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D&J Delivery Management System: Enhancing Operational Efficiency and Transaction Transparency for Den&Jes Delivery Services

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Abstract: *The D&J Delivery Management System is designed to enhance the efficiency and management of Den&Jes Delivery Services by streamlining the coordination of drivers, trucks, and deliveries. This research presents a website that facilitates the dispatch of deliveries and the assignment of drivers. The developed system aims to improve the overall experience for customers and drivers while optimizing the delivery process. The study evaluates the website's interface and operational efficiency, demonstrating its effectiveness in providing a more organized and user-friendly solution for delivery management. The D&J Delivery Management System was evaluated through a survey yielding an overall score of 4.33 out of 5. Users expressed high satisfaction with the system's functionality, reliability, and usability. The study concluded that the implementation of the D&J Delivery Management System significantly enhanced operational efficiency, streamlined scheduling, maintained updated driver and truck availability, provided real-time delivery tracking, and offered centralized reporting with a user-friendly interface for better decision-making.*

Keywords – Operational Efficiency; Delivery Services; Web-Based Application; Delivery Scheduling;

1. INTRODUCTION

The Philippines is one of the developing countries that are considered to have an inefficient transportation system, this is due to lack of capital roads, regulation, and traffic delays, resulting in disruption of goods and services. (Bitumen, 2022). Covid-19 triggered a huge change in how business operates. Lockdowns became the new normal back then and consumers had to go digital to follow the Covid-19 protocols stated by their respective governments (UNCTAD, 2021). In which, there was an increase where consumers were attracted to online services due to its convenience and helped people with busy lifestyles to make decisions with much less effort, this trend resulted in deliveries being digitized due to the consumer demands (Poon and Tung, 2022). In the study conducted by Cruz C. (2024), Management application has to foster an increased in community support and engagement towards enhanced management.

Den&Jes Delivery Services established in 2023, is a pioneering land transportation and logistics company serving the Luzon region. Despite its dedication to providing top-notch services, the company faces several challenges. Coordinating and scheduling multiple deliveries efficiently has been difficult, and there is a lack of visibility into delivery performance. Additionally, there is uncertainty about the availability of drivers and trucks. The business also lacks reliable reports, which are essential for informed decision-making. These challenges can be addressed by implementing a delivery management system that streamlines the process of scheduling deliveries. In which, the researcher will develop a system that will allow clients to place orders online and provide necessary details such as destinations, delivery time, and types of goods. As well include an updated list for available drivers and trucks. Innovation of service creates a positive and significant impact on customer satisfaction. Promoting loyalty and long-term profitability (Sarah, et al., 2022).

1.1 Objectives of the Study

This project aimed to develop and design a system to deliver a user-friendly and business efficient delivery management system. To create a digital platform for Den&Jes Delivery Services, to improve the business visibility further. The researchers aimed to design and develop a website that can:

1. Implement a delivery management system that streamlines the process of scheduling deliveries and make the clients book deliveries online where they provide the necessary details such as destination, delivery time, and goods type.

2. Maintain an updated list of available drivers and trucks. Assign drivers and trucks based on availability and truck capacity needed and update the delivery status accordingly.

3. Make a platform where centralized reports generated. And has a user-friendly interface that helps the admin to generate revenue reports, expenses, and others.

1.2 Significance of the Study

The study intended to develop a delivery management system and find the efficient algorithms that will be necessary for schedule of deliveries with the client preferences, including the report generated necessary for a business informed decision making. This study was deemed significant to the following:

Business Owners and Managers: The developed system provided them with better visibility and control over their operations which helped them make data-driven decisions and improved efficiency.

Drivers: The system included scheduling and coordination, reducing the uncertainties about the availability and workloads. This led to improved job satisfaction and productivity.

Customers: Enhanced delivery scheduling led to a more reliable and timely deliveries which improved overall customer satisfaction and trust in the company's services.

IT and System Developers: The study's findings on efficient algorithms and system design served as a valuable resource for professionals working on similar projects, which provided insights and best practices that can be applied to similar contexts.

Future Researchers: The study contributed towards the existing knowledge in the field of logistics and transportation management. Future researchers can build on its findings, explore new algorithms, technologies, and methodologies to further improve delivery and logistic systems.

1.3 Scope and Limitations

The study focused on the implementation of the proposed delivery management system for the business. It aimed to provide insights into the processes of testing and development, ensuring that the solution is effective. The primary focus was optimizing the delivery process using algorithms to determine the availability of drivers and trucks. This included scheduling to enhance operational efficiency. Additionally, the study focused on the generation of necessary reports that are crucial for informed decision-making within the business.

The study explored the impact of the app towards the client side. This study explored the user experience from the design perspective and their subjective preferences. The study did not cover the marketing and commercialization of the app.

1.4 Definition of Terms

The following terms are hereby defined in the study:

Delivery Performance: Metrics and data that indicate how well delivery operations are being carried out.

Driver Availability: The status of drivers being ready and available to undertake delivery tasks, which is critical for efficient scheduling and operations.

Informed Decision-Making: The process of making business decisions based on reliable data and reports generated by the delivery management system.

