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VanGO: Alaminos to Dagupan Van Scheduling, Queuing, and Booking System for the Convenience of Commuters

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Abstract: The VanGO Alaminos to Dagupan Van scheduling, queuing, and booking system for convenience commuters addresses the challenges faced by van drivers, dispatchers, and commuters along the route, focusing on enhancing transportation efficiency and improving the overall travel experience. Using the Rapid Application Development (RAD) methodology, this study aims to design and develop a strong system that integrates key features such as real-time updates on van locations, efficient route optimization, and reliable scheduling algorithms. Through interviews, observations, and literature review, insights were gathered into the commuting experience and operational challenges along the specified route. A purposive sampling method was employed to select respondents, resulting in a total of 50 participants including commuters and van drivers/dispatchers. The system's acceptance level will be evaluated using a Likert Scale survey questionnaire, and statistical analysis will be conducted to validate usability and performance. By addressing the inefficiencies in van scheduling, queuing, and booking processes, this study contributes to the improvement of transportation systems and enhances commuter satisfaction along the Alaminos to Dagupan route.

Keywords – van scheduling, queuing, booking system. commuter experience

I. Introduction

Throughout human history transportation systems have continuously evolved while maintaining their origins from human-led travel. Man used foot movement as the pioneer medium of transport. Before modern conveniences people traveled long distances on foot to visit different places. Early innovation in transportation systems involved responders learning to navigate multiple surface types for travel. Humans began using the first wheeled vehicles during 3500 BC. Small loads obtained transportation with the attachment of wheels to carts and chariots. During this historical period people turned ordinary tree trunks into waterfront vehicles that could be piloted using oars as steerable instruments. After the domestication of animals people learned to use horses as transportation carriers. People began domesticating animals for transportation toward carrying human travelers alongside tiny commodities after following this established protocol.

Urban infrastructure depends heavily on public transportation because it provides efficient mobility for residents throughout the city. The system faces substantial issues regarding schedule organization as well as wait time management and passenger ease of travel. The rare combination of heavy commuter flow along with inconsistent journey demand makes these transportation problems reach their peak along the Alaminos to Dagupan route. The VanGo system addresses current scheduling booking and queuing challenges with modern technological approaches to provide superior passenger convenience in transportation. This study examines VanGo's developmental journey as it looks at its ability to affect public transportation user satisfaction and operational efficiency.

Long delays coupled with unpredictable van schedules regularly make travelers less comfortable when using transportation. Current approaches to both scheduling and booking van services prove inefficient resulting in annoyed customers and wasted waiting periods. Studied cases prove the effectiveness of optimized scheduling and queuing systems because they diminish waiting periods and build better experiences for all users. Through an innovative scheduling algorithm VanGo predicts passenger needs to manage its van fleet and minimize transportation delays for all users. The system adjusts schedules based on both real-time data collection and user inputs while delivering current travel information to travelers in real time.

The key element of VanGo includes simple navigation patterns which enable users to access the system without difficulty through its web-application platform users can pre-book seats while monitoring live van positions and seeing scheduled updates through notification systems. The system developers optimized the application interface to accommodate a broad spectrum of users who represent different experience levels with technology. Through booking capabilities the system enhances the travel experience and collects important travel data enabling better scheduling algorithm refinement Service delivery and user satisfaction benefit from digital solutions according to modern transportation management trends.

VanGo's deployment will bring wider societal benefits to urban transportation combined with environmental sustainability goals. The transportation system operated through vans delivers efficiency improvements that decrease congestion and reduce environmental impact from emissions. A well-designed public transportation network stands essential for creating sustainable urban centers because it helps people make train each other instead of driving personal cars.

The move toward shared vehicle usage instead of private cars reduces road traffic volume and creates lower environmental effects. This work assesses both technical aspects of VanGo and evaluates its potential advantages for urban planning alongside

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environmental sustainability benefits.

The Alaminos to Dagupan route now benefits from advanced VanGo technology which revolutionizes its van transportation management approach. The booking and scheduling and queuing solutions within the system support better traveler convenience as well as meet their expectations. The analysis presented in this study examines every step of the system's development path from implementation through potential benefits which adds substantial value to public transportation research. Findings derived from this research will shape future deliveries of urban mobility systems which focus on sustainable transportation development.

Objectives of the Study

The main objective of the study is to design and develop a van scheduling, queuing, and booking system for commuters in Alaminos to Dagupan. Specifically, the study aims to achieve the following objectives:

1. To identify the challenges encountered by the HIAT in the existing van scheduling and booking system.
2. To identify features to be included in the system.
3. To identify the acceptance level of the developed system.

