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Implementation of a Rule-Based Decision Support System in Determining the Level of Customer Satisfaction with Services

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Abstract

Sarmi Car Wash is a car and motorbike washing service located at Jalan Sultan Hasanuddin No. 52, offering pick-up and drop-off services within a specified range. To enhance employee performance and customer service, the business seeks to implement a decision support system (DSS) to monitor employee performance and assess customer satisfaction effectively. This research aims to design a web-based DSS application that utilizes rule-based assessments of employee performance, integrating data such as employee names and tenure as references for developing the system. The study employed data collection methods including observation, interviews, documentation, and literature review. The system was tested using the black-box method, confirming that it functions as intended. Additionally, based on a user assessment questionnaire, the application achieved an average score of 80.4%, indicating its suitability and effectiveness for implementation. The developed system provides an efficient solution for improving service quality and employee performance monitoring at Sarmi Car Wash.

Keywords: Decision Support System (DSS); Employee Performance; Customer Satisfaction; Web-Based Application; Service Quality

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Introduction

The service industry, especially in the automotive service sector such as car washing, is now facing increasingly complex challenges in meeting customer satisfaction (Zebua et al., 2023). One of the key aspects that service providers must pay attention to is the quality of service provided to customers, by assessing employee performance (Amhas, 2018; Asdini et al., 2022). Customer assessments are needed to evaluate the extent of the quality of service provided by employees when serving them (Hijeriah et al., 2022; Fashoto et al., 2018). Several aspects that can be assessed by customers involve the cleanliness of the car body, car interior, and inside the car engine (Khairina, 2021; Asana et al., 2021). The results of customer assessments can be used as evaluation material so that in the future employees can provide better service in accordance with customer expectations (Alfaridzi & Budiani, 2021; Pislaru et al., 2018).

Sarmi Car Wash, as a car wash service provider, faces stiff competition in the market (Kondrashova, 2021). To remain competitive and retain customers (Sandra et al., 2024; Wijaya & Farisi, 2023), this company needs to ensure that the service they provide reaches customer expectations, but at this car wash service provider there is no system that can be used by customers to assess employee performance either manually or by using a web-based system (Pertiwi & Diana, 2020; Christiana & Mailoa, 2022; Jaya & Handoko, 2023). A system is needed that can help determine the level of customer satisfaction on a web basis so that customers can easily access it and implement a rule-based Decision Support System (DSS) (Sumarto & Sihotang, 2021; Toni & Roestam, 2022). The implementation of rule-based SPK at Sarmi Car Wash is expected to help optimize the decision-making process related to customer service (Rachman & Daru, 2021; Yaafi, 2022). With the SPK, companies can determine service priorities, identify areas for improvement, and overall improve service quality (Putra et al., 2020; Fu'Adi et al., 2021). DSS can also help in identifying factors that contribute to customer satisfaction and provide specific recommendations for improvement (Thanri et al., 2023).

This research aims to examine the implementation of rule-based SPK in determining the level of customer satisfaction with services at Sarmi Car Wash (Febriani & Muslih, 2021; Novianto & al Amin, 2023). By understanding how SPK

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can improve the decision-making process and service quality, it is hoped that companies can increase customer satisfaction, maintain their existing customer base, and attract new customers (Zulfikar & Chotijah, 2022; Ramadhan & Santika, 2020). This method allows structured decision-making and can be explained by certain rules (Ariantini et al., 2023; Azhari et al., 2021). By utilizing predetermined rules, companies can systematically analyze various factors that influence customer satisfaction, such as service time, car wash quality, and interactions with customers (Rizky & others, 2020; Bancin, 2022). This rule-based approach makes it easier to identify patterns and relationships between variables, thereby enabling companies to design improvement strategies that are specific and responsive to customer needs, which in turn is expected to improve service quality and overall customer satisfaction (Wantoro et al., 2021; Anindita & Rahayu, 2021).

