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Workshop Information System Design Using Dynamic System Development Method

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Abstract

A practical and comprehensive information system is essential for operating contemporary auto repair shops, such as Madju Motor Auto Repair Shop in Bandung. This thesis aims to create and implement an information system that can enhance service efficiency and streamline data administration at the shop. This research employs the Dynamic System Development Method (DSDM), renowned for its emphasis on adaptable and user-centric software development. This study involves multiple steps, which include requirements analysis, system design, implementation, and testing. The outcome of this study is establishing an information system that allows clients to arrange car repair appointments conveniently. The system also enables the management to oversee the data that supports the shop's business processes and track the overall performance of the shop. The utilization of the DSDM methodology enables adaptability in system development, facilitating the incorporation of modifications and enhancements by evolving company requirements and customer preferences. This thesis aims to substantially improve Madju Motor Auto Repair Shop in Bandung substantially, enhancing customer service quality and operational efficiency.

Keywords : *Information Systems, Car Repair, Dynamic System Development Method (DSDM)*

INTRODUCTION

The swift advancement of technology has led to substantial transformations, influencing human existence and necessitating a more forward-thinking approach, particularly in the business realm. This shift is crucial for enhancing future performance, including in the car repair shop industry. The success of the auto repair shop industry is not only determined by automobile maintenance services, but also by many variables that might facilitate business operations. In this context, modern technology plays a pivotal role, improving efficiency, enhancing customer service, and streamlining data processing, thereby demonstrating its necessity and potential benefits in the industry.

Technological and information improvements have spread across different sectors, including the industrial field, where enterprises such as auto repair shops have yet to embrace information technology fully. (Kong et al., 2021) Any business operator must try to entice customers to use the services offered by vehicle repair shops.

Systems and Information

A system is a complex arrangement of interconnected components that work together to accomplish the system's primary goals. (Yudianto & Sulistyo, 2022) To ascertain whether something may be classified as a system, one might notice specific characteristics. The features of a system typically encompass having a defined goal, clear boundaries, openness, the presence of subsystems, interrelatedness and interdependence, and the manifestation of systematic sovereignty. (Sahid & Nama, 2022)

Information refers to data transformed into a more valuable and significant format for the individuals who receive it. Information is a physical or semi-tangible entity that can decrease ambiguity about a situation or event. (Zeng et al., 2020)

Service

Service refers to providing an activity, action, or effort by an individual or group. This is done through contacts between two parties using equipment provided by organizational institutions or organizations. The purpose of this provision is to satisfy recipients, customers, or consumers. (Mangan et al., 2019)

The current issue is the need for specific business owners, such as auto repair shops, to be more able to incorporate and utilize technology in their operations effectively. (Ju et al., 2021; Zhou et al., 2020) The business operations, encompassing customer service, transaction data management, customer data management, and other data, are only partially optimized by utilizing technology. (Sanoto, 2021)

Recognizing the urgency of the current challenges faced by auto repair shops, the most suitable course of action is to create a web application. This solution, the auto repair shop service information system, is not just a convenience, but a necessity in today's rapidly evolving business landscape. It will streamline processes, enhance customer service, and improve data management, all while utilizing the Dynamic System Development Method (DSDM). (Cosenz et al., 2020; Li et al., 2020; Liu et al., 2019)

METHOD

Descriptive Analysis Research Method

The research methodology employed in this study is descriptive analysis, which aims to provide a detailed account of a current phenomenon, event, or occurrence. The data collection procedures employed in this research are as follows:

1. Analysis of Literary Works: This entails gathering data from guidebooks, papers, and journals essential for composing the research by thoroughly researching and analyzing the content using a problem-oriented methodology.
2. Field Study: This method entails gathering data by directly researching the object of data collection through:
    1. Interviews: These sessions involve a direct meeting between the author and the workshop manager, during which they engage in a question-and-answer session. The purpose of this session is to address various questions about the data required for the research.
    2. Observation: This entails a meticulous examination and firsthand observation of the operations taking place at Madju Motor vehicle repair facility, ensuring the accuracy and reliability of the data collected.
    3. Documentation: This methodology entails gathering and examining several types of documents, including both physical and digital formats. Documentation involves more than just gathering and presenting papers as quotes; rather, it involves analyzing these documents to provide a reported consequence.

System Development Methods

The author employed the Agile Development Method, explicitly emphasizing the Dynamic System Development Method (DSDM), to design the system.

