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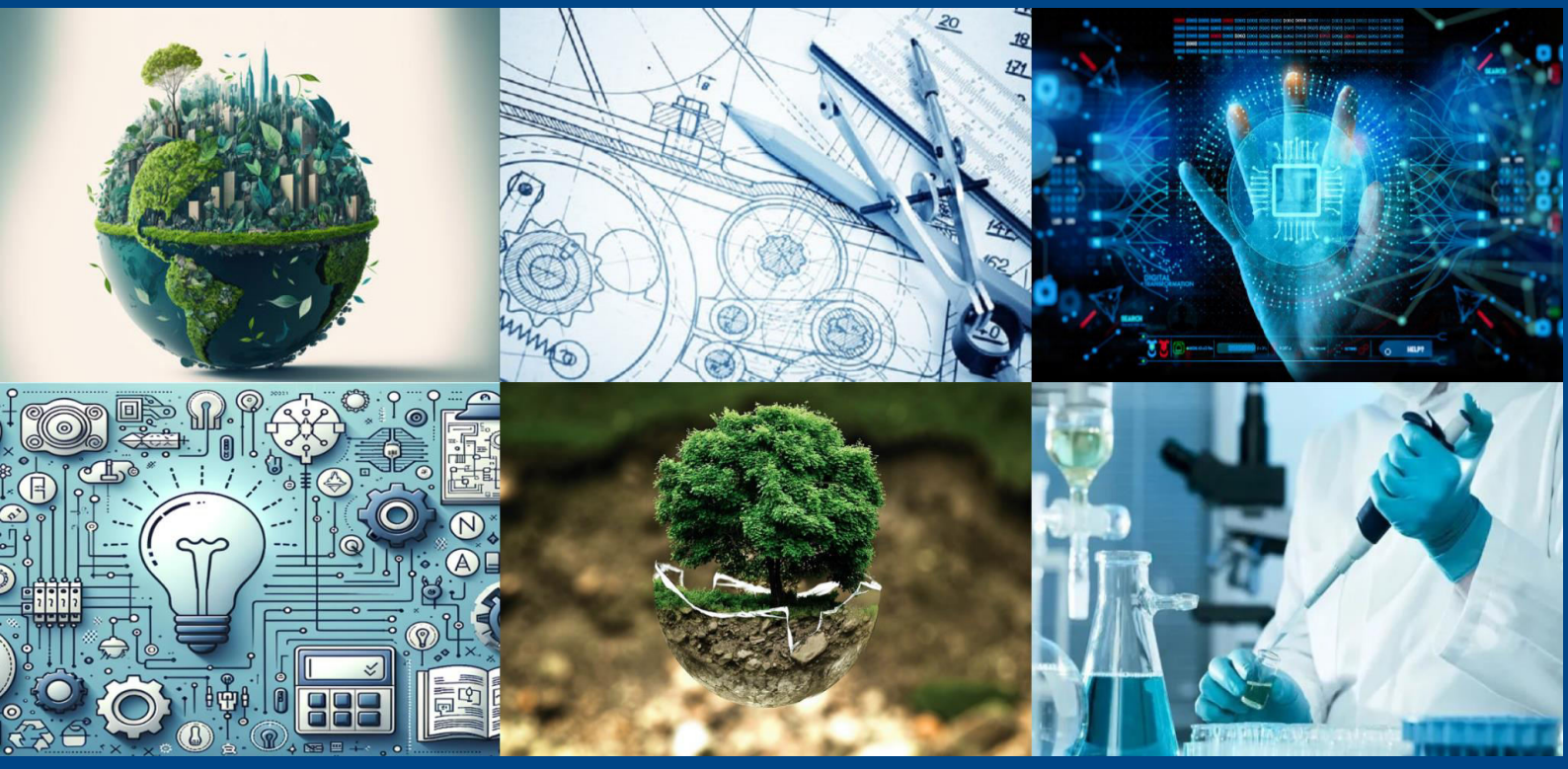

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GoVan: A Hybrid App Transportation Booking and Real-Time Tracking System for Maharlika

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ABSTRACT: This study developed and evaluated GoVan, a hybrid transportation booking and real-time tracking system for the Maharlika community in Cantilan, Surigao del Sur. The system addressed manual booking, unclear schedules, limited seat monitoring, and lack of real-time updates by integrating online reservation, GPS tracking, administrative management, and SOS emergency alerts. Using descriptive-developmental research, Agile SDLC, and ISO/IEC 25010 evaluation, GoVan obtained Very Great Extent ratings across functionality, reliability, usability, efficiency, maintainability, and security, with an overall mean of 4.77, showing strong acceptability and practical value for community-based transportation management.

