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Handyman Service Website with AI Chatbot Features Using the Software Development Life Cycle (SDLC) Approach at PT Semen Indonesia Distributor

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ABSTRACT

This study aims to design and develop a WordPress-based handyman service website equipped with an AI chatbot as a digital solution for PT. Semen Indonesia Distributor. The research is motivated by the public's difficulty in finding reliable construction workers and the limited availability of digital platforms specifically supporting the cement distribution industry. The website was developed using the Software Development Life Cycle (SDLC) waterfall model, encompassing requirements analysis, system design, implementation, testing, and maintenance. A descriptive qualitative method was employed, with data collected through interviews, observations, and documentation involving five employees from the ICT and Digital Marketing divisions of PT. SID. The results show that the website enables users to select handyman services, conduct online consultations via the chatbot, and access service-related information, while Black Box Testing using the Equivalence Partitioning technique confirms that all system functions operate as expected. This study contributes practically by enhancing digital service quality and theoretically by supporting the application of AI chatbot technology in web-based services.

Keywords: *Website, AI Chatbot, SDLC, WordPress, Black Box Testing*

I. INTRODUCTION (Heading 1) (font 10, Space 1.15 with 6 pt after)

In today's highly digital era, the adoption of information technology has expanded across almost all industrial sectors with the aim of improving performance quality and customer service (Wahyudi et al., 2024). The widespread use of internet-based technology provides significant benefits for both individuals and organizations, encouraging companies to adopt digital systems in order to remain competitive and responsive to customer needs (Trisnawati & Syafrizal, 2016). However, many people still experience difficulties in finding suitable construction workers in terms of

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service quality and availability, which makes web-based information systems an effective solution to overcome limitations of distance, location, and time (Putri & Bobby, 2020)

Construction workers play a vital role in building projects because their skills directly influence the quality and success of construction outcomes (Polapa et al., 2024). Despite this importance, PT. Semen Indonesia Distributor (PT SID), a company engaged in cement distribution and the sale of building materials, has not yet provided a dedicated digital platform to assist consumers in finding qualified construction workers (Al Hazmi, 2018). The absence of an integrated service platform causes customers who need both construction materials and labor services to face difficulties, which may lead to lower satisfaction due to limited information and service support (Gouzali, 2019).

Based on observations conducted with PT SID, there is an urgent need for a handyman service website because the lack of a digital platform has resulted in unintegrated business processes and limited service accessibility (Alfonsius et al., 2023). To address this issue, this study proposes the development of a WordPress-based website equipped with an AI chatbot feature that enables interactive communication and automated consultation for users (Yuniar & Purnomo, 2018). The system is developed using the Software Development Life Cycle (SDLC) methodology and tested through Black Box Testing to ensure functional reliability, with the expectation of improving operational efficiency, customer satisfaction, and the company's professional image while contributing to the application of AI chatbot technology in digital service systems (Astuti et al., 2024).

II. LITERATURE REVIEW

A. Website

Terminologically, a website can be defined as a collection of interconnected digital pages organized within a specific domain or subdomain structure and accessible via the internet through the World Wide Web (WWW). A website may also be described as a digital platform that presents pages containing various types of information, including text, images, audio, video, animations, or a combination of these multimedia formats. Websites are designed to deliver information in an interactive and engaging manner and can be accessed through internet networks (Prihantoro & others, 2023).

B. Handyman Services

Services can be defined as economic activities, processes, or actions intended to provide value or benefits to customers without directly producing a physical product, focusing on performance designed to meet needs and ensure customer satisfaction (MY et al., 2022). A handyman or construction worker is a laborer who is directly involved in carrying out

physical work in the field according to their area of expertise and under the direction of a field coordinator, playing a crucial role in project operations and being responsible for the final technical outcomes of the work performed (Hutasoit & Sibi, 2017). Based on these definitions, a handyman service refers to a form of service in which skilled workers perform on-site construction or technical tasks to deliver tangible results and practical benefits to customers.

