

Integration of Customer Relationship Management (CRM) for Optimizing Service Operations in the Automotive Industry

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Abstract: Service is an important element in shaping a company's image and maintaining customer loyalty, especially in the competitive automotive industry. This research aims to design and implement an integrated Customer Relationship Management (CRM) system to optimize the service process at PT Denpasar Agung Indah Motor. The system is designed using the DevOps development method, which allows development to be done iteratively and efficiently. The CRM system involves five types of users, namely customers, sales, CCO, service advisors, and leaders, with the main features including customer data management, service reservations, product marketing, and report generation. System testing using the blackbox testing method shows that all features have functioned according to the specified functional requirements. The results show that this CRM system not only improves the company's operational efficiency, but also strengthens relationships with customers, which ultimately increases the company's competitiveness.

Keywords: Customer Relationship Management (CRM); DevOps Methods; Innovative System.

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Introduction

Service is a key element in shaping the image and reputation of a company, either through the media, internalization of corporate culture, or strategic communication with various stakeholders. In an increasingly competitive industry, superior service is a very significant differentiating factor [1], [2]. Moreover, for companies engaged in products and services, service is not only about meeting customer needs, but also about creating memorable experiences to maintain their loyalty [3], [4].

PT Denpasar Agung Indah Motor, widely known as Honda Denpasar Agung, is one of the leading Honda car dealers in Bali. The company provides a wide range of services, including car sales and workshop facilities for the care and maintenance of Honda vehicles. However, the existing operational processes faced several challenges. In terms of service reservations, for example, the process still relies on customer care personnel to receive calls from customers who want to book a service. When customers need further information, such as estimated costs and processing time, customer care must contact the service advisor. Obstacles arise when the service advisor is serving other customers, so the information needed cannot be provided quickly and efficiently [5], [6].

On the other hand, product marketing is still done conventionally by sales consultants through social media, direct promotion in showrooms, or door-to-door method by distributing brochures. This approach requires great effort from sales consultants to build

extensive relationships in order to achieve sales targets. Customer loyalty can actually be a valuable asset for the company. Satisfied customers are not only likely to make repeat purchases in the future, but also have the potential to recommend products to their relatives or friends, which in turn can increase company sales.

This condition shows the need for an integrated system to optimize the entire service process, from reservation to marketing. This system is expected to improve operational efficiency and strengthen the relationship between the company and customers. With a strategic approach, customer loyalty can be increased, which indirectly impacts the company's competitiveness.

Based on the problems described, this research aims to design and implement an integrated Customer Relationship Management (CRM) system to optimize the service process at PT Denpasar Agung Indah Motor. The main focus of this research is to create a system that is able to improve operational efficiency in the service reservation process, product marketing, and overall customer interaction. This research is expected to provide significant benefits to the company, not only in improving internal workflows [7]–[9], but also in building more solid long-term relationships with customers, thereby increasing customer loyalty and company competitiveness in the automotive industry.

There is existing research gap in CRM implementation in the automotive sector, particularly in dealerships that combine customer service processes with product marketing activities in an integrated manner [10]–[12]. Most previous studies only focus on

one aspect, such as digital marketing or service reservation systems, without developing a holistic solution that combines all aspects of service operations in one platform. Therefore, this research offers a novel contribution by designing a CRM approach that not only optimizes efficiency, but also creates a more personalized and relevant customer experience [13]–[15], which can ultimately improve the company's business sustainability.

Method

This research uses the DevOps approach as a system development method to design and implement an integrated Customer Relationship Management (CRM) system. DevOps is a method that combines the development and operations processes to accelerate the development cycle [16], [17], improve collaboration between teams, and ensure the designed system can be implemented quickly and efficiently [18]–[20]. By using DevOps, the CRM system development process for ordering, purchasing, and service reservations at PT Denpasar Agung Indah Motor can be carried out in an iterative and controlled manner.