KEYWORDS: Hybrid application; transportation booking system; real-time GPS tracking; Agile SDLC; ISO/IEC 25010

I. INTRODUCTION

Maharlika's van transportation system continues to rely heavily on manual processes, leaving commuters with uncertain schedules, unclear seat availability, and no access to real-time location updates. These issues create long waiting lines, miscommunication, and frequent delays that affect daily travel. To address these problems, the researchers developed GoVan, a hybrid web and mobile application that makes booking easier, provides real-time GPS tracking, and improves coordination among commuters, drivers, and transport administrators.

Digital transportation systems have been shown to improve service quality by reducing delays, strengthening coordination, and improving commuter awareness. Hsu et al. (2022) found that online reservation and moving path monitoring improve transportation coordination, while Ascueta et al. (2022) demonstrated that real-time bus tracking enhances commuter awareness and service reliability. Ulay et al. (2025) further noted that transportation systems for local communities should remain flexible and reliable even under connectivity limitations.

Although transportation applications are increasingly available, many are designed for large cities or commercial transport operators. Smaller communities require simpler, affordable, and reliable systems that combine booking, tracking, emergency communication, and administrative monitoring. GoVan responds to this gap by integrating online booking, real-time GPS tracking, a centralized administrative dashboard, and SOS emergency notification into one hybrid platform designed for Maharlika's daily transportation operations.

This study is significant because it aims to make commuting more convenient, safe, organized, and efficient. Commuters benefit from easier seat reservation and real-time vehicle visibility. Drivers and transport administrators benefit from clearer schedules, better trip monitoring, and faster emergency communication. The study also provides a reference for future researchers and local transport groups interested in community-based digital transportation solutions.

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II. LITERATURE SURVEY

Digital transportation booking and tracking systems

Transportation systems worldwide continue to adopt digital technologies to improve operational efficiency, safety, and commuter satisfaction. Sharma et al. (2021) revealed that digital booking and tracking systems significantly reduce waiting time and improve commuter accessibility. Afzali et al. (2025) discussed how mobility applications use real-time data processing and intelligent algorithms to optimize transportation services and support user decision-making.

IoT-based and mobile GPS tracking systems also strengthen transportation monitoring. Kavitha et al. (2025) emphasized that GPS tracking and automated notifications improve transparency, coordination, and operational efficiency. J. S. P. et al. (2024) demonstrated that mobile GPS-based tracking can provide affordable transportation monitoring for local communities, while Jayapal et al. (2023) found that real-time route management enhances fleet efficiency and reduces delays.

Local transportation applications and commuter safety

Local studies in the Philippines support the implementation of digital transportation systems. Ascueta et al. (2022) developed BusTap, a real-time bus tracking Android application that improved commuter awareness and transportation reliability. Gosela and Encarnacion (2024) emphasized that integrating booking and tracking services into a hybrid platform improves accessibility and transportation coordination.

Safety features are essential in transportation applications. Mapa-Madlos et al. (2022) highlighted that real-time tracking combined with emergency alert systems improves commuter protection and service reliability. Ulay et al. (2025) also noted that systems designed for areas with unstable connectivity should maintain flexibility and dependable service delivery. These findings justify GoVan's inclusion of real-time GPS tracking and SOS emergency notification.

Intelligent transportation systems

Related studies further demonstrate the effectiveness of intelligent transportation systems. Lakshmi et al. (2025) used Long Short-Term Memory models to predict bus arrival times and improve commuter planning. Wanninayaka and Vidanagama (2023) developed an AI-powered transportation platform integrating passenger monitoring, digital payment, and real-time tracking. These studies show that transportation systems are evolving into multifunctional platforms that improve user convenience and operational performance.