II. Methodology

The proposed system development utilizes Rapid Application Development (RAD) to combine descriptive and developmental approaches as the research framework. Surveys and interviews will serve descriptive research to obtain user feedback for system effectiveness evaluations. The RAD methodology, chosen for its fast project turnaround and emphasis on user involvement, consists of four phases: Requirements Planning, User Design, Construction, and Cutover. During Requirements Planning a combination of interviews and surveys collect data and concepts for system needs identification alongside potential issues discovery. User Design phase pairs clients together with developers to with flow charts for data evaluation. The Construction phase involves using Java in Visual Studio Code to develop a prototype until all essential requirements become satisfied. During the Cutover phase testing occurs to transition the system and convert data while performing user training which leads to system activation for feedback and additional surveys that measure the system's adequacy and functional suitability. The development method of the mobile application follows an adapted RAD model as shown in Fig. 1.

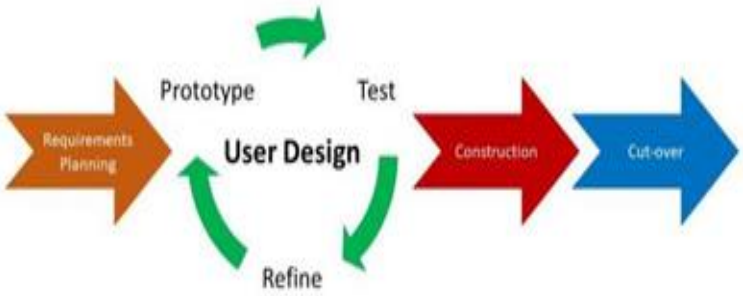

Fig. 1 Rad Methodology

Research activities took place at HIAT Terminal where researchers studied operator and commuter difficulties on the Alaminos to Dagupan route. We gathered primary data by interviewing terminal staff Mr. Jackie Ferrer Banlaoi together with Mr. Alvin Regines Damasen in their roles as drivers and dispatchers. Through their input the research team obtained significant details concerning operational obstacles and passenger interactions. Observational data collection took place during site visits to provide first-hand observation of how vans operate as well as how commuters experience the system along with observing overall system dynamics. Secondary data concerning transport issues was acquired from academic studies and economic reports along with literature reviews about van scheduling systems and queuing order and booking procedures within the Philippines. This additional information enabled researchers to both contextualize their findings and develop recommendations for system improvements. The researchers conducted convenient sampling at HIAT Coop UV terminals located in Alaminos and Dagupan City as well as the Alaminos to Dagupan route in order to gain speedily valuable information about traveler experiences. Table I presents a list of those who took part in the research investigation.

Table I. Respondents of the Study

Respondents	Number of Respondents
Commuters	26
Driver	1

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Dispatcher	1
IT experts	2
Total	30

establish design prototypes which start from documented requirements through the use of Figma design software along

A survey questionnaire measured system acceptance and enhancement levels through a measurement scale designed based on Stanley Stevens' work. Statistical evaluation of the collected responses confirmed the system's usability through analysis methods. The researchers measured system assessment and improvement using a 5-point Likert Scale where Excellent received the highest rating of 5 while Poor had a lowest value of 1.

The weighted mean methodology allows more important data points to attain prominence in analyses. The set acceptance threshold for this system stood at 3.4 below which made the system unacceptable. The scale and its statistical limits are illustrated in Table II below:

Table II. The Scale of Measurement for Acceptance Test

Scale	Statistical limits	Rating	Interpretation
5	4.21 - 5.00	Excellent	Accepted
4	3.41 – 4.20	Very Good	Accepted
3	2.61 – 3.40	Good	Accepted
2	1.81 – 2.60	Fair	Not
1	1.00 – 1.80	Poor	Not

Statistical methods processed data from the Likert Scale survey which enabled meaningful conclusion-drawing along with statistical significance discovery and broad populationreinterpretation. Research on contemporary systems supporting van scheduling and queuing and booking operations uncovered effective practices and existing transportation analyses in the same region helped VanGO development ensure proper support for route users and operators between Alaminos and Dagupan. A combination of Java programming with Visual Studio Code enabled the development team to create scheduling algorithms and real-time system updates that simplified programming and testing. Commuters gained easy ride booking and van tracking capability through mobile application design work done within Figma user interface development. Real-time data communication between the application platform and dispatchers was implemented through cloud-based technologies to deliver precise up-to-date information to commuters.

The analysis of factors influencing VanGO system functionality and user experience required the implementation of a Fishbone Diagram (Ishikawa diagram) which illustrated potential system issues and performance barriers. The diagram identified four main categories which included technology infrastructure alongside user experience together with scheduling algorithms as well as external environmental conditions specifically including weather and traffic conditions that had an effect on system performance. Through its systematic categorization process the Fishbone Diagram clarified which possible causes needed improvement while protecting the complete operational system for riders and drivers.

