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Developing an Outsource Driver Management Application to Improve Cargo Company Operational Efficiency

Denny Jean Cross Sihombing
Information System Study Program, Atma Jaya Catholic University of Indonesia

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ABSTRACT
This research aims to develop an outsourced driver management application to improve the operational efficiency of cargo companies. The methods include needs analysis, planning, development, and application testing. The results of this research include designing an intuitive user interface, developing an efficient database management system, implementing responsive real-time tracking features, and integrating with other systems. Comprehensive testing was also conducted to ensure the application's quality, performance, and security before the official launch. The contribution of this research is to provide a solution that can improve the operational efficiency of cargo companies in outsourced driver management and provide an optimal user experience in using the application.

Corresponding Author:
Denny Jean Cross Sihombing
Atma Jaya Catholic University of Indonesia
Jakarta, Indonesia
denny.jean@atmajaya.ac.id

INTRODUCTION

The cargo industry is an integral part of the global distribution chain. Cargo companies are responsible for transporting goods from the point of origin to the destination, ensuring that goods arrive on time and in good condition(Guo et al., 2022; Ilic & Momcilovic, 2023; Lokras et al., 2022; Serinkan et al., 2014). The main challenges cargo companies face includes inventory management, efficient route selection, driver management, and monitoring safety and compliance with transport regulations. In this case, the role of drivers is vital as they are the spearhead in running freight operations. Therefore, efficiency and effectiveness in managing drivers are critical factors in determining the success of cargo companies.

Driver outsourcing refers to the practice whereby cargo companies hire or utilize the services of third-party drivers to perform deliveries. This can be done for various reasons, such as increasing operational flexibility, reducing overhead costs, or meeting on-demand transport needs. However, while outsourced drivers can provide significant benefits, managing them also comes with challenges. For example, companies need to ensure outsourced drivers have the appropriate qualifications, maintain service consistency, and ensure on-time delivery(Corrotea et al., 2024; Hunt et al., 2023; Malik et al., 2023; Narayanan & Antoniou, 2022; Vinje Kramer & Steen, 2022; Yıldız et al., 2023).

Most cargo companies still rely on traditional methods of managing outsourced drivers. This often involves using spreadsheets or manual systems that are prone to errors and

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need more efficiency in monitoring and coordination. Lack of real-time visibility and constraints in communication between cargo companies and outsourced drivers can also hamper operational efficiency(Cudok et al., 2022; Farafontova et al., 2022; Kováciková et al., 2023; Narayanan et al., 2022; Naumov et al., 2021; Wang et al., 2023). Therefore, there is an urgent need to adopt more advanced technology solutions to improve outsourced driver management and, overall, the operational efficiency of cargo companies.

Various research and case studies have been conducted to explore using management applications in the cargo and logistics industry. Examples include applications that enable real-time monitoring of shipment locations, driver status, estimated arrival times, and integration with other systems such as inventory management(Garro et al., 2023; Gonzalez-Calderon et al., 2022; Malmgren et al., 2023; Merz et al., 2023; Merzlikin et al., 2022; Mingaleva et al., 2022; Tseremoglou et al., 2022; Ulitskaya et al., 2022). These studies show that information technology can improve operational efficiency, reduce human error, and speed up response time to changing conditions.

From the literature review and analysis of current conditions, there is an urgent need for a dedicated management application for outsourced drivers in the cargo industry. This application is expected to provide an integrated solution to monitor and manage outsourced drivers more efficiently. Some of the expected features of the application include real-time tracking, automatic scheduling, driver performance monitoring, integration with payment systems, and the ability to generate analytical reports for evaluation and improvement.

