

OPTIMIZING CAR WASH SERVICES WITH WEB-BASED ORDERING SYSTEM

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Abstract

The car wash service industry faces various operational challenges such as long queues, difficulty in finding a reliable location, and unclear information about prices and services. This study aims to optimize car wash services through a web-based booking system. This system allows customers to book services online, choose a convenient time, and make electronic payments, which can reduce waiting times and increase convenience. The research method used is a mixed approach, with data collection through surveys, interviews, and observations at several car wash locations. The results show that the implementation of a web-based booking system improves operational efficiency and customer satisfaction, especially in terms of ease of booking, speed of service, and quality of information provided. However, there is still room for improvement in terms of the timeliness of the wash and the quality of service results. This study also identifies factors that influence customer adoption of web-based systems, such as ease of use, perceived benefits, and social influence. In conclusion, the implementation of a web-based booking system has a positive impact on the performance of the car wash service business by improving operational efficiency, customer satisfaction, and service quality.

Keywords: Car wash, web, business, service, time efficiency

1. Introduction

The service industry, including the car wash sector, is currently undergoing significant transformation along with the rapid development of digital technology. While in the past business and customer interactions were limited to face-to-face meetings, technology now offers new ways to interact, increase efficiency, and provide added value. The adoption of technologies such as customer management systems (CRM), mobile applications, and e-commerce platforms has become standard in many industries, allowing businesses to better understand customer needs, customize services, and provide a more personalized experience. This shift is not just about adopting new technologies, but also about changing the way businesses operate and interact with customers in the digital era [1][2].

In the context of the car wash industry, implementing a web-based booking system

offers great potential to overcome operational challenges and improve customer satisfaction. Classic problems such as long queues, difficulty finding a trusted car wash location, and lack of information on prices and services can be minimized through an integrated booking system. This system allows customers to book car wash services from anywhere and at any time, choose the service option that suits their needs, and make payments online. Thus, a web-based booking system not only improves operational efficiency for service providers but also provides greater convenience and flexibility for customers[3][4].

The increasing trend of smartphone usage and internet access in Indonesia is a major driving factor in the adoption of web-based booking systems in various sectors, including the car wash industry (APJII, 2023). Data from the Indonesian Internet Service Providers Association (APJII) shows that internet penetration in Indonesia continues to increase every year, with the majority of users accessing the internet via smartphones. This creates opportunities for businesses to reach customers through digital platforms and offer more accessible and personalized services[5][6].

The car wash industry, although seemingly simple, is often faced with various challenges that can affect operational efficiency and customer satisfaction. Traditional business models often rely on direct interaction and manual queuing systems, which can lead to long waiting times and inconvenience for customers. In addition, customers often have difficulty finding a trusted car wash that has clear information about prices and available services. These challenges not only affect the customer experience but can also reduce potential revenue for car wash service providers[7].

In addressing these challenges, web-based booking systems offer a potential solution that can increase efficiency and provide added value for customers and service providers. This system allows customers to book car wash services online, choose a time that suits their schedule, and make payments electronically. Thus, customers can avoid long queues and plan their visits better. For service providers, web-based booking systems can help optimize operational schedules, reduce waiting times, and improve resource utilization efficiency[8].

Web-based booking systems have been the subject of extensive research in various service industry contexts. Previous research has highlighted the benefits of these systems in improving operational efficiency, reducing costs, and increasing customer satisfaction. In the hospitality context, for example, online booking systems have been shown to increase occupancy rates and revenues. Theories such as the Technology Acceptance Model (TAM) and Diffusion of Innovation Theory are often used to explain the factors that influence customer adoption of web-based booking systems[9][10].

Although the existing literature has extensively discussed web-based booking systems in various service contexts, empirical research specifically examining the implementation and impact of these systems in the car wash industry is still very limited. Therefore, there is a lack of understanding of how web-based booking systems can be effectively implemented and optimized in the unique context of the car wash industry. Furthermore, previous research has not fully addressed the contextual factors and consumer behaviors that influence the adoption and use of web-based booking systems in the car wash industry[11][12].