Research on employee assessment using SPK has been carried out by Liesnaningsih et al. (2019), in his research aims to explore the steps for evaluating and selecting the best employees at PT. Trans Retail Indonesia also designed a decision support system that can provide employee assessments according to company needs. The process of developing this decision support system will apply the Simple Additive Weighting (SAW) method with criteria that have been adopted by PT. Trans Retail Indonesia, includes integrity, compliance with regulations, level of absenteeism, discipline, responsibility, cleanliness, dedication, creativity, cooperation, and a friendly attitude.

On research Yudha (2023), Decision Support Systems are designed to support all stages of decision making starting from identifying problems, selecting relevant data, and determining the approach used in the decision-making process to evaluating the selection of existing alternatives. Other research was also carried out by (Pujiawati et al., 2023). "Decision Making System in Selecting the Best Employees: Literature Review" The problem raised in this research concerns decision-making to determine the best employees. Based on the background of the problem above, the author took the title "Implementation of a Rule-Based Decision Support System in Determining the Level of Customer Satisfaction with Services at Sarmi Car Wash".

Method

In this research, implementing a rule-based decision support system to determine the level of customer satisfaction with services at Sarmi Car Wash. This type of research is descriptive research, namely research that intends to make plans (descriptions) related to situations or events (Kosterman, 2019; Banjarnahor, 2020). In descriptive research, this research aims to collect data, describe, analyze data, classify, and inventory the overall employee performance data obtained (Waty et al., 2023). So that the data obtained can be used as parameters in customer assessments using the employee performance assessment application created by the author (Sutisna, 2020). This research uses data collection techniques, the stages are as follows: Observation is an information-gathering method used to collect the necessary data (Data, 2019). In this observation stage, the aim is to observe the criteria related to employee performance evaluation (Alfansyur & Mariyani, 2020).

The interview method is used to collect information and data about criteria that can be used to evaluate employee performance (Fadhallah, 2021). In this method, the process involves discussions and questions to individuals who are considered to have a deep understanding of the research problem (Sunardi et al., 2022). Documentation involves the process of collecting information or material related to the subject being discussed (Assyakurrohim et al., 2023). In the Literature Study Method, the steps taken are looking for references from various sources such as books, and the internet, which are relevant to the problem you want to define (Muktamar et al., 2024).

The testing method in this research is the black box testing method (Arbeit et al., 2023). The black box testing method is a way to test software that focuses on how the system functions from the outside without having to understand how the source code works inside (Patria, 2023). In black box testing, testing is carried out as if from the perspective of an ordinary or end user, where the system is tested on what is put into it and what it produces as output (Kumová & Pilát, 2021). The purpose of black box testing is to check whether the system works as expected, regardless of the internal processes used to achieve those results (Mustaqbal et al., 2015). Various techniques like test case testing, equivalent class testing, and bounds testing can be used in this method. The importance of black box testing is its ability to discover weaknesses and problems in system functionality from the user's perspective, which helps ensure that the system released to end users is of high quality and reliability (Utami et al., 2024).

Results and Discussion

Results

This research was carried out at Sarmi Car Wash, a car and motorbike washing service located on Jalan Sultan Hasanuddin No. 52 in Pangkajene and Islands Regency as a place for data collection. The data needed in this research is employee data in the form of a list of employee names and how long the employee has worked.

Figure 2. Login page

In Figure 2, the login page is the first page that appears when the satisfaction level assessment system is opened. After registering, the admin can log in by filling in the username and password.