C. AI Chatbots

A chatbot is a form of computer system development designed to communicate with humans through text or voice messages. Chatbots are equipped with Artificial Intelligence (AI) and Natural Language Processing (NLP) technologies, enabling them to respond intelligently to user inquiries. They are developed as tools to provide information services or customer support, with predefined topic scopes tailored to specific service needs (Astari et al., 2023).

D. Software Development Life Cycle Waterfall model

The System Development Life Cycle (SDLC) is a series of systematic stages carried out to design and develop a system. One of the most well-known and widely applied SDLC models is the waterfall model, alongside other alternative models such as spiral, fountain, incremental, rapid application development, prototyping, build and fix, and synchronize and stabilize (Hidayat & others, 2018). SDLC represents a structured approach to software development that includes stages such as requirements analysis, design, implementation, testing, and maintenance, which serve as the fundamental basis for various modern software development methods (Siva et al., 2023). The waterfall method, in particular, is one of the SDLC models frequently used in the development of information systems and software due to its sequential and well-defined process flow (A. A. Wahid, 2020).

E. Black Box Testing

Black Box Testing is a testing method used to evaluate a program without requiring knowledge of its internal details or code structure. One of the main advantages of this method is that testers do not need to have in-depth understanding of the programming language used. The testing process is conducted from the user's perspective, creating a dependency between programmers and testers to ensure that system functions operate as intended (Hidayat & Putri, 2019).

III. METHOD

In this research method, the researcher adopts a qualitative approach as the main foundation for the data collection process. This approach is chosen based on the characteristics of the problem addressed, which relate to the complexity of company operations in designing a handyman service website. The data collection for this

study was conducted at PT. Semen Indonesia Distributor. This research applies a purposive sampling technique as the sampling method, in which respondents are selected based on specific criteria or characteristics considered relevant to the research objectives. The sample consists of five employees working at the head office of PT. SID, comprising three employees from the Digital Marketing division and two employees from the Information Communication and Technology (ICT) division.

To develop the website, the study employs the Software Development Life Cycle (SDLC) waterfall method, with the following stages:

1. Requirements Analysis: This stage is the initial step in analyzing the requirements for developing the handyman service website.
2. Design: The design stage functions to describe the system architecture and specifications in more detail.
3. Implementation: At this stage, the handyman service website is developed using the WordPress platform along with its supporting features.
4. Testing: In the testing stage, the method used is Black Box Testing with the Equivalence Partitioning (EP) technique.
5. Maintenance: In the maintenance stage, the management and upkeep of the website are carried out directly by the company.

Furthermore, system testing is conducted using the Black Box Testing method. This testing stage is performed comprehensively to ensure that the website functions according to user requirements through functional testing (Black Box Testing).

IV. RESULTS AND DISCUSSION

A. Results of the Software Development Life Cycle (SDLC) Stages

This section explains the results of the system development stages based on the Software Development Life Cycle (SDLC) approach using the waterfall model, which includes requirements analysis, design, implementation, testing, and maintenance. The SDLC Waterfall method is characterized by the principle that each stage must be completed before proceeding to the next stage (Nugraha et al., 2018).

1. Requirements Analysis

The initial stage of the research was conducted by collecting data through interviews with company employees to identify system needs and expectations in depth. Based on a comprehensive analysis of the interview results with stakeholders, system requirements were systematically classified into two main categories: functional requirements and non-functional requirements.

a. Functional Requirements

Functional requirements define the specific capabilities and behaviors that the system must possess to support the company's business and operational objectives. These requirements describe in detail what the system is expected to do, including:

1. User Management

   The system must be able to manage user accounts by providing registration features for handymen, as well as authentication functions (login and logout) for administrator account management.

2. Consultation and Communication Features

   The system must provide an advanced AI chatbot feature for online consultation and automated responses to user inquiries, as well as a private chat feature to enable direct communication between customers and handymen after a service order is placed.

3. Company Profile

   The system must allow the creation of a digital company profile that includes information about the company's history as well as its vision and mission.

4. Service Catalog

   The system must be able to display and manage various types of handyman services (such as ceilings, lightweight steel, canopies, granite, and aluminum) as well as professional services (including architectural services and cost estimation/RAB calculations).