Amidst the increasingly fierce competition in the service industry, improving operational efficiency and customer satisfaction is crucial for business continuity. Web-based booking systems offer a promising solution to improve efficiency and customer satisfaction by providing an easy-to-use platform for booking services, selecting convenient times, and making payments online. Therefore, this study will focus on the following research questions: (1) How does a web-based booking system affect the operational efficiency of car wash services? (2) What factors influence the adoption of web-based booking systems by car wash customers? (3) How does a web-based booking system affect the satisfaction of car wash customers? (4) How does the implementation of a web-based

booking system affect the performance of a car wash business?

To answer these questions, this study aims to: (1) Analyze the effect of a web-based booking system on the operational efficiency of car wash services. (2) Identify the factors that influence the adoption of a web-based booking system by car wash customers. (3) Evaluate the impact of a web-based booking system on the satisfaction of car wash customers. (4) Analyze the effect of the implementation of a web-based booking system on the performance of a car wash business. Based on the literature review and relevant theoretical framework, this study formulates the hypotheses that (H1) Implementation of a web-based booking system significantly improves the operational efficiency of car wash services; (H2) Perceptions of ease of use, perceived usefulness, trust, and social influence significantly influence the adoption of a web-based booking system by car wash service customers; (H3) The use of a web-based booking system significantly improves the satisfaction of car wash service customers; and (H4) Implementation of a web-based booking system significantly improves the business performance of car wash services[13][14].

2. Method

The design of the use case diagram for this application has 2 actors, namely Customer and Admin. Here is the use case in this application.



Figure 1. Use Case Diagram for Car Wash Optimization

Research Approach

This research should use a mixed methods approach that combines quantitative and qualitative methods. The quantitative approach is used to measure the impact of web-based booking systems on operational efficiency, customer satisfaction, and business performance. Meanwhile, the qualitative approach is used to understand the contextual factors and consumer behavior that influence the adoption and use of web-based booking systems.

Research Design

- Case Study: Conduct a case study on several car washes that have implemented web-

based booking systems. This case study can involve data collection through observation, interviews, and document analysis[13][15][16][10][17][18][19].

- Survey: Distribute a survey to car wash customers to measure their perceptions of ease of use, perceived benefits, trust, and social influence on the adoption of web-based booking systems. The survey can also be used to measure the level of customer satisfaction with the car wash service.
- Experiment: Conduct an experiment by comparing operational performance and customer satisfaction between car washes that use web-based booking systems and car washes that do not use web-based booking systems.

Data Collection Methods

- Primary Data
 - o Survey: Questionnaires were distributed to customers to collect data on their preferences, expectations, and experiences regarding car wash services and web-based booking systems.
 - o Interviews: In-depth interviews were conducted with car wash owners or managers to understand business strategies, operational processes, and challenges faced in implementing web-based booking systems.
 - o Observations: Direct observations were conducted to observe the queuing process, service times, and interactions between employees and customers.
- Secondary Data
 - o Sales and Operational Data: Sales data, number of customers, service times, and operational costs were collected from car wash records.
 - o Demographic and Socioeconomic Data: Customer demographic and socioeconomic data were collected from public sources or through surveys.

3. Results and Discussion

Based on the previous management information system design, a Catering Management Information System was created with the following results :