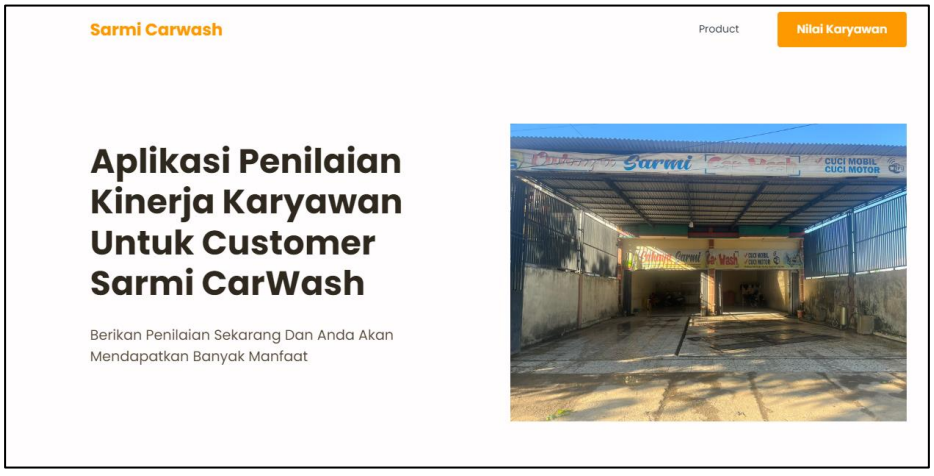

Figure 3. Home page

In Figure 3, the home page is the page that will be displayed after the username and password entered by the user or admin are valid. This page contains images of the research site, and this page contains various menus that can be used by users.

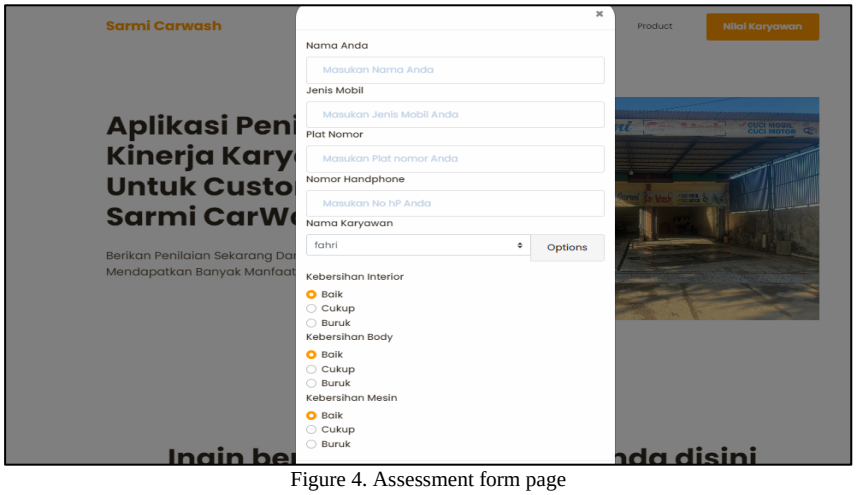

Figure 4. Assessment form page

The assessment form page (Figure 4) is designed for customers to provide feedback on employee performance. The system includes an assessment form page, which allows customers to provide feedback on employee performance. Accessed via the "employee rating" menu, this form captures essential information such as the customer's name, car type, license plate, phone number, and evaluations of interior cleanliness, body cleanliness, and engine cleanliness. This data serves as a foundation for assessing service quality and tracking employee performance.

Administrators manage the system through a centralized dashboard, which offers tools to oversee employee data and monitor customer feedback. The dashboard includes features for adding, updating, and organizing employee information, such as names, addresses, and phone numbers, ensuring the system remains up-to-date and reliable. One of the system's core functionalities is its rule-based decision support feature, which evaluates customer feedback to determine appropriate service guarantees. For instance, if a customer rates all aspects of cleanliness—interior, body, and engine—as "clean," no additional service is provided. Conversely, if specific areas are rated as "not clean," such as the interior, the system offers a one-wash guarantee bonus to enhance customer satisfaction and maintain service standards.

The system was tested using the black-box method to ensure its functionalities aligned with expectations. This approach confirmed that the system effectively integrates customer feedback, supports administrative tasks, and enhances decision-making processes, thereby achieving its design objectives.