The Agile Development Method is a system development technique that relies on iterative procedures. It involves organized and structured team participation to establish agreed-upon rules and solutions. The Agile methodology encompasses various varieties, such as Extreme Programming (XP), Adaptive Software Development (ASD), Dynamic System Development Method (DSDM), Scrum Methodology, Crystal Feature Driven Development (FDD), Agile Modeling (AM), and Rational Unified Process. The Agile approach chosen for system development is the Dynamic System Development approach (DSDM).

The Dynamic System Development Method (DSDM) is an agile software development methodology specifically designed for software development purposes. DSDM is a framework that originated from Rapid Application Development (RAD). It employs iterative and incremental development approaches, with a strong emphasis on user-driven change and ongoing user involvement. This prioritization of adaptability to change ensures the creation of software systems that fully meet business requirements.

DSDM, an improved version of the James Rapid Application Development Method (JRADM), is an iterative and incremental software development approach that promotes collaboration between users and developers.

RESULTS AND DISCUSSION

System Analysis and Design

The Dynamic System Development Method (DSDM) will be implemented to develop the information system application for Madju Motor Auto Repair Shop in Bandung.

The Dynamic System Development Method (DSDM) is an Agile Software Development methodology that is employed for the purpose of iterative and incremental software development. It uniquely emphasizes ongoing user interaction, ensuring that software solutions are designed to suit business goals by prioritizing user changes.

DSDM comprises three primary stages and five sub-stages, as outlined below:

1. Pre-Project: Feasibility Study: Evaluating the project's feasibility regarding corporate objectives, prospective advantages, and overall viability.

Business Study: Comprehending the business needs, limitations, and objectives to guarantee that they align with the project's objectives.

2. Project Life Cycle: Functional Model Iteration: Creating functional prototypes that fulfill the main system requirements and incorporate user feedback.

In the Design and Build Iteration stage, user feedback plays a crucial role. It guides the process of improving and constructing the system using the functional models, ensuring that the system meets user requirements.

Implementation: Completing the system, doing comprehensive testing, and delivering the system for end-users.

3. After the project is completed: Maintenance and support: Offering continuous assistance and upkeep to guarantee the system remains aligned with user requirements and can adjust to any modifications in the business environment.

These stages guarantee a methodical yet adaptable approach to constructing the information system, enabling ongoing

enhancement and user engagement throughout the development process.

1) Pre-Project Phase

This phase is conducted to assess the efficacy of the forthcoming project, thus according necessitating thorough preparation from executing the application and his stage encompass:

a. Determine the challenges encountered by the research subject.
b. Develop a comprehensive project blueprint.

The results of problem identification obtained in this phase are as follows:

Table 1 Problem Identification and Resolution

Problem	Completion
The customer support procedure is being conducted manually and stored in physical format. All of the data and documents have yet to be digitized.	Designing a service information system as a tool to help carry out business processes, especially customer service, and storing data integrated with a database.

2) Project Life Cycle

a) Feasibility Study

A feasibility study evaluates and chooses the most suitable solution and determines whether the suggested development solution aligns with the organization's business requirements. During this phase, it was determined that the DSDM approach, perfectly aligned with the identified business process issues, was the optimal answer.

b) Business Studies

Business studies are carried out to determine the scope of business processes that will be supported in application development, including information system requirements. There are several things to do at this stage, namely:

i. Describing Business Processes Using Use Case Diagrams

Figure 1 Usecase Diagram

ii. Describes Business Process Flow

Figure 2 Business Process

c) Functional Model Recurrence

This stage is conducted to delineate the necessary functional and static models.

The functional models in this system encompass many tasks such as inputting work order data, accessing invoices, inputting customer data, inputting service price data, inputting spare part price data, inputting employee data, inputting user data, scheduling services, and seeing sales reports. The static model, on the other hand, is designed for data retrieval and serves as a dashboard page.

d) Design and Manufacturing Iteration

This stage is dedicated to refining the functional prototype to ensure it fulfills the non-functional requirements and satisfies the user's demands. During this phase, database design is conducted using Class Diagrams, and an interface is developed.