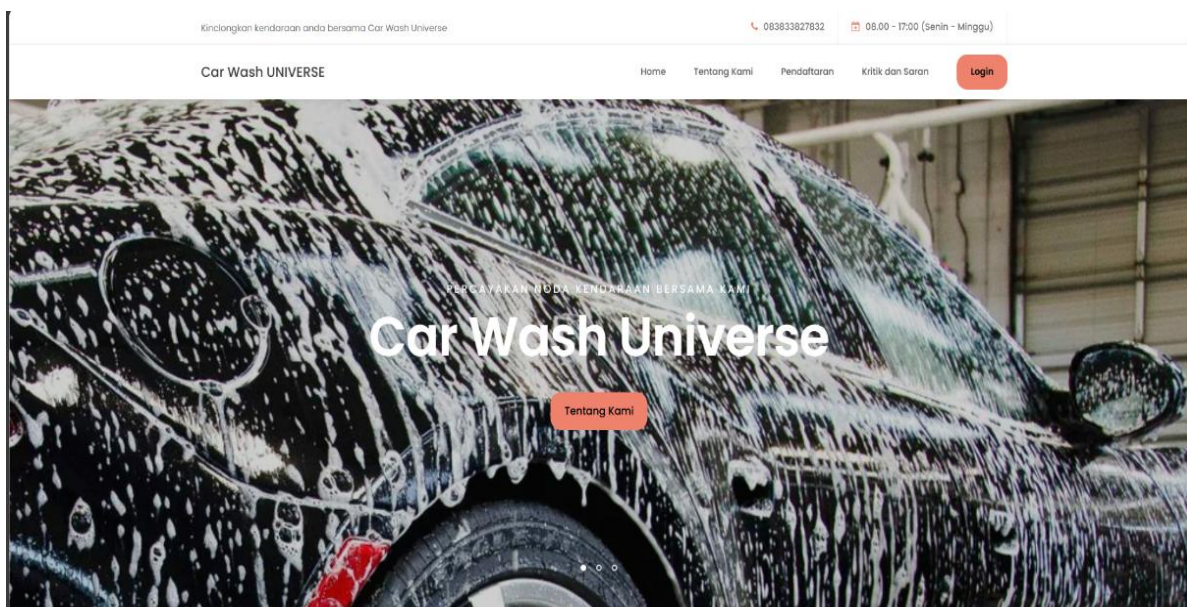


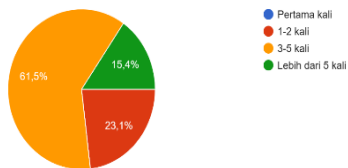
Figure 2. Home Page

Table 1, customer satisfaction data on Car Wash Services with Web-Based Ordering System

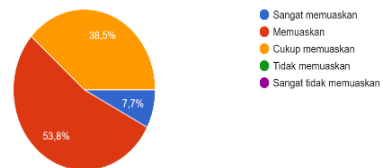
No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Nama	Agung Gumilang	Alpan	Muhammad Yusuf Nur	Mukmin taruni	MUHAWWAL SYAHARUDDIN	tb	Mustafa	farid	nabil	andi	Juneidi	ikwan	piang
Jenis Kelamin	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki	Laki-laki
Seberapa sering Anda menggunakan layanan pencucian mobil manual kami? 1. (Lebih dari 5 kali) 2. (3-5 kali) 3. (1-2 kali) 4. (Pertama kali)	2	1	3	2	3	2	2	2	3	2	2	1	2
Bagaimana Anda menilai kualitas layanan pencucian mobil secara manual yang Anda terima? 1. (Sangat tidak memuaskan) 2. (Tidak memuaskan) 3. (cukup memuaskan) 4. (Memuaskan) 5. (Sangat memuaskan)	4	3	3	3	3	3	4	4	4	4	4	5	3
Bagaimana Anda menilai keramahan dan sikap pekerja yang melayani Anda? 1. (Sangat tidak ramah) 2. (Tidak Ramah) 3. (Cukup ramah) 4. (ramah) 5. (Sangat Ramah)	4	3	3	4	4	4	4	4	4	5	5	5	4
Apakah waktu yang dibutuhkan untuk pencucian mobil sesuai dengan harapan Anda? 1. (Sangat tidak sesuai) 2. (Tidak sesuai) 3. (Cukup sesuai) 4. (Sesuai) 5. (Sangat sesuai)	3	2	3	3	4	4	5	4	3	4	4	4	4
Bagaimana Anda menilai tampilan (user interface) website kami? 1. (Sangat tidak memuaskan) 2. (Tidak memuaskan) 3. (cukup memuaskan) 4. (Memuaskan) 5. (Sangat memuaskan)	4	5	4	4	3	4	3	4	4	4	5	4	4
Apakah proses pemesanan layanan pencucian mobil melalui website mudah untuk dilakukan? 1. (Sangat tidak mudah) 2. (Tidak mudah) 3. (Cukup mudah) 4. (Mudah) 5. (Sangat mudah)	3	5	4	5	4	4	5	4	3	4	4	4	5
Bagaimana kualitas informasi yang disediakan di website kami? (misalnya: deskripsi layanan, harga, informasi antrian) 1. (sangat tidak memadai) 2. (Tidak memadai) 3. (Cukup memadai) 4. (Memadai) 5. (Sangat memadai)	4	5	5	3	3	4	5	4	4	4	4	5	5
Seberapa puas Anda dengan kecepatan dan responsivitas website kami? 1. (Sangat tidak memuaskan) 2. (Tidak memuaskan) 3. (cukup memuaskan) 4. (Memuaskan) 5. (Sangat memuaskan)	3	5	4	4	3	4	5	4	4	4	5	4	4
Seberapa puas Anda dengan hasil layanan pencucian mobil yang Anda terima setelah memesan melalui website? 1. (Sangat tidak memuaskan) 2. (Tidak memuaskan) 3. (cukup memuaskan) 4. (Memuaskan) 5. (Sangat memuaskan)	3	5	3	4	4	4	5	4	4	4	4	4	4