The development of applications using Agile methodology has become a popular and practical choice in the software industry(Al-Saqqa et al., 2020; Bomström et al., 2023; Dingsoeyr et al., 2019; Dingsøyr et al., 2012; Rindell et al., 2021; Santos et al., n.d.; Serrador & Pinto, 2015; Shrivastava & Rathod, 2014). With this approach, development teams can adopt an iterative development cycle that allows them to flexibly adjust plans and priorities based on changing user needs or feedback. The main advantages of Agile methodology are its high responsiveness to changes, the ability to deliver business value more quickly, increased user engagement, and the capability to reduce project risks through continuous testing and adaptation(Alami et al., 2022, 2023; Hasan et al., 2013; Meiliana et al., 2023; Mishra & Alzoubi, 2023; Tøndel et al., 2022). Therefore, in this research, Agile methodology is employed in developing the driver outsourcing management application to ensure alignment between dynamic user needs and the development team's ability to deliver effective, high-quality solutions. Agile methodology also provides flexibility, efficiency, and better quality, ultimately enhancing overall user satisfaction and project success.

This research aims to develop an outsourced driver management application that cargo companies can use to improve operational efficiency. With a focus on real-time monitoring, optimization of driver schedules, and seamless integration with other systems, this application is expected to help cargo companies overcome the challenges of managing outsourced drivers. As such, this research is expected to significantly contribute to the development of information technology in the cargo and logistics industry.

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METHOD

The research started by defining the cargo company's needs regarding outsourced driver management through in-depth analysis and interaction with stakeholders. Next, project planning was conducted, which included timelines, resource allocation, and selection of an appropriate development methodology. The development phase involved the design of an intuitive user interface, the development of a robust database system, and the integration features such as real-time tracking. Finally, the testing phase was conducted to ensure the application's quality, performance, and security before the official launch, involving functional, performance, and security testing, as shown in Figure 1.

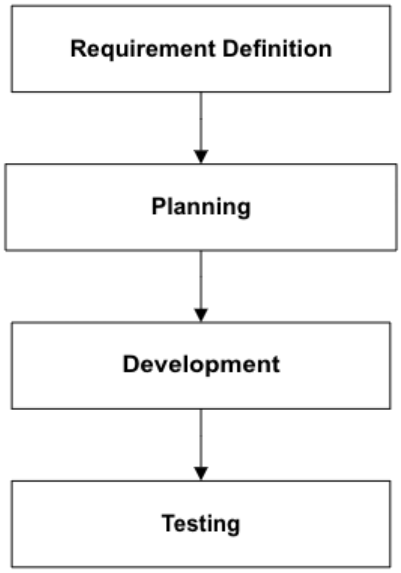

Figure 1. Research Stages

Definition of need

In this stage, the focus was to deeply understand the needs and requirements of the cargo companies regarding outsourced driver management. This involves conducting a thorough analysis of the processes involved in driver management, identifying existing issues, and listening to various stakeholders' input. Surveys and interviews with logistics managers, drivers, and other relevant departments will be conducted to gain a comprehensive view. A complete and detailed requirement specification document will be drafted based on the findings from the analysis.

Planning

Once precise requirements and specifications have been established, the planning stage begins. This stage includes drawing up a project plan with a timeline, budget allocation, and required resources. The project team will be clearly defined, including the roles and responsibilities of each team member. The development methodology will also be established in this planning stage, considering flexibility, responsiveness to change, and project risk management.

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Development

Once the plan has been established, the development phase will begin with a focus on designing and building the outsourced driver management application. The development team will liaise with user interface designers to create an intuitive and easy interface for users. A database management system will be developed to store and manage driver data, delivery routes, work schedules, and other necessary information. Features like real-time tracking and integration with other systems will also be developed during this stage.

Testing

The last stage of this research is the testing stage, which includes various tests to ensure the quality and performance of the application. Functional testing will be conducted to verify that all features and functions of the application are working correctly as per the specifications. Performance testing will evaluate the response and performance of the application in different situations, while security testing will ensure that sensitive data and information are well protected. Alpha and beta testing will involve internal and external users to obtain feedback and correct deficiencies before officially launching the app.