The reviewed literature collectively supports the development of GoVan by showing that online booking, GPS tracking, administrative management, and emergency notification can improve transportation reliability, commuter convenience, and operational efficiency. However, the review also highlights the need for a localized system suited for community-based van transportation rather than a large-scale commercial mobility service.

No.	Paper/Study	Author/s	Key Points	Relevance to GoVan
1	Integrated System for Official Vehicles with Online Reservation and Moving Path Monitoring	Hsu et al., 2022	Online reservation and tracking improve coordination and reduce delays.	Supports booking and GPS tracking features.
2	User Perception of Real-Time Updates in Transportation Tracking Systems	Prashanth et al., 2025	Real-time updates increase commuter confidence and improve trip planning.	Justifies real-time GPS monitoring.
3	BusTap: A Real-Time Bus Tracking Android Application	Ascueta et al., 2022	Real-time tracking improves awareness, usability, and reliability.	Supports accurate tracking and user-friendly interfaces.
4	IoT-Based Real-Time Vehicle Tracking Systems for Public Transportation	Kavitha et al., 2025	GPS tracking and automated notifications improve efficiency and transparency.	Supports live tracking and notification functions.

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No.	Paper/Study	Author/s	Key Points	Relevance to GoVan
5	Enhancing Fleet Operations with a Vehicle Route Management Solution	Jayapal et al., 2023	Route management and monitoring improve fleet efficiency and reduce delays.	Supports dashboard and trip management.
6	GTRIKE: Internet-Based Mobile Application for Tricycle Reservation	Ulay et al., 2025	Reliable systems should remain flexible despite unstable connectivity.	Supports reliable community transportation design.

Table 1. Enhanced summary of related literature and studies.

III. METHODOLOGY / APPROACH

Research design

This study utilized a descriptive-developmental research design to develop and evaluate the GoVan hybrid transportation booking and real-time tracking system. The developmental aspect focused on the design and implementation of the application, while the descriptive aspect focused on evaluating system acceptability and software quality based on respondent feedback.

The Agile Software Development Life Cycle served as the development methodology. Agile development enabled the researchers to build the system iteratively through multiple sprints, allowing for continuous refinement and integration of user feedback throughout the development process.

Conceptual Framework:

Using online booking and tracking tools has been shown to enhance the efficiency and reliability of transportation systems, as supported by previous research (Hsu et al., 2022). The inputs consist of the requirements and resources necessary for developing the GoVan system, while the process involves designing, developing, and deploying the hybrid application.