5. Ordering Mechanism

   The system must facilitate users in selecting services and initiating service orders by submitting inquiries through the chatbot, which will then direct users to the administrator's WhatsApp for pricing information and more detailed consultation.

b. Non-Functional Requirements

Non-functional requirements are quality criteria used to evaluate system performance and operational attributes rather than core functionality. These requirements are essential to ensure an optimal user experience and system sustainability. Non-functional requirements include:

1. Design Appearance (Usability & Aesthetics)

   The user interface (UI) must be easy to understand, with intuitive navigation and logical workflows, while presenting an attractive, professional, and consistent visual design without causing user confusion.

2. Security
   All user data, transaction information, and communications must be strictly protected using high security standards, including data encryption, user authentication, and protection against security vulnerabilities.

3. Performance
   The website must have responsive loading times by minimizing excessive plugin usage and avoiding large image file sizes that could negatively affect performance.

c. Applied Tools

To build the system, several main tools and technologies are utilized, including:

1. Main Platform

   WordPress is used as the primary Content Management System (CMS) to facilitate rapid and efficient website development.

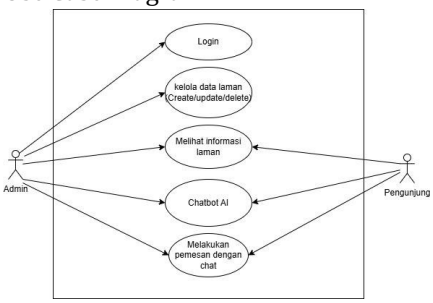
2. Plugins

   - Plugins to support website appearance and layout.
   - External plugins for AI chatbot services.
   - Plugins or configurations for direct integration with the WhatsApp API to support the service ordering workflow.
   - Security plugins to protect the website from cyber threats.

2. Design

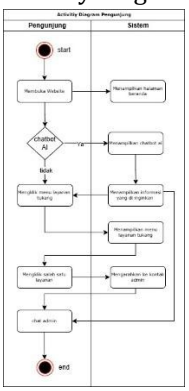
After the analysis stage is completed, the next step is to develop a comprehensive system design by creating Unified Modeling Language (UML) diagrams, designing the User Interface (UI), and defining the Entity Relationship Diagram (ERD) cardinality. The UML diagrams include several models such as use case diagrams, activity diagrams, and sequence diagrams.