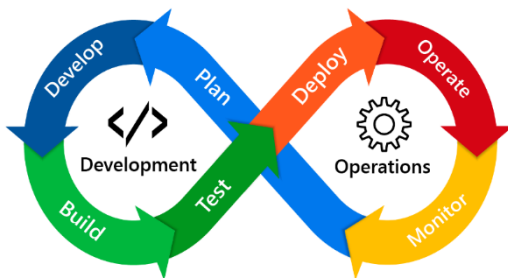


Figure 1. DevOps Method Flow

Stages of System Development with DevOps Method

1. Plan

In the planning stage, a system requirements analysis was conducted to identify the main features that a CRM system must have. Based on the functional requirements analysis, this system is designed to support five types of users, namely customers, sales, CCO, service advisors, and leaders. Each user has different access rights according to their role. This needs analysis includes identifying the login process, managing user data, managing vehicle orders and purchases, and managing service reservations. Planning also includes the preparation of technical specifications and system design that will be a reference during the development process.

2. Develop

The development phase includes the creation of system modules based on the functional requirements that have been analyzed. The development team built the system with a continuous integration and continuous delivery (CI/CD) approach to ensure any code changes can be automatically integrated and thoroughly tested before implementation. The main modules developed include: Login module with role-based authorization for customers, sales, CCO, service advisor, and management. User data management module by CCO, including adding, changing, searching, and deleting user data. Vehicle booking and purchase management module by sales. Service reservation management module by

customers, including service history search and reservation cancellation.

3. Build & Test

In this stage, the CRM application that has been developed is tested through the process of automated testing and manual testing. Testing is done to ensure that each feature functions according to functional requirements and there are no errors or bugs that can interfere with operations. The testing process is done iteratively at each iteration to improve the quality of the system. The DevOps team also uses monitoring tools such as Jenkins or GitLab CI/CD to ensure testing runs automatically and efficiently.

4. Release

After the system is declared stable through testing, the CRM application is released in a staging environment first for further testing with real data. At this stage, feedback from end users, such as customers and the internal team of PT Denpasar Agung Indah Motor, is collected to make adjustments before being released to the production environment.

5. Deploy

The CRM system is implemented into the production environment using the continuous deployment method. With this approach, any updates or improvements made can be applied immediately without disrupting system operations. This process allows the implementation of system improvements quickly and responsively to customer needs.

6. Operate

The CRM system begins to be fully operated after implementation. At this stage, the operations team is tasked with monitoring the performance of the system and ensuring it is running properly. Monitoring tools are used to monitor system stability and proactively diagnose potential problems.

7. Monitor

The final stage is the continuous monitoring of the CRM system performance. The data obtained is used to evaluate system performance and support further development.

Integration of DevOps with Functional Requirements Analysis

By using the DevOps method, CRM system development can be done iteratively and adaptively. The system is designed to fulfill functional needs, such as role-based login, user data management, vehicle booking and purchase management, and service reservation management. The DevOps approach ensures that the development and implementation process runs efficiently, with attention to team collaboration, iterative testing, and continuous improvement. This is expected to produce a reliable CRM system that provides the best experience for users.

Results and Discussion

Statement of Purpose

The CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor was designed with the aim of facilitating customers in the process of ordering, purchasing and reserving vehicle services. The users involved in the system are customers, sales, CCO, service advisors and leaders. Customers

can place orders and purchase vehicles, can book services and view vehicle service history. Meanwhile, sales can view vehicle order and purchase data and create monthly sales reports. Then the CCO is in charge of managing service booking data and making reports related to customers. Then the service advisor can manage service data, service transactions and service reports. Then the leader can check the monthly sales report and service reports both daily and monthly.

Context Diagram

Context diagram is the highest level of DFD which describes all inputs to the system or outputs from the system. The following context diagram describes all the data processed on the system. Where there are several entities, namely customers, sales, CCO, service advisors and leaders. Overall data can be accessed by customers. While sales can only access vehicle data, finance data, vehicle reservations, vehicle purchases and sales reports. Meanwhile, CCO can access user data, customer data, manage service booking data and manage customer care data. Then the service advisor can manage vehicle service data, service booking data and service transactions. While leaders can check monthly sales reports and service reports. The following is a context diagram of the CRM system design for ordering, purchasing and service reservations.