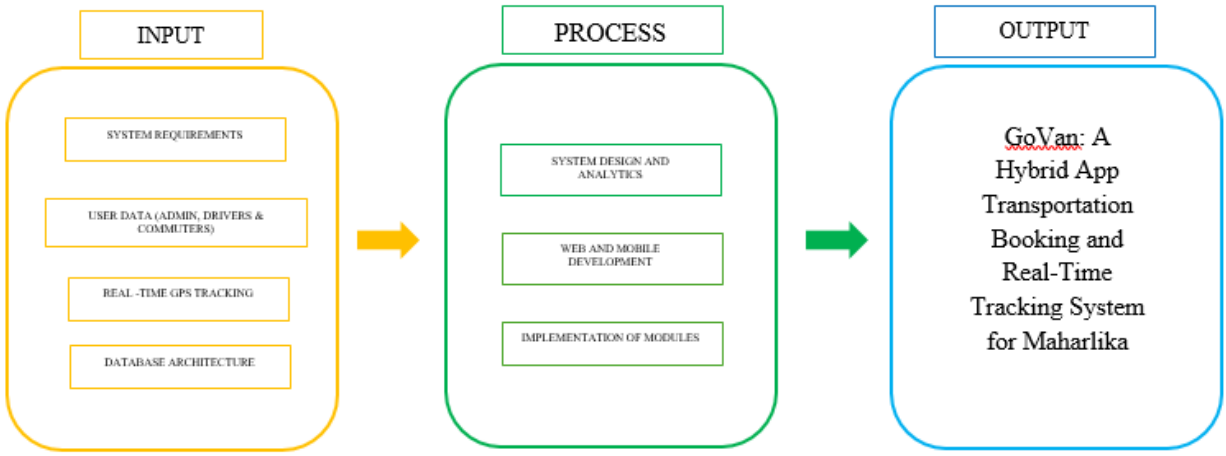

Figure 3.0 Conceptual Framework of the GoVan hybrid transportation system

Figure 3.0 presents the conceptual framework of the study used in developing the GoVan hybrid transportation system. The input phase includes the required hardware, software, and user data that support the system's web and mobile platforms for booking, tracking, and communication. The process phase covers system planning, programming, interface design, GPS integration, and testing to ensure efficient and reliable transportation services. As a result, the developed GoVan application provides real-time tracking, online booking, and communication features that improve safety, convenience, and transportation efficiency for the Maharlika community.

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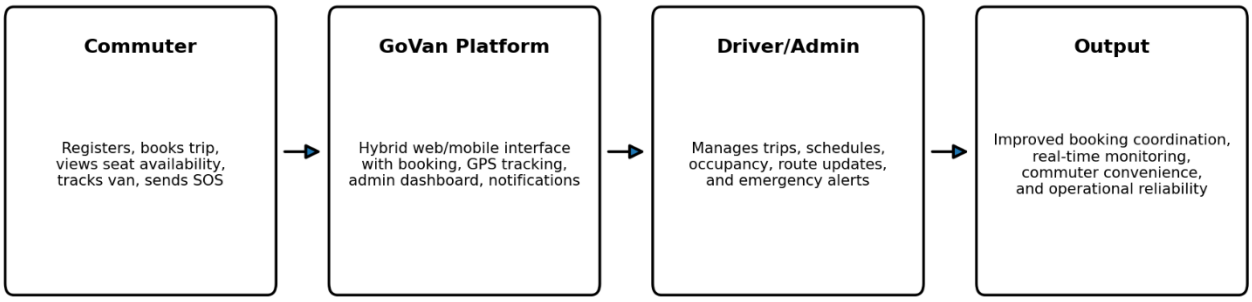

Figure 3.1 The Functional workflow of the GoVan hybrid transportation system.

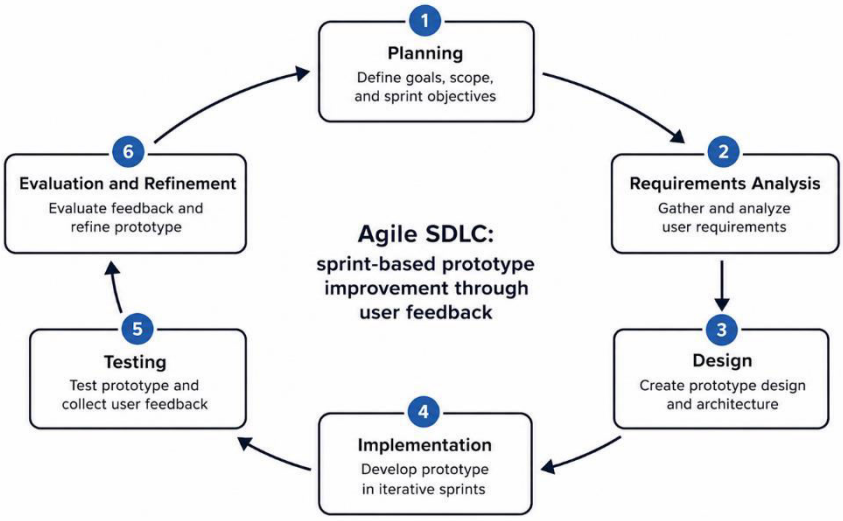

Figure 3.2 Agile development workflow used in the development and refinement of GoVan.