RESULTS AND DISCUSSION

Definition of need

The results of the requirement definition phase showed that this activity provided a deep understanding of the needs and requirements involved in outsourced driver management of cargo companies as shown in Table 1. Essential requirements such as driver location monitoring, efficient work scheduling, driver performance tracking, and good integration with payment systems were identified through careful analysis. In addition, interviews and surveys with various cargo company stakeholders also provided comprehensive input, enabling the researcher to understand the perspectives and needs of the various stakeholders. The requirement specification document that was developed, which included key features such as an intuitive user interface, real-time tracking, efficient automated scheduling, and analytical reports, formed the basis for designing a responsive application that suits the needs of cargo companies. Furthermore, an analysis of similar existing applications in the market provided valuable insights into practical and adoptable features and identification of the strengths and weaknesses of existing solutions, which will help in designing a better application that meets user expectations.

Table 1. Results of Needs Definition

Activities	Hasil
Cargo Company Needs Analysis	- Key needs related to outsourced driver management have been identified, such as driver location monitoring, work scheduling, performance tracking, and integration with payment systems.
Interviews and Surveys with Stakeholders	- To understand their perspectives and needs first-hand, comprehensive inputs have been gathered from various stakeholders, including logistics managers, drivers, and other relevant departments.
Requirement Specifi-	- A requirements specification document covering key features

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Activities	Hasil
cation Document	such as an intuitive user interface, real-time tracking, automated scheduling, and analytical reports was drafted.
Benchmarking Analysis against Similar Apps	- A comprehensive analysis of similar applications was conducted to gain insight into practical and adoptable features and identify the strengths and weaknesses of existing solutions.

Planning

The results of the planning stage have resulted in several necessary steps that serve as the foundation for the implementation of this project. First, a comprehensive project plan was carefully developed, including a detailed schedule, proper resource allocation, and an estimate of the budget required to develop the outsourced driver management application. This plan served as a fundamental guideline in determining the steps to be taken in each phase of the project and ensuring efficiency and effectiveness in overall project management. Furthermore, the planning stage also successfully identified a project team of experts in their respective fields, including software developers, user interface designers, system analysts, and project managers. The existence of a competent and experienced team is an essential asset in running the project well, as each team member can make valuable contributions according to their expertise and responsibilities.

The development methodology used in this project has been carefully defined, and the Agile method has been chosen as the appropriate approach. The Agile method was chosen because its flexibility allows for rapid adaptation to changing project needs and provides high responsiveness to changes that may occur during the application development process. This ensures that the project can run smoothly and remain focused on achieving the main objectives. Finally, an effective risk management scheme was developed to identify potential obstacles or problems that may arise during the project. The risk-reduction measures implemented will help mitigate the negative impact of such potential obstacles on the overall course of the project. Thus, this planning stage provided a solid and strategic foundation for the smooth and successful implementation of this outsourced driver management application development project.

Figure 2 shows the complex planning process of developing an outsourced driver management application. The initial stage involves setting the project's goals and objectives and gathering stakeholders' requirements and feedback. Next, the diagram illustrates the analysis of project constraints, if any, including identifying and analyzing possible risks. The following steps include the development of a project plan, allocating human and material resources, establishing a project schedule and timeline, and developing an effective risk management plan. In addition, this diagram shows the process of selecting an appropriate development methodology, emphasizing selecting an Agile methodology for flexibility. The overall activity diagram reflects a systematic and comprehensive approach in the project planning stage, which is essential to ensure the smooth and successful execution of this application development project.