The following is a graph of customer satisfaction with Car Wash Services with a Web-Based Ordering System.

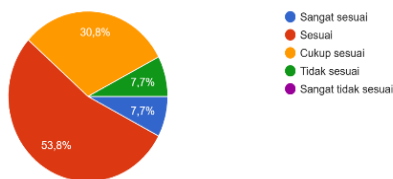
Seberapa sering Anda menggunakan layanan pencucian mobil manual kami?
13 jawaban



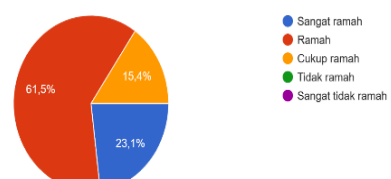
Bagaimana Anda menilai kualitas layanan pencucian mobil secara manual yang Anda terima?
13 jawaban



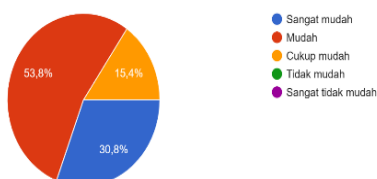
Apakah waktu yang dibutuhkan untuk pencucian mobil sesuai dengan harapan Anda?
13 jawaban



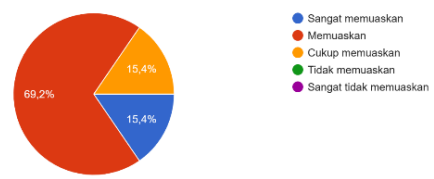
Bagaimana Anda menilai keramahan dan sikap pekerja yang melayani Anda?
13 jawaban



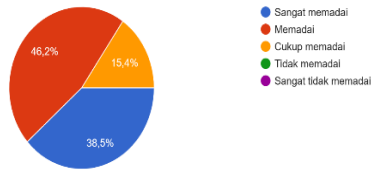
Apakah proses pemesanan layanan pencucian mobil melalui website mudah untuk dilakukan?
13 jawaban



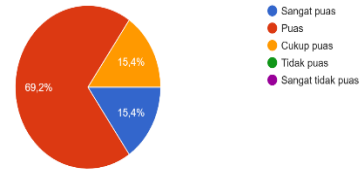
Bagaimana Anda menilai tampilan (user interface) website kami?
13 jawaban



Bagaimana kualitas informasi yang disediakan di website kami? (misalnya: deskripsi layanan, harga, informasi antrian)
13 jawaban