System features and framework

GoVan was designed as a hybrid web and mobile transportation management platform. Its core modules include online booking and reservation, real-time GPS tracking, an administrative dashboard, occupancy monitoring, and SOS emergency notification. These modules were intended to address manual booking, unclear seat availability, delayed coordination, and limited trip visibility.

Feature	Main Function	Expected Benefit
Online booking and reservation	Allows commuters to reserve seats, select schedules, and confirm bookings.	Reduces manual booking problems and improves seat management.
Real-time GPS tracking	Allows commuters and administrators to monitor van location and route movement.	Improves visibility, trip planning, and commuter confidence.
Administrative dashboard	Enables operators to manage trips, schedules, bookings, and occupancy.	Improves operational coordination and monitoring.
SOS emergency notification	Allows users to send emergency alerts through the system.	Improves commuter safety and response communication.

Table 3.0 Summary of GoVan system Features

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The system supports commuters by allowing them to reserve seats, select schedules, confirm bookings, and track vans in real time. It supports drivers and transport administrators by allowing them to manage trips, monitor passenger lists, update schedules, and respond to emergency alerts.

Respondents, instrument, and data collection

The study involved 107 respondents, composed of commuters, drivers, transport administrators, and IT experts who were directly involved in transportation operations and system evaluation. Purposive sampling was used to ensure that participants had direct experience with the GoVan system or with the transportation process it was designed to improve. The primary research instrument was a structured ISO/IEC 25010-based evaluation questionnaire using a five-point Likert scale, where 1 represented Strongly Disagree, and 5 represented Strongly Agree. The evaluation covered functionality, usability, reliability, efficiency, maintainability, and security. Data collection was conducted through interviews, observations, consultations, system testing, and questionnaire administration.

Data analysis

The gathered data were analyzed using a weighted mean to determine the overall scores for each software quality characteristic. Standard deviation was used in the source study to measure the consistency of respondent evaluations, while scale interpretation was applied to determine the extent of system acceptability. Qualitative feedback from interviews and observations was summarized to identify user experiences, suggestions, and system issues relevant to transportation operations.

IV. RESULTS AND DISCUSSION

Implementation of system features

The results showed that GoVan successfully implemented its intended transportation booking and tracking functionalities. The online booking and reservation feature allowed commuters to reserve seats, select schedules, and confirm bookings through a user-friendly interface. Real-time seat availability minimized booking conflicts and improved trip coordination.

The real-time GPS tracking feature allowed commuters and administrators to monitor van locations, routes, and estimated arrival information. This improved commuter confidence, operational visibility, and transportation reliability. The administrative dashboard also enabled transport operators to manage schedules, trips, bookings, and occupancy monitoring more efficiently.

ISO/IEC 25010 performance evaluation

Quality Characteristic	Mean	Verbal Interpretation
Functionality	4.83	Very Great Extent
Reliability	4.82	Very Great Extent
Usability	4.87	Very Great Extent
Efficiency	4.80	Very Great Extent
Maintainability	4.70	Very Great Extent
Security	4.58	Very Great Extent
Overall Mean	**4.77**	**Very Great Extent**

Table 4.0 Performance evaluation of the GoVan system using ISO/IEC 25010.