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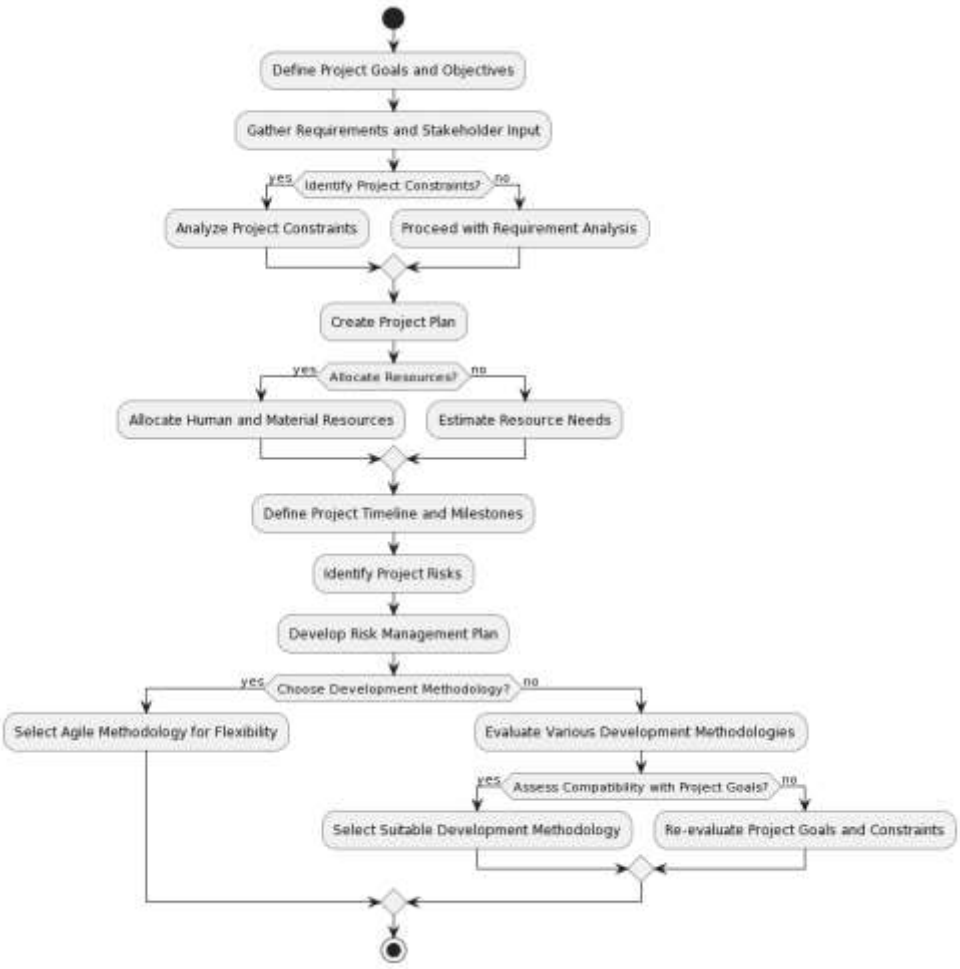

Figure 2 The Planning Phase

Development

In the application development phase, designing an intuitive and user-friendly user interface has been successful based on the previously defined requirement specifications. This ensures that end users can utilize the application quickly and efficiently, enhancing the overall user experience. Furthermore, a database management system has been developed to store and manage essential data related to drivers, delivery routes, work schedules, and other information required in outsourced driver management. The development of this system ensures the smooth operation of the application and adequate data accessibility.

In addition, a real-time tracking feature has been implemented to monitor the driver's location and status and provide notifications or alerts in case of problems or delays. This improves the app's responsiveness and operational efficiency. Finally, integration with other systems such as payment systems and inventory management has been done to ensure overall operational alignment, improve business process efficiency and reduce the potential for manual errors. With the results of this development, the outsourced driver management application can significantly contribute to improving cargo companies' operational efficiency and user experience.