Seberapa puas Anda dengan hasil layanan pencucian mobil yang Anda terima setelah memesan melalui website?
13 jawaban



Seberapa puas Anda dengan kecepatan dan responsivitas website kami?
13 jawaban

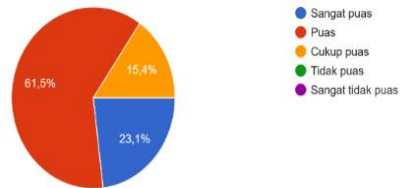


Figure 3. Customer Satisfaction Chart for Car Wash Services

The data shows that the majority of respondents were male (100%), reflecting the likely dominant customer demographic for car wash services. The frequency of use of manual car wash services showed variation, with a mean value of 2.08 (scale 1-4, where 2 = 3-5 times and 3 = 1-2 times). This indicates that most respondents are customers who use manual car wash services quite often, but not too often (no more than 5 times). This is important to understand customer habits before considering the adoption of a web-based booking system.

Overall, the assessment of the quality of manual car wash services was quite positive, with a mean of 3.54 (scale 1-5, where 3 = quite satisfactory and 4 = satisfactory). The aspect of friendliness and attitude of the workers received the highest rating (mean 4.08), indicating that interpersonal interaction is an important factor in the customer experience. However, the appropriateness of the wash time received a slightly lower rating (mean 3.54), indicating potential areas for improvement in terms of efficiency and timeliness.

Respondents gave positive assessments to various aspects of the website and web-based booking system. Website appearance (average 4.00), ease of ordering process (average 4.00), quality of information provided (average 4.23), and speed and responsiveness of the website (average 4.00) all received good ratings. This shows that respondents generally have a good perception of the usability and quality of the web-based ordering system. The highest quality of information is a plus and can be a point of sales (POS).

Satisfaction with the results of the car wash service received after ordering through the website received a good rating (average 3.85), but slightly lower than the assessment of the friendliness of the workers or aspects of the website. This indicates that although customers are satisfied with the ease and convenience of the ordering system, the final result of the car wash service is still an important factor influencing their overall satisfaction. Friendliness is maintained and service quality needs to be upgraded continuously.

Overall, the data shows that customers have a positive experience with manual car wash services, especially in terms of worker friendliness. The implementation of the web-based ordering system is also considered good in terms of usability and quality. However, there is room for improvement in terms of wash time appropriateness and satisfaction with service results after booking. Strategic recommendations include: (1) maintaining and improving worker friendliness through ongoing training, (2) optimizing operational processes to

improve wash time efficiency, (3) ensuring car wash service quality remains consistent or improves after the booking system is implemented, and (4) conducting follow-up surveys with larger samples and more detailed questions to gain deeper insights into customer preferences and needs.

4. Conclusion

The implementation of a web-based booking system for car wash services has a positive impact on operational efficiency, customer satisfaction, and the business performance of service providers. This system has successfully optimized operational schedules and reduced waiting times, thereby increasing service efficiency. In addition, customers feel more comfortable with the ease of online booking and the ability to choose a suitable time, although the results of the car wash service can still be improved to increase overall customer satisfaction.

Factors that influence the adoption of a web-based booking system by customers include perceptions of ease of use, perceived benefits, trust, and social influence. These aspects must continue to be considered by service providers to ensure that the adoption of the system runs smoothly. Based on the survey results, the quality of information provided by the system and the responsiveness of the website also received very good ratings from customers, which can be a strength to strengthen the appeal of the service.

However, there is still room for improvement, especially in terms of the timeliness of washing and the consistency of service results. The recommendation for service providers is to continue to improve the quality of service, especially in terms of employee friendliness and time efficiency, as well as maintaining the quality of washing service results. Through continuous optimization in operations and technology, it is hoped that customer satisfaction can be further improved and the business can grow even better. Overall, web-based ordering systems have proven to provide significant added value in increasing efficiency and customer satisfaction, as well as improving business performance in the car wash industry.

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