has a positive impact on improving operational efficiency, accuracy of travel data, transparency of driver performance, and facilitating integrated supervision of logistics fleets. However, the system still has limitations such as dependence on an internet connection and the unavailability of automatic notification features, so further development is needed so that the system can be more optimal in the future.

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