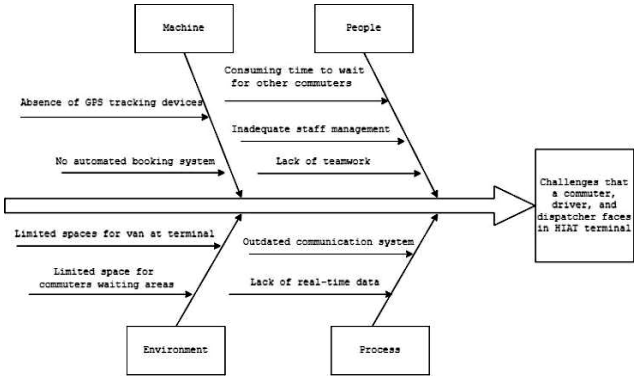

Fig. 2 Fishbone Diagram

Through the integration of these methodologies, tools, and technologies, the VanGO development process ensured a comprehensive, efficient, and user-centered solution for improving the commuting experience. By addressing key challenges in scheduling, queuing, and booking, the system aims to optimize transportation efficiency and enhance commuter satisfaction along the Alaminos to Dagupan route. The thoughtful design and strong development of the VanGO platform ensure that it meets the

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needs of both commuters and van operators, contributing to a more streamlined and reliable transportation experience.

III. Results and Discussion

The proposed Alaminos to Dagupan Van Scheduling, Queuing, and Booking System utilizes a three-tier architecture, a well-established software application structure known for its scalability and efficiency. This architecture comprises the presentation tier, the application tier, and the data tier.

In the proposed VanGo system architecture, as shown in Figure 3, the end users (drivers, dispatchers, and commuters) access the system online through a mobile application interface.The web application interface request pages from the server side to accept and process user submit various request such as booking, scheduling, and processing payments via this interface. The system efficiently processes these requests and stores user inputs in the database.

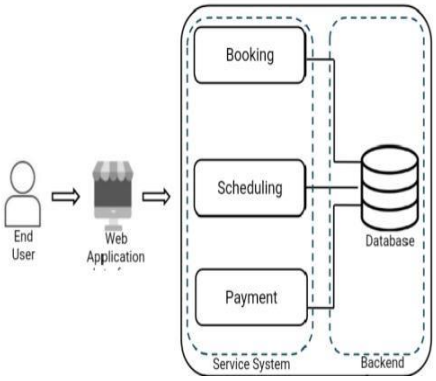

Fig. 3 Alaminos to Dagupan Van Scheduling, Queuing, and Booking Three-Tier Architecture

In the Alaminos to Dagupan Van Scheduling, Queueing, and Booking system architecture, the presentation tier, the system's user-facing interface caters to the diverse needs of commuters, drivers, and dispatchers. Commuters utilize a mobile app to book rides and access travel information, while drivers employ a separate app for scheduling, navigation, and task management. Dispatchers benefit from a dashboard interface for overseeing routes, scheduling, and managing drivers.

This tier encapsulates functionalities such as user registration, booking requests, and schedule management, serving as the gateway for user interaction with the system.

The application tier serves as the engine of the system, responsible for processing user inputs, optimizing routes, and ensuring data security. Core functionalities such as booking requests and route optimization are handled at this tier, facilitating efficient communication between the user interface and the data storage layers. By managing critical tasks, the application tier ensures the system's reliability and responsiveness to user demands.

The data tier forms the foundation of the system, securely storing essential data related to vans, drivers, customers, routes, and bookings. This tier ensures data integrity and reliability, supporting the system's scalability and performance. By maintaining a robust database infrastructure, the data tier enables the system to handle a large volume of transactions and data queries efficiently.

The proposed three-tier architecture offers a scalable and efficient framework for the Alaminos to Dagupan Van Scheduling, Queueing, and Booking System. Future enhancements focusing on mobile optimization and advanced functionality can further elevate the user experience and system performance. Continuous stakeholder engagement and iterative development will be crucial for ensuring the system's success and meeting evolving user needs.

IV. Conclusions

The VanGo Alaminos to Dagupan Van Scheduling, Queuing, and Booking System presents a promising solution to the transportation challenges faced along the Alaminos to Dagupan route, offering significant improvements in efficiency and commuter satisfaction. Through the integration of advanced mobile technology, including real-time updates, optimized routing, and reliable scheduling, the system aims to mitigate waiting times and enhance the overall commuting experience. By providing commuters with easy access to information and streamlined booking processes via a user-friendly mobile app, VanGo addresses issues such as traffic congestion and manual queuing while promoting sustainability and technological advancement. The robust three-tier architecture ensures secure data management and scalability, while user involvement in the Rapid Application Development (RAD) process guarantees that the system meets their needs effectively. By enhancing transportation along this route, VanGo contributes to a more organized, efficient, and commuter-centric service, fostering increased mobility and economic activity in the region. Ultimately, the VanGo system sets a precedent for addressing similar transportation challenges nationwide, offering a comprehensive solution to improve daily commutes and establish a more connected and efficient transportation network.

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