i. Database Design

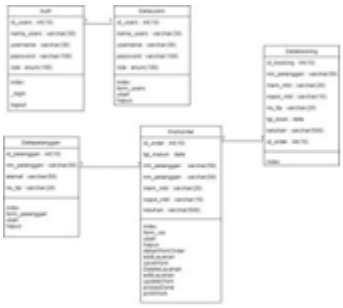

Figure 3 Database Design

ii. Interface Creation

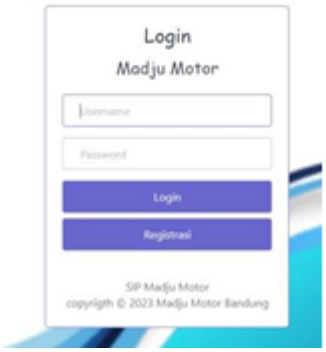

Figure 4 Login Interface

Figure 5 Registration Interface

Figure 6 Secretary Dashboard Interface

Figure 7 Owner Dashboard Interface

Figure 8 Customer Dashboard Interface

During this phase, system testing is conducted utilizing white box testing methodologies. This test is conducted to verify the design specifications by utilizing the control structure of the program design in a procedural manner to partition the test into several test cases.

Below is an illustration of the test outcomes on the login page.

i. Login Program Code

Figure 9 Login Program Code

ii. Login Flowchart

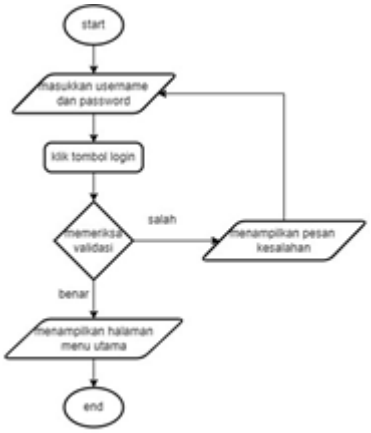

Figure 10 Login Flowchart

iii. Flowgraph Login

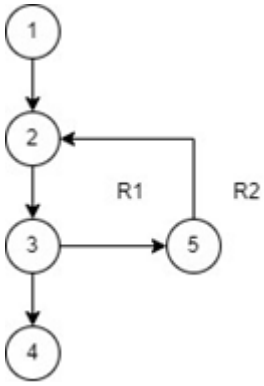

Figure 11 Login Flowgraph

iv. Cyclomatic Complexity (CC)

E = number of edges (arrows)

N = number of nodes (nodes)

Cyclomatic Complexity (CC) Calculation

CC = E – N + 2

= 5 – 5 + 2

= 2

v. Independent Path

From the calculations, there are two independent paths to the login process, namely:

Line 1 = 1-2-3-4

Line 2 = 1-2-3-5-2-3-4

e) Implementation

This step is executed after the development of the designed program. During this phase, users undergo training to enhance their proficiency in utilizing the application program, enabling them to utilize it effectively for its intended purpose. In addition, this step will also evaluate the user's application usage outcomes in terms of system problems to facilitate future enhancements. This application was developed using the PHP and MySQL programming languages and explicitly implemented with the CodeIgniter framework version 3 and XAMPP as the web server. The PHP programming language was selected and utilized in developing this application due to its seamless integration with MySQL and ability to run on multiple platforms.

Some minimum hardware and software standards are necessary to ensure optimal performance of the proposed application. These specifications include:

i. Software

Table 2 Software Specifications

Type of Type of Software	Software Requirements
Sistem Operasi	Window 10
Web Servers	PhpMyAdmin
Language Programming	PHP dengan CodeIgniter
Browser	Google Chrome
Text Editor	Visual Studio Code
Diagram Visual	Draw.io

ii. Hardware

Table 3 Hardware Specifications

Jenis Hardware	**Kebutuhan Hardware**
Processor	Inter(R) Core(TM) i3-4005U CPU @
Memory	4,00 GB
Keyboard	Compatible with Windows

3) Post Project Phase

This stage is the ultimate phase following the construction of the application by the system requirements. It involves the execution of the application, as well as the necessity for ongoing maintenance, repairs, and enhancements.

The application is designed with concurrent capabilities that empower the user to assess whether the developed application aligns with the initial plan or is required, providing a sense of efficiency and control over the project.

CONCLUSION

The research findings can be summarized as follows: The implementation of this service information system facilitates the management of workshops for their managers, decreasing errors compared to the prior system. Including a booking service function allows consumers to expedite and streamline the service process, eliminating the need for an initial visit. Moreover, the system can provide more precise data due to storing each process in the database.

Recommendations for enhancing the efficiency of the service information system include: Providing details about the daily service schedule is essential for the secretary to handle service appointments effectively. In addition,

engaging employees in reporting their job outcomes enables the secretary to effectively oversee and provide vital monitoring data for the workshop owner.

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