System Implementation

Home Page Display

On the main page of the official Honda website is a display design when a customer visits the website of PT Denpasar Agung Indah Motor before logging in. On this page the customer can access the official website of PT Denpasar Agung Indah Motor without having an account first, if the customer wants to place an order, purchase and reserve a service, the customer can create an account and click login for customer access rights to the next menu. The following is an implementation of the main page display of the official Honda website on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.



Figure 1. Website Initial View

CCO Dashboard Page View

On the CCO dashboard page display is a display that will appear when the user (CCO) has successfully logged in by entering the correct username and password. In the CRM system for ordering, purchasing and reservation services at PT Denpasar Agung Indah Motor, the CCO dashboard display displays customer data info, booking service data, complaint data and ratings. In addition, the CCO dashboard page also displays 1 graph, namely booking service graph data. The following is a draft display of the

CCO dashboard page on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.

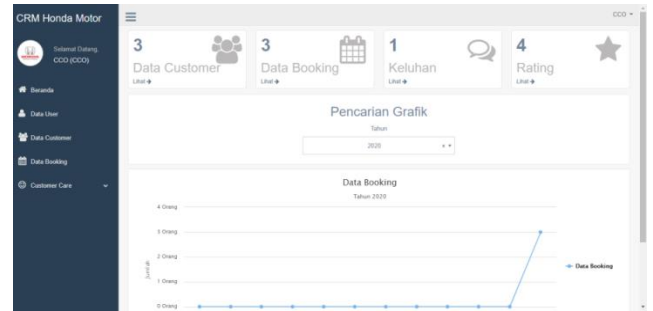


Figure 2. CCO Dashboard View

Display of Service Data Search Page

The vehicle service data search page is a display that will appear when the user (service advisor) clicks the service data menu on the side bar menu. In this CRM system for ordering, purchasing and reserving services, the service data search page display provides service data information in the form of a table containing service id data, service name and service cost. The following is an implementation of the display of the service data search page on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.

No	ID Service	Nama	Biaya	Aksi
1	SVC-006	Berkas 20.000 KM	Rp 8.500.000,00	[Aksi]
2	SVC-005	Berkas 5.000 KM	Rp 2.500.000,00	[Aksi]
3	SVC-004	Berkas 1.000 KM	Rp 700.000,00	[Aksi]
4	SVC-003	Pajak	Rp 1.500.000,00	[Aksi]
5	SVC-002	Tipe Lu	Rp 3.500.000,00	[Aksi]
6	SVC-001	Berkas 11.000 KM	Rp 5.500.000,00	[Aksi]

Figure 3. Display of Search Service Data

Display of Search Page for Booking Service Data

The search page for booking service data is a display that will appear when the user (CCO) clicks the booking service data menu on the side bar menu. In this CRM system for ordering, purchasing and reserving services, the search page for booking service data provides information on service booking queues in the form of a table containing booking service id data, customer, queue number, booking hours, vehicle type and status. The following is a draft display of the search page for service booking data on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.

No	ID Booking	Customer	Tanggal	Jam	No Antr	Nama Kendaraan	Status
1	BNG-0003	CST-00001	01-12-2020	17:42:00	85-002	HR-V 1.8 I 1.5 RS CVT CKD	Validasi
2	BNG-0002	CST-00001	30-11-2020	16:38:00	-	HR-V 1.8 I 1.5 RS CVT CKD	Belum Validasi
3	BNG-0001	CST-00001	01-12-2020	14:44:00	85-001	HR-V 1.8 I 1.5 RS CVT CKD	Validasi (Selesai)

Figure 4. Display of Search for Booking Service Data

Display of Reminder Data Search Page

The reminder menu page is a display that will appear when the user (CCO) clicks the reminder menu on the side bar menu. In this CRM system for ordering, purchasing and reservation services, the reminder page display provides customer reminder data information in the form of a table containing date data, customer name, reminder type and reminder message content. The following is a draft display of the reminder page on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.