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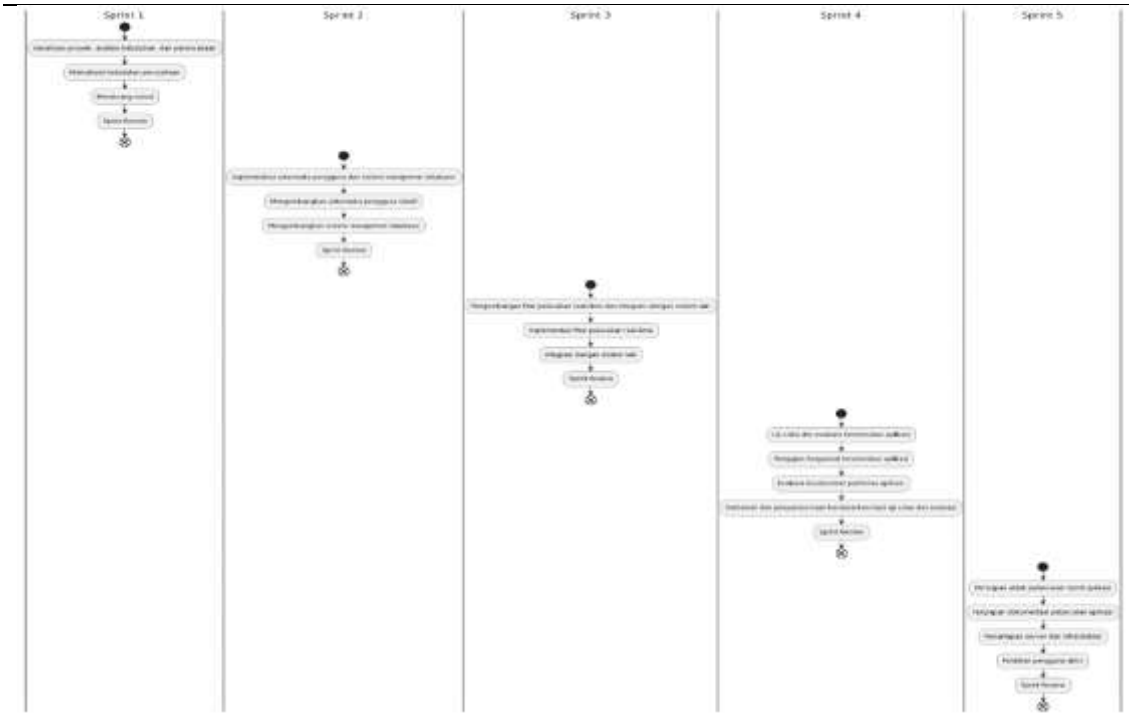

Figure 3 Sprint

Figure 3 shows Sprint Planning in five sprints, each containing the activities to be performed in each sprint for developing the outsourced driver management application. Each sprint begins with "start" and ends with "end," with activities in between that describe the activities to be performed in each sprint.

Testing

The testing phase in developing the outsourced driver management application involved several essential activities. Firstly, careful test scenarios were developed to cover functional, performance, and security testing. This aims to ensure that the application can operate according to predefined specifications, has optimal performance, and is protected from potential security threats. Next, unit testing is conducted to examine each application component separately and ensure that each part functions appropriately before being combined with other parts. Integration testing is also conducted to verify the seamless interaction between modules and systems in the application and ensure that all components work harmoniously. The alpha testing phase involves internal users thoroughly testing the application before launching it publicly. In contrast, beta testing involves external users providing feedback that can be used to make improvements before the official launch of the application. The results of these tests become an essential cornerstone in ensuring the app's quality, performance, and security before it is widely publicized to end users.

CONCLUSION

In this research, an outsourced driver management application has been developed to improve the operational efficiency of cargo companies. The research stages include require-

ments definition, planning, development, and testing. The results of this study show that the developed application successfully designed an intuitive user interface, developed an efficient database management system, introduced responsive real-time tracking features, and integrated the system well. Comprehensive testing was also conducted to ensure the application's quality, performance, and security before the official launch. The development of this application is expected to positively contribute to improving the operational efficiency of cargo companies and providing an optimal user experience in outsourced driver management.

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