Delivery Management System: A digital solution designed to optimize the scheduling, coordination, and monitoring of truck deliveries, driver assignments, and operational reporting.

Delivery Reports: Reports Generated by the delivery management system that provide detailed information about delivery activities and performance metrics.

2. METHODOLOGIES

This section describes the methodology employed by the researchers in developing and designing the web application, including the data collection process, the instruments utilized, and the analysis conducted to further the study.

2.1 Research Instrument

The evaluation of D&J Delivery Management System was conducted in accordance with ISO/IEC 25010:2011 standards. A research instrument based on this framework was used to thoroughly assess the system's quality attributes, including functionality, performance efficiency, compatibility, usability, reliability, security, and maintainability. Researchers presented the system to participants both online and offline, along with an evaluation

form. Participants provided valuable feedback by rating each characteristic on a scale from 5 (strongly agree) to 1 (strongly disagree). This feedback enabled a comprehensive analysis of the system's strengths and weaknesses.

2.2 Waterfall Model Development Methodology

To create D&J Delivery Management System, the Waterfall model, a structured methodology in software development, was utilized. This model provided a systematic and organized approach for designing, building, and deploying software projects.

Requirement Analysis: The initial phase involved gathering detailed requirements through interviews with the owners of Den&Jes Delivery Services. It included defining both functional and non-functional requirements and documenting them for approval before moving on to the next phase.

System Design: After planning, researchers proceeded on to the architectural design phase for D&J Delivery Management System, which included database and user interface design. Detailed specifications for each component were developed, reviewed, and refined based on stakeholder feedback.

Implementation: With the design phase completed, researchers began developing the system according to the design specifications. Front-end development used HTML, CSS, Bootstrap, and JavaScript, whereas PHP and MySQL were used for the back end. This phase also involved integrating all system components and modules and conducting rigorous unit testing to ensure each module functioned correctly.

Integration and Testing: During this phase, integration testing ensured smooth interaction between modules, followed by system testing, integration testing ensured smooth interaction between modules, followed by system testing to validate compliance with the specified requirements. Any errors or issues were addressed to ensure the system met all requirements effectively.

Deployment: The system was demonstrated to the business owners and professionals to gather feedback using an evaluation form. This step aimed to collect initial feedback on the system's usability and functionality, which was crucial for the assessment phase.

Maintenance: After gathering data, the researchers focused on resolving any issues identified during the demonstration. Feedback from the demonstration was used to make necessary adjustments and enhancements. Additionally, researchers planned for future updates and improvements based on ongoing feedback and evolving requirements.

By adhering to the Waterfall methodology, the researchers ensured a systematic and thorough development process, resulting in a reliable online delivery system for the needs of Den&Jes Delivery Services.

3. PRESENTATIONS, DISCUSSION, INTERPRETATION OF DATA

This part explored the project's strengths and weaknesses and presented the assessment results from the researcher's evaluation form. This analysis aimed to further strengthen D&J web-based Delivery Management System.

3.1 Project Capabilities and Limitations

D&J Delivery Management System provides the following capabilities and functions:

1. The system provides a streamlined process for scheduling deliveries, allowing clients to place orders online with necessary details such as destination, delivery time, and types of goods.
2. The system maintains an updated list of available drivers and trucks, assigning them based on availability and truck capacity needed, and updating delivery status accordingly.
3. The system generates centralized reports with a user-friendly interface, enabling administrators to produce revenue reports, expenses and delivery invoices.
4. The system helps business owners and managers in making informed decisions by offering reliable data and an intuitive, metric-based dashboard.
5. The system allows drivers to upload delivery proofs, such as photos of signed documents and actual delivery, ensuring accountability and transparency in the delivery process.
6. Clients can confirm deliveries through the system, enhancing trust and providing a reliable record of completed transactions.

The following are the limitations of the delivery management system:

1. De&Jes delivery management system is currently in the prototype stage, featuring interactive pages for user interface and experience without full deployment.
2. While the system simplifies booking delivery and management, it does not handle integrated payment processing.
3. Den&Jes delivery management system does not cover the rescheduling or cancellation of deliveries once they are scheduled and approved.
4. The system does not include location tracking connected to external devices like Global Positioning System (GPS).

3.2 Project Evaluation Result

Den&Jes delivery management system was assessed based on the system's functionality, reliability, performance efficiency, compatibility, usability, security and maintainability. The system evaluation was adapted from ISO/IEC 25010:2011, ensuring a comprehensive and standardized assessment of the system.

The mean scores obtained from evaluations done by end users and IT professionals are interpreted as follows:

Table 1

Mean range interpretation scale.

Scale	Description	Range
5	Strongly Agree	4.51 - 5.00
4	Agree	3.51 - 4.50
3	Neutral	2.51 - 3.50
2	Disagree	1.51 - 2.50
1	Strongly Disagree	1.00 - 1.50

Table 2

Evaluation results computation.