a. Use Case Diagram

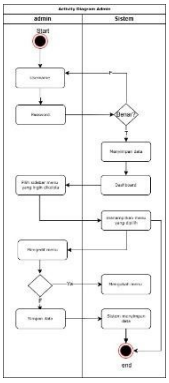


Picture 1 Use Case Diagram

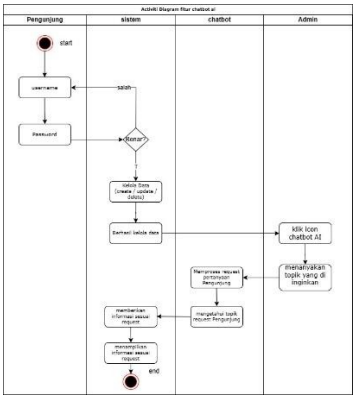
b. Activity Diagram



Picture 2 Visitor Activity Diagram

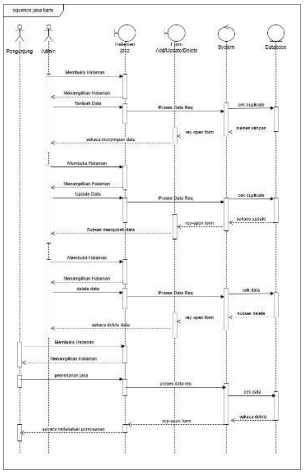


Picture 3 Admin Activity Diagram

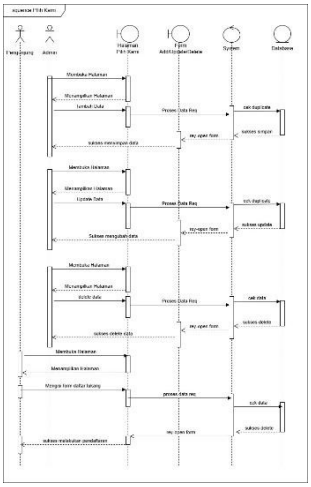


Picture 4 AI Chatbot Activity Diagram

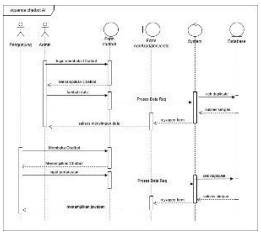
c. Sequence Diagram



Picture 5 our services sequence

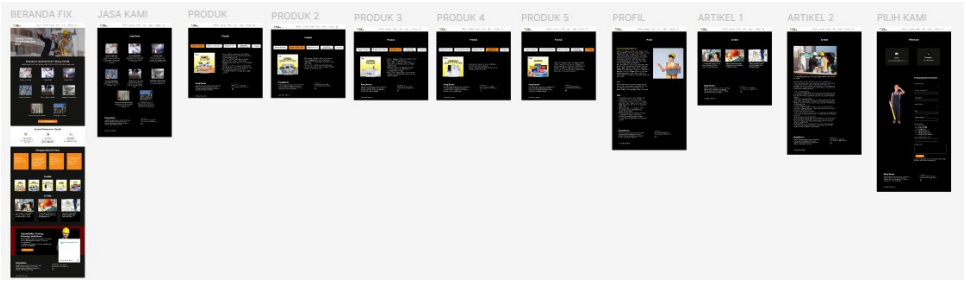


Picture 6 our select sequence



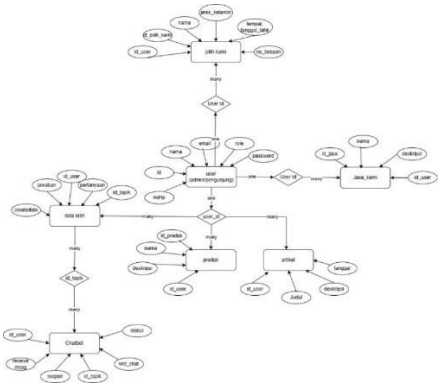
Picture 7 AI Chatbot sequence diagram

d. Design UI



Picture 8 Design UI Website

e. ERD Cardinality



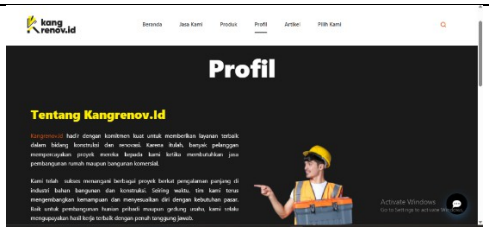
Picture 9 ERD

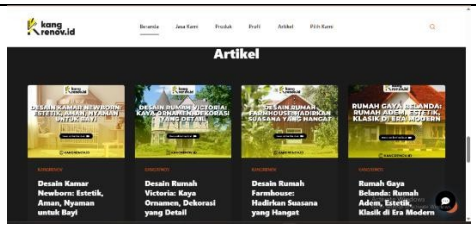
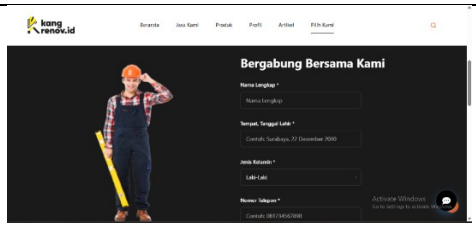
3. Implementation

The implementation stage begins with applying the core platform based on the previously prepared design, which in this case focuses on installing WordPress on the designated hosting server. This process is low-code or no-code in nature, leveraging WordPress's built in capabilities as a Content Management System (CMS).