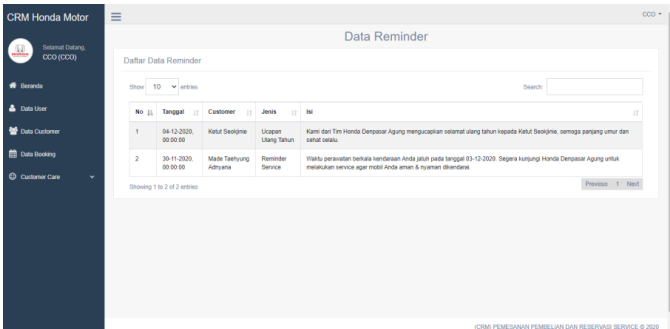


Figure 5. Reminder Data Display

Display of Complaint Data Search Page

The complaint menu page is a display that will appear when the user (CCO) clicks the complaint menu on the side bar menu. In this CRM system for ordering, purchasing and reservation services, the complaint page display provides customer complaint data information in the form of a table containing customer name data, complaint division, complaint content, complaint information and solutions. The following is a draft display of the complaint page on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.

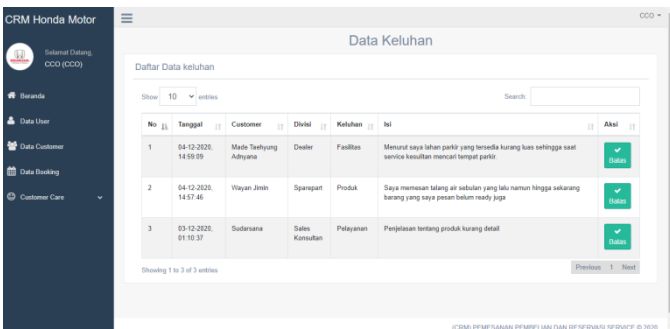


Figure 6. Display of Search Complaint Data

Sales Report Page Display

On the vehicle sales report print page is a display that will appear when the user (sales) clicks the print button on the sales report page. The following is an implementation of the sales report print display on the CRM system for ordering, purchasing and service reservations at PT Denpasar Agung Indah Motor.

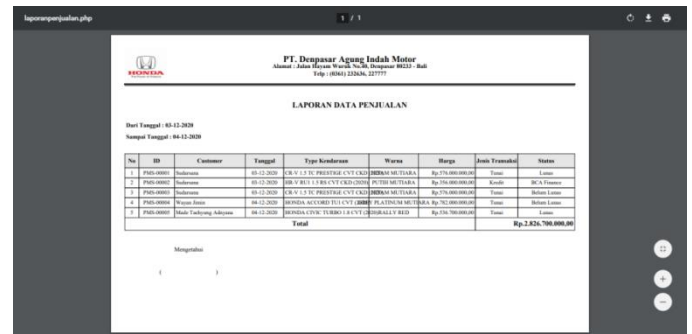


Figure 7. Sales Report Print View

Service Report Page Display

The service report page is a display that will appear when the user (service advisor) clicks the service report menu on the side bar menu. In this CRM system for ordering, purchasing and reserving services, the service report page can be filtered according to the user's wishes. The following is an implementation of the service report page display on the CRM system for ordering, purchasing and reserving services at PT Denpasar Agung Indah Motor.

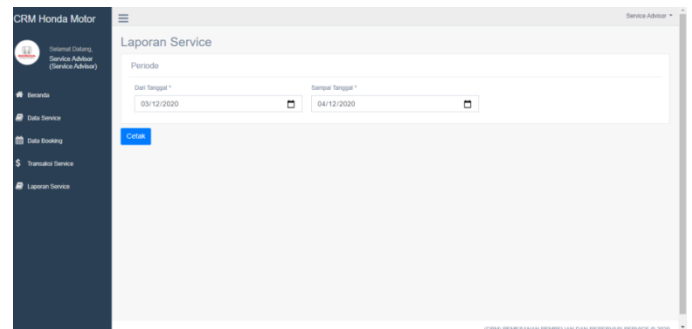


Figure 8. View of Service Report Menu

System Testing

System testing is carried out to ensure that all features of the Customer Relationship Management (CRM) system function according to the needs and specifications that have been designed. The test method used is blackbox testing, which focuses on testing the functionality of the system without paying attention to the internal structure or program code. This test is done by testing each feature to ensure that the input given produces the output as expected.