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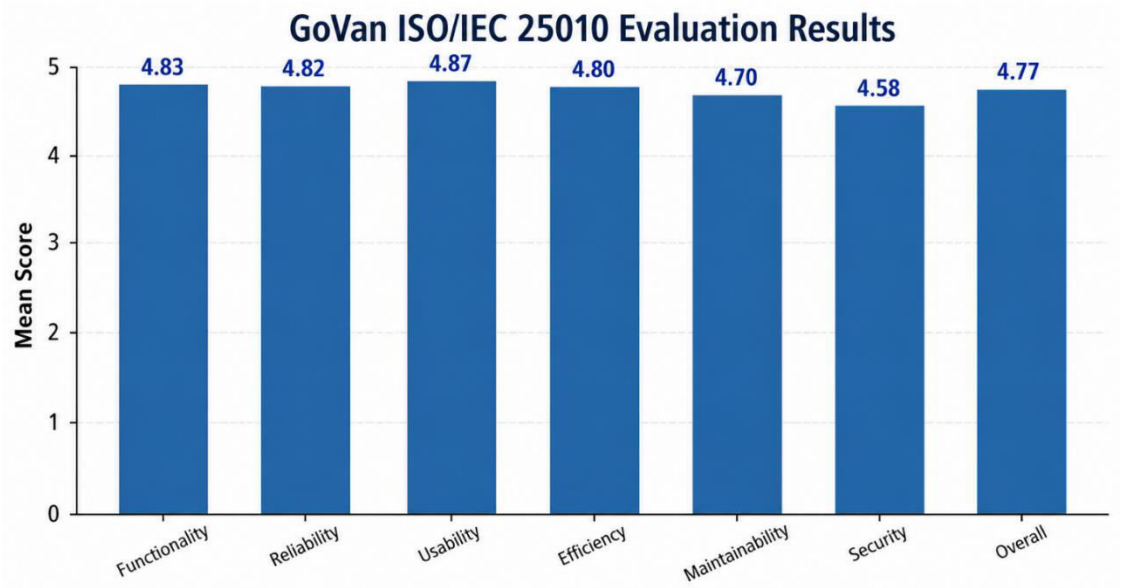

Figure 4.0 ISO/IEC 25010 evaluation results of the GoVan system.

The system obtained an overall mean of 4.77, interpreted as Very Great Extent. This result indicates that respondents strongly accepted the GoVan system as a reliable transportation management platform. Usability received the highest mean score of 4.87, showing that respondents found the system understandable and convenient to use. Functionality followed with a mean of 4.83, confirming that the system performed its intended booking, tracking, and management functions effectively.

Reliability obtained a mean of 4.82, indicating that respondents perceived the system as dependable during transportation-related tasks. Efficiency obtained a mean of 4.80, showing that GoVan was perceived as responsive in processing bookings and displaying system information. Maintainability obtained a mean of 4.70, suggesting that the system can be improved and updated for future needs. Security obtained a mean of 4.58, still within Very Great Extent, indicating that respondents perceived the system as safe for handling user and transportation-related information.

The results demonstrate that GoVan effectively improves transportation coordination, booking management, commuter convenience, and operational reliability. By replacing manual booking and unclear trip monitoring with digital booking, real-time tracking, and administrative control, the system provides a more organized and transparent transportation process for the Maharlika community.

Discussion of the contribution and practical implications

GoVan contributes to local transportation management by offering a practical hybrid platform designed for the actual needs of a community-based van transport service. Instead of relying on manual lists, verbal updates, and uncertain schedules, the system centralizes booking information, route visibility, and administrative coordination. This improves the experience of commuters while also assisting drivers and administrators in managing daily operations.

The findings also show that ISO/IEC 25010 is an appropriate evaluation model for assessing a transportation application because it measures both technical quality and user-oriented acceptability. The Very Great Extent ratings across all criteria suggest that GoVan is not only functional but also usable, efficient, reliable, maintainable, and secure enough to support day-to-day transportation activities.

V. CONCLUSION

The study successfully developed and evaluated GoVan: A Hybrid App Transportation Booking and Real-Time Tracking System for Maharlika. The system addressed existing transportation challenges such as manual booking processes,

unclear schedules, lack of seat availability monitoring, and absence of real-time transportation updates. Through online booking, real-time GPS tracking, administrative management, and SOS emergency notification, GoVan provided a more organized, accessible, and reliable transportation experience for commuters, drivers, and transport administrators.

The ISO/IEC 25010 evaluation confirmed that the system achieved Very Great Extent ratings in functionality, reliability, usability, efficiency, maintainability, and security, with an overall mean of 4.77. These findings demonstrate that GoVan is user-friendly, efficient, dependable, and capable of supporting daily transportation operations. Therefore, the system may be considered a reliable hybrid transportation platform that enhances operational coordination, commuter convenience, and service quality within Maharlika transportation service.

Future enhancement may focus on expanding the system to other transportation groups, strengthening security features, improving real-time tracking under unstable connectivity, and integrating more advanced decision-support functions for route management, passenger analytics, and estimated arrival monitoring.

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