Table 1 website display results

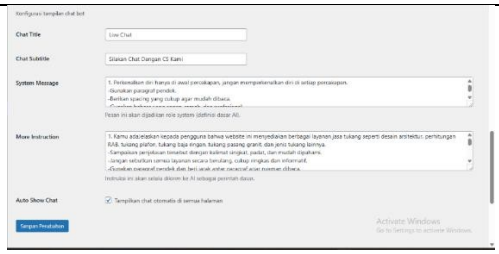
Home Page

The main interface displays the company logo along with navigation menus such as Home, Our Services, Products, Profile, Articles, and Why Choose Us. In addition, a search icon is provided in the upper right corner to help users quickly find the information they need.	
Our Services page	
The Our Services page functions to display the various types of handyman services available, allowing users to view and select services that best match their needs.	
Product Page	
It functions to display various types of building materials and components used in each service. Users can view product categories such as structure and foundation, framing and roofing, electrical systems, wall and floor installation, and the finishing stage.	
Profile Page	
The Profile page on the handyman service website contains information about the background and identity of the service provider. This section explains the history of the service establishment and its commitment to delivering the best results in the field of construction and renovation.	
Articles Page	

The Articles page serves as an information and educational platform for visitors regarding construction, renovation, and building design topics.	
Our Select Page	
The our select page not only functions as a registration form for prospective handymen but also provides contact information, including an email address and a call center, which can be used as alternative options for handyman registration.	

In this implementation section, an AI Chatbot feature is included. This section explains how the AI chatbot is built and configured on the website using the external Chatbots AI plugin. The Chatbots AI plugin is integrated by utilizing OpenAI's Chat Model 4.1 to support intelligent and automated interactions.

Tabel 2 AI Chatbots display results

Before the AI chatbot is displayed, configuration is performed by adding the desired prompts and setting the option to display the chatbot on all pages once all prompt settings have been completed.	
After the configuration is completed, the AI chatbot feature can be used by submitting any questions, which will then be answered by the AI chatbot, as illustrated in the example shown in the accompanying image.	

4. Testing

At this stage, system testing is carried out to verify the functionality of the developed website. This study implements the Black Box Testing method, in which testing is conducted from the end-user's perspective.

a. Home Page

Table 3 homepage test scenario results

No	Test Class	Test Steps	Expected Result	Test Result	Status
1.	Handyman Services	Testing the service category function to ensure the system displays a list of handymen according to the category selected by the user.	The feature is able to display relevant handyman data based on the selected category after being edited and published.	The service category feature works properly. The system successfully displays the appropriate list of handymen.	Successful
2.	Ordering Flow	Users test the user guide or tutorial for the handyman service ordering process.	Users are able to clearly understand each stage of the handyman service ordering process without confusion.	Users can easily follow the ordering guide without experiencing confusion.	Successful
3.	Products	Users test by opening the product page by clicking on one of the available products.	After a product is clicked, the system displays a detailed product page	The product page displays all products with complete information.	Successful

			containing complete product information.		
4.	Articles	Users access the article page by clicking one of the articles displayed on the website homepage.	The system displays the article page completely, including elements such as title, image, and article content.	The article page is successfully displayed with all expected elements.	Successful
5.	AI Chatbot	Users input questions related to services or products into the chatbot.	The chatbot responds with relevant and accurate answers and provides appropriate solutions or guidance.	The chatbot delivers fast, relevant responses and helps users obtain the required information.	Successful

b. Our Services Page

Table 4 our services page test scenario results

No	Test Class	Test Steps	Expected Result	Test Result	Status
1.	Types of Handyman Services	Users test by opening the "Our Services" page through the header menu at the top of the website.	The system displays data on various available handyman services, accompanied by images and brief descriptions for each service type.	The "Our Services" page successfully displays all handyman service categories completely, with appropriate images and descriptions.	Successful

c. Product Page

Table 5 product page test scenario results

No	Test Class	Test Steps	Expected Result	Test Result	Status
1.	Product Category Types	Users perform testing by opening the "Products" page via the header menu at the top of the website or by clicking on one of the available products.	The system is expected to display the complete list of available products, including images, product names, and descriptions.	The "Products" page successfully displays all product data as expected. Each image, product name, and description appears correctly.	Successful

d. Profile Page

Table 6 profile page test scenario results

No	Test Class	Test Steps	Expected Result	Test Result	Status
1.	History, Vision, and Mission	Users perform testing by reviewing the profile information display, which includes the company's history, vision, mission, and description.	The system is expected to clearly display the company profile information with appropriate descriptions that reflect the company's identity.	Users can easily find the company profile information. The displayed content is sufficiently informative.	Successful