INDICATORS	MEAN	DESCRIP-TIVE WRITING
A. FUNCTIONALITY		
1. The system's ability to accurately record and retrieve delivery and truck information.	4.30	Agree
2. The user-friendliness of the system's interface for users to access delivery and truck data.	4.32	Agree
3. The clarity of instructions provided by the system on how to use its features.	4.32	Agree
B. RELIABILITY		
1. The system's capability to handle high volume of delivery and truck data without any data loss.	4.32	Agree
2. The system's safeguards in place to prevent data loss or unauthorized access.	4.32	Agree
3. Level of trust that the system securely stores your delivery-related information and remains accessible whenever you need to access it for review needs.	4.2	Agree
C. PERFORMANCE EFFICIENCY		
1. The system's performance in terms of working quickly and without delays when you need to input or retrieve information.	4.2	Agree
2. The system's ability to allow you to access delivery, truck, and driver-related records and retrieve	4.12	Agree

notifications in a timely manner.		
3. The system's ability to operate smoothly without causing unnecessary delays or inconveniences.	4.32	Agree
D. COMPATIBILITY		
1. Ability to access the system using your preferred website.	4.4	Agree
2. The system's compatibility with web operating systems that you use.	4.44	Agree
3. The compatibility of the system with the existing technology at the school.	4.24	Agree
E. USABILITY		
1. The ease of use and navigation of the system, particularly for individuals who are not tech-savvy	4.36	Agree
2. Ability to understand the information and options presented by the system.	4.48	Agree
3. The system in terms of providing guidance or help when you need assistance.	4.32	Agree
F. SECURITY		
1. Is the information kept private and protected from unauthorized access?	4.48	Agree
2. Does the system require secure login credentials to ensure only authorized individuals can access records?	4.64	Strongly Agree
3. Does the system comply with privacy regulations to safeguard any personal information?	4.56	Strongly Agree
G. MAINTAINABILITY		
1. Perception of the system being designed to be regularly updated and improved to meet the customer's needs.	4.24	Agree
2. The system in terms of providing clear instructions or user guides to assist with any troubleshooting or maintenance tasks.	4.32	Agree
3. Confidence that the system will be regularly updated and improved to ensure it continues to work well and provide the best possible delivery process & experience for the users.	4.04	Agree
Overall	4.33	Agree

Table 2 shows the mean range computation of the evaluation conducted by the researchers. D&J Delivery Management System garnered an overall mean average of 4.33 with a corresponding descriptive rating of “Agree”.

4. SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATIONS

4.1 Summary of Findings

For the system’s evaluation, the researchers conducted a survey involving 25 respondents, 10 of which are IT professionals, and the remaining 15 respondents are those with business-related backgrounds. The survey aimed to evaluate the D&J Delivery Management System’s strengths, weaknesses, and its potential as a delivery management system.

D&J Delivery Management System received a descriptive rating of "Agree" in most of the given indicators used in system evaluation. This indicated that the system performed as expected in terms of accurately recording and retrieving delivery and truck information, user-friendliness of the system, and clarity of instructions. D&J Delivery Management System gained the trust of its users in securing the user's delivery-related information and managing high volume of delivery, driver, and truck data without compromising system's performance, accuracy and accessibility. Among the seven evaluation indicators, the system gained a highest descriptive rating of "Strongly Agree" in terms of Security.

In general, the D&J Delivery Management System received an average score of 4.33, categorized as "Agree." This indicates that the system performed well, with users expressing high satisfaction regarding its functionality, reliability, performance efficiency, compatibility, usability, security, and maintainability, while also highlighting areas for potential improvement.

4.2 Conclusion

In consideration of the objectives of the study, the following conclusions were reached after evaluating the system.

1. The implementation of the D&J Delivery Management System greatly enhanced the operational efficiency of Den&Jes Delivery Services. By streamlining the scheduling process, the system allowed clients to place orders online, providing all necessary details such as destination, delivery time, and type of goods.
2. The web-based delivery management system effectively maintained an updated list of available drivers and trucks. It assigned these resources based on availability and truck capacity, and consistently updated the delivery status as required.
3. Provides the capability to track deliveries and real-time updates on the status of each delivery. This enhances the customer satisfaction and operational visibility, ensuring that all stakeholders are informed throughout the delivery process.
4. The delivery management system generated centralized reports and featured an improved, user-friendly interface. This interface facilitated the generation of various reports, including revenue and expense reports, aiding administrators in their decision-making processes.

4.3 Recommendations

Based on the conclusions and results of the evaluation of the D&J Delivery Management System: Enhancing Operational Efficiency and Transaction Transparency for Den&Jes Delivery Services, the following recommendations are made:

1. Implementation of notifications for truck drivers (pick-up personnel) via Short Message Service (SMS) or email to keep them informed about their schedules and any changes in real-time.
2. Set up email or SMS notification reminders for users to keep them updated on their package status.
3. Allow users to reschedule their deliveries through the system. This feature should provide options for users to select a new delivery date and time.
4. Expand the payment options beyond cheques to include other methods such as online payments, credit or debit cards, and digital wallets to facilitate smoother and more convenient transactions for clients.
5. Integrate Global Positioning System (GPS) technology to track the real-time location of deliveries. This will enhance transparency and allow both the company and clients to monitor the progress of deliveries, ensuring timely updates and better route management.

5. REFERENCES

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