Table 1. System black box testing

Testing Scenarios	Expected results	Information
Click login	Enter the admin page and display all information related to user data.	Succeed
Click the dashboard menu	Enter the admin dashboard page.	Succeed
Click the manage employees menu	Enter the employee page and display information related to employee data.	Succeed
Click add data	Displays the Add Employee Data Form and saves employee data.	Succeed
Click edit	Displays the Edit Employee Data Form and edits employee data.	Succeed
Click delete	Deleting employee data	Succeed
Click the Assessment menu	Go to the assessment list page that has been given by the customer.	Succeed
Bonus clicks are awarded	Give bonuses to customers	Succeed
Access www.sarmicarwash.my.id	Go to the main customer page	Succeed
Click employee grades	Display employee assessment forms and provide assessments.	Succeed

Discussion

A questionnaire for designing a website-based employee satisfaction support system application has been carried out to test the level of feasibility of the application system. This questionnaire involved customers and employees and the total number of respondents was 5 consisting of 10 customers. The results of each questionnaire can be seen in the following Table 2.

Table 2. Questionnaire results of system design

No.	Question	Webqual 4.0 / Area (Dimension)	Answer				
			SK	K	C	B	SB
1.	Appraisal Website Display	Usability (ease of use)	0	0	0	3	2
2.	Ease of learning the website system		0	0	0	3	2
3.	Ease of website system to use		0	0	1	3	1
4.	The website system is easy to remember how to use		0	0	1	2	2
5.	The system provides space to assess employees	Information Quality (information quality)	0	0	0	3	2
6.	The system's ability to convey errors that occur		0	0	1	3	1
7.	Ease of assessing employees		0	0	3	1	1
8.	Clarity of the assessment stages so that customers are given the best service	Interaction Quality (quality of interaction)	0	0	2	3	0
9.	Satisfaction in carrying out assessments and getting bonuses		0	0	3	2	0
10.	Customer data security		0	0	2	2	1

The questionnaire has been analyzed by checking each question. Questions one to ten were assessed based on responses from five respondents. Each question has a total mark calculated from the respective responses, with an average mark and a percentage mark calculated. The overall average score of the ten questions is added up to get a total score. The results show that the overall average of all questions is 80.4%. Various studies have explored the use of Decision Support Systems (DSS) in evaluating customer satisfaction with car wash services. Dahria et al. (2020) designed a DSS based on Fuzzy Associative Memory to enhance the efficiency of customer satisfaction assessments, replacing manual survey methods. Arbiansyah (2022) revealed that service quality and pricing significantly influence customer satisfaction at Car Wash WS Sampit, supported by multiple regression analysis to verify the relationship. Additionally, Sofyan et al. (2013) found that facilities and service quality significantly impact customer satisfaction and loyalty at Star Clean Car Wash, emphasizing the importance of service quality improvements to strengthen customer retention.

Conclusions and Suggestions

Conclusions

Implementation of the rule-based SPK in determining the level of customer satisfaction with service at Sarmi Car has resulted in that if the customer gave a value to the cleanliness of the interior, namely clean, clean body and clean engine, then the customer did not get a guarantee of a wash again. Meanwhile, if the customer gives a value to the cleanliness of the interior which is not clean, the body is clean, and the engine is not clean, then the customer gets a one-wash guarantee bonus where the customer can rate the employee on a web-based system that has been designed. The results of this research show that based on testing using the black box method on a web-based system, it can be concluded that functionally this application is suitable and provides results as expected, and based on the results of the assessment questionnaire, an average score of 80.4% of the applications created is suitable for use. With the employee performance assessment application, employees can evaluate employee performance to make it better in the future.

Suggestions

Based on the conclusions that have been made, it is recommended to carry out several developments such as:

1. Developing this application so that a mobile version is available.
2. It is hoped that this application will add several features to make it more dynamic.

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