e. Articles Page

Table 7 articles page test scenario results

No	Test Class	Test Steps	Expected Result	Test Result	Status

1.	Article Content	Users perform testing by checking the availability and ease of access to the article section on the homepage and the dedicated articles page, including the relevance of article content to handyman service topics.	The system is expected to display published article content, including the title, body text, and publication date.	The article section displays content that is relevant to user needs, such as tips for choosing handymen, home renovation guides, and building maintenance information that have been created and published.	Successful

f. Our Select Page

Table 8 our select page test scenario results

No	Test Class	Test Steps	Expected Result	Test Result	Status
1.	Contact Information, Email, & Handyman Partner Form	Users perform testing by opening the "Our Select" page via the header menu at the top of the website to check the display of contact information, email address, and the availability of	The system is expected to clearly display the company's contact information, including phone number and email address, and provide a partner registration form complete	The "Our Select" page successfully displays all contact information clearly and in an easy-to-read format. The partner form is also fully displayed with all required input fields.	Successful

		the handyman partner registration form.	with input fields.		

B. Black Box Testing Results on the Website

The results of Black Box Testing confirm that each function of the PT. Semen Indonesia Distributor handyman service website operates as expected.

a. Results of Table Score Calculations

Table Effectiveness Value = $\left(\frac{\Sigma \text{ Pengujian sesuai}}{\Sigma \text{ Jumlah skenario pengujian}}\right) \times 100\%$

- Home Page Table: $(\frac{5}{5}) \times 100\% = 100\%$, all test scenarios were successfully executed.
- Our Services Page Table: $(\frac{1}{1}) \times 100\%$, all test scenarios were successfully executed.
- Products Page Table: $(\frac{1}{1}) \times 100\% = 100\%$, all test scenarios were successfully executed.
- Profile Page Table: $(\frac{1}{1}) \times 100\% = 100\%$, all test scenarios were successfully executed.
- Articles Page Table: $(\frac{1}{1}) \times 100\% = 100\%$, all test scenarios were successfully executed.
- Our Select Page Table : $(\frac{1}{1}) \times 100\% = 100\%$, all test scenarios were successfully executed.

b. Black Box Testing Website Results

$$\text{Website Effectiveness Value} = \left(\frac{100\%+100\%+100\%+100\%+100\%+100\%}{6}\right) \times 100\%$$

$$= 100\%$$

Based on the calculation results, an effectiveness value of 100% was obtained, indicating that all modules on the website functioned very well without any errors during the testing process. Therefore, the website is considered suitable and ready for use.

V. CONCLUSION AND RECOMMENDATION

Conclusion

This study successfully designed and developed a WordPress-based handyman service website for PT. Semen Indonesia Distributor by applying the Software

Development Life Cycle (SDLC) waterfall model. The development process systematically covered requirements analysis, system design, implementation, testing, and maintenance, ensuring that the website was built in a structured and well-planned manner. The integration of an AI chatbot using an external plugin enhanced user interaction by enabling automated consultations and providing quick, relevant information related to services and products.

The website offers comprehensive features, including service listings, product catalogs, company profile information, articles, ordering guidance, contact details, and a handyman partner registration form, all designed to improve accessibility and user experience. Based on Black Box Testing results, all website modules achieved a 100% success rate, indicating that each function operated as expected without errors. Therefore, the website is deemed effective, reliable, and suitable for use, while also contributing practically to improved customer service and theoretically to the application of AI chatbot technology in web-based service platforms.

Recommendation

Based on the results of the design, implementation, and testing of the handyman service website with an AI chatbot feature for PT. Semen Indonesia Distributor, several recommendations can be considered for future development and research:

1. Development of Advanced Website Features, The developed website can be further enhanced by adding advanced features such as an online payment system, project progress tracking, and promotional or discount systems. The integration of these features is expected to improve user convenience and support a more seamless and fully integrated transaction process.
2. Enhancement of AI Chatbot Capabilities, The current AI chatbot is able to provide basic question-and-answer services effectively. However, future development could involve training the chatbot with more specific and diverse conversational data to enable more contextual and in-depth responses, particularly related to cost estimation, work schedules, and technical requirements of construction projects.

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