Table 1. Blackbox Testing

Number	Scenario	Results
1	Login Page	Valid
2	USer Data Page	Valid
3	Vehicle Data Page	Valid
4	Service Data Page	Valid
5	Reminder Data Page	Valid
6	Sales Report Page	Valid
7	Service Report Page	Valid

Based on the test results table, it can be explained that the login page is declared valid after successfully verifying that users from various roles, such as customers, sales, CCOs, service advisors, and leaders, can access the system with the appropriate username and password. The user data management page is also tested to ensure that the CCO can perform various operations, such as adding, changing, searching, and deleting user data, and all functions run correctly. In testing the vehicle data page, the system successfully ensures that sales can manage vehicle order and purchase data accurately and without constraints. In addition, the service data page is tested to verify that service advisors can manage service data, including adding, changing, and searching for vehicle service history, with results showing that this feature runs as expected. Tests on the reminder data page ensured that reminders of scheduled services or other activities could be correctly displayed to users. The sales report page was also tested and successfully showed vehicle sales data accurately and completely. Similarly, testing on the service report page ensures that vehicle service data can be correctly presented in report form. Overall, the test results show that all tested features are valid, so the system has met the designed functional requirements and is ready to be implemented in the operations of PT Denpasar Agung Indah Motor.

Conclusion and Suggestions

This research successfully designed and implemented an integrated Customer Relationship Management (CRM) system at PT Denpasar Agung Indah Motor to optimize service processes, including service reservations, product marketing, and customer interaction. By using the DevOps development method, the system is able to accelerate the development cycle, improve operational efficiency, and create a better customer experience. The designed CRM system involves five types of users, namely customers, sales, CCO, service advisors, and leaders, with features focused on managing customer data, vehicle data, service reservations, and sales and service reports. System testing using the blackbox testing method shows that all main features function properly and in accordance with the predefined functional requirements. This system not only improves internal efficiency, but also strengthens the relationship between the company and customers, thus increasing customer loyalty and the company's competitiveness in the automotive industry.

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References

- Sumesta, I. G. A. P., & Satyawan, I. W. W. G. A. (2024). Optimising Tropical Group Bali's Food Processing Business Process using a Web-Based Information System. *TECHNOVATE: Journal of Information Technology and Strategic Innovation Management*, 1(1), 9-20.
- Lin, A. K. (2024). The AI Revolution in Financial Services: Emerging Methods for Fraud Detection and Prevention. *Jurnal Galaksi*, 1(1), 43-51, doi: 10.70103/galaksi.v1i1.5.
- Hamid, A., Widjaja, W., Sutrisno, S., Napu, F., & Sipayung, B. (2024). The Role of Fintech on Enchancing Financial Literacy and Inclusive Financial Management in MSMEs. *TECHNOVATE: Journal of Information Technology and Strategic Innovation Management*, 1(2), 81-88.
- Kraugusteeliana, K., & Violin, V. (2024). Application of Decision Support in Performance Assessment of Delivery Services in the E-Commerce Industry. *Jurnal Galaksi*, 1(1), 53-61. doi: 10.70103/galaksi.v1i1.6.
- Sudipa, I. G. I., Harto, B., Sahusilawane, W., Afriyadi, H., Lestari, S., & Handayani, D. (2023). *Teknologi Informasi & SDGs*. PT. Sonpedia Publishing Indonesia.
- Wijaya, B. K., Sudipa, I. G. I., Waas, D. V., & Santika, P. P. (2022). Selection of Online Sales Platforms for MSMEs using the OCRA Method with ROC Weighting. *Journal of Intelligent Decision Support System (IDSS)*, 5(4), 146-152. doi: <https://doi.org/10.35335/idss.v5i4>.
- Pratiwi, N. M. D. G., Juliuntari, N. K. V., Agustin, P. W., & Aprilia, S. (2024). Prototyping Approach for User Interface Optimization of "Gowes" Bicycle Rental Mobile Application. *TECHNOVATE: Journal of Information Technology and Strategic Innovation Management*, 1(3), 127-140. doi: 10.52432/technovate.1.3.2024.127-140.
- Anggraini, F. D., Sumartono, S., & Rusman, H. (2024). Information Technology Audit in Optimizing Resources and Utilization of Financial Information Systems. *TECHNOVATE: Journal of Information Technology and Strategic Innovation Management*, 1(1), 35-44.
- Putra, I. N. T. A., Sudipa, I. G. I., Sukerthi, N. M. S. D., & Yunia, N. P. Y. (2023). Analisis User Experience Pada Layanan Telekomunikasi Operator Seluler Menggunakan Metode System Usability Scale (SUS). *Digital Transformation Technology*, 3(1), 49-57.
- Saxena, R., & Khandelwal, P. (2011). Exploring customer perception and behavior towards CRM practices in banking sector: An empirical analysis. doi: 10.18848/1833-1882/cgp/v05i09/51879.
- Shokouhyar, S., Shokouhyar, S., Raja, N., & Gupta, V. (2021). Promoting fashion customer relationship management dimensions based on customer tendency to outfit matching: mining customer orientation and buying behaviour. *International Journal of Applied Decision Sciences*, 14(1), 1-23.
- Adiyanto, N. (2021). Customer Relationship Management (CRM) Based On Web To Improve The Performance Of The Company. *IAIC Transactions on Sustainable Digital Innovation (ITSDI) The 1st Edition Vol. 1 No. 1 October 2019*, 32.
- Arslyandi, F., Sudipa, I. G. I., Pramita, D. A. K., Suryawan, I. G. T., & Widiartha, K. K. (2024). UX Analysis on SpeedID Application Using Usability Testing Method and System Usability Scale. *Sinkron: jurnal dan penelitian teknik informatika*, 8(3), 1413-1428.
- Putri, R. M. A., Parwita, W. G. S., Handika, I. P. S., Sudipa, I. G. I., & Santika, P. P. (2024). Evaluation of accounting information system using usability testing method and system usability scale. *Sinkron: jurnal dan penelitian teknik informatika*, 8(1), 32-43. doi: 10.33395/sinkron.v9i1.13129.
- Yanti, C. P., Sudipa, I. G. I., & Aditama, P. W. (2023). Design Thinking Testing of AR/VR Application for Bali's

- Lontar Prasi Preservation. *Jurnal Multidisiplin Madani*, 3(9), 1956-1963.
16. Riyanti, A., Taryana, T., Dirgantoro, G. P., & Gunawan, I. M. A. O. (2024). Development of Rental Application using Prototyping Method. *TECHNOVATE: Journal of Information Technology and Strategic Innovation Management*, 1(2), 69-80. doi: 10.52432/technovate.1.2.2024.69-80.
17. Hidayat, D. C., Atmaja, I. K. J., & Sarasvananda, I. B. G. (2024). Analysis and Comparison of Micro Frontend and Monolithic Architecture for Web Applications. *Jurnal Galaksi*, 1(2), 92-100. doi: 10.70103/galaksi.v1i2.19.
18. Gunawan, I. K. A. B., Sudipa, I. G. I., Wardhana, G. W., Radhitya, M. L., & Sandhiyasa, I. M. S. (2024, December). DESIGNING A DIGITAL DUES APPLICATION TO ENHANCE FINANCIAL TRANSPARENCY AND EFFICIENCY AT THE HAMLET LEVEL. In *Proceeding International Conference on Information Technology, Multimedia, Architecture, Design, and E-Business* (Vol. 3, pp. 428-435).
19. Budiman, D., Datya, A. I., Wartono, T., Judijanto, L., Sudipa, I. G. I., Kurniawan, H., ... & Setiono, D. (2024). *Sistem Informasi Manajemen: Panduan Praktis dalam Pembangunan Sistem Informasi Manajemen*. PT. Sonpedia Publishing Indonesia..
20. Sudipa, I. G. I., Udayana, I. P. A. E. D., Rizal, A. A., Kharisma, P. I., Indriyani, T., Asana, I. M. D. P., ... & Rachman, A. (2023). *Metode Penelitian Bidang Ilmu Informatika (Teori & Referensi Berbasis Studi Kasus)*. PT. Sonpedia Publishing Indonesia.