

Prototype Design of User Centered Design Based on UCD For Hand Services at PT Semen Indonesia Distributor

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Abstract

Advances in information technology, especially in digital-based services, have created potential business opportunities, including in the provision of handyman services that are easily accessible to the public. This has encouraged PT Semen Indonesia Distributor to develop a new business in the provision of handyman services. To facilitate public access and interaction, a website is needed that functions as a portal for information services for handyman services. Therefore, this prototype is designed to help users choose the right handyman services and provide information related to services, prices, and locations of handymen. The User Centered Design UCD method is used to ensure that the website design is in accordance with user needs and convenience, and provides more efficient interactions. This study uses a research and development (R&D) approach with a technology readiness level (TKT) of 6. Data collection was carried out through observation and interviews with five respondents from the information communication technology and digital marketing divisions of PT SID. Based on the results of the needs analysis, the prototype was developed using the Figma tool, starting from making wireframes to high fidelity prototypes. The evaluation was carried out using the Black Box Testing method to test the functionality on the main pages such as Home, Our services, products, profiles, articles, and choose us, and the results showed that all features had run according to the specified specifications and according to user expectations.

Keywords : Prototype, User Centered Design (UCD), black box testing, handyman service website

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Prototype Design Of User Centered Design Based On Ucd (User Centered Design) For Handiser Services At Pt Semen Indonesia Distributo

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ABSTRACT

Advances in information technology, especially in digital-based services, have created potential business opportunities, including in the provision of handyman services that are easily accessible to the public. This has encouraged PT Semen Indonesia Distributor to develop a new business in the provision of handyman services. To facilitate public access and interaction, a website is needed that functions as a portal for information services for handyman services. Therefore, this prototype is designed to help users choose the right handyman services and provide information related to services, prices, and locations of handymen. The User Centered Design UCD method is used to ensure that the website design is in accordance with user needs and convenience, and provides more efficient interactions. This study uses a research and development (R&D) approach with a technology readiness level (TKT) of 6. Data collection was carried out through observation and interviews with five respondents from the information communication technology and digital marketing divisions of PT SID. Based on the results of the needs analysis, the prototype was developed using the Figma tool, starting from making wireframes to high fidelity prototypes. The evaluation was carried out using the Black Box Testing method to test the functionality on the main pages such as Home, Our services, products, profiles, articles, and choose us, and the results showed that all features had run according to the specified specifications and according to user expectations.

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INTRODUCTION

Information technology advances are currently experiencing rapid development (Andramawan et al., 2018) . This includes digital-based or online-based services and bookings, which are in line with the high public interest in easily accessible services, thus creating very potential business opportunities (Sridayanti Banjarnahor et al., 2023). In addition, technology also functions as a tool to facilitate various human activities in daily life, especially those related to cyberspace and the internet. As a result, many developers are competing to create systems that are useful and can make everyday activities easier (Nurmansyah & Aminudin, 2017).

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Today, many people still have difficulty finding a builder to complete tasks outside of their expertise, such as building a house, repairing buildings, or performing maintenance around the house. In the process of construction, repair, or maintenance, the existence of a builder is often only known by the closest people who know their profession and expertise (Putra et al., 2024). As a result, many handyman job seekers do not know the location, expertise, or availability of these workers. To address this issue, individuals with experience in the field of construction services as well as specialized knowledge and skills are needed. On the other hand, some construction service providers face limitations in expanding their scope of work due to the lack of effective media to help them land a project or job (Janis et al., 2020). The problems experienced by the community can be solved with a website-based handyman service selection application that can help the community in choosing handyman services that suit their needs and budget (Setiawan, 2019).

PT Semen Indonesia Distributor is a company engaged in the distribution of building materials, providing a variety of quality products to meet construction needs. PT SID plans to create a website-based platform that offers handyman services. This website is designed to be an integrated solution, making it easier for users to find professional workers for various construction, renovation, and repair jobs while supporting the building material distribution ecosystem.

The use of *the User Centered Design* (UCD) method has been widely applied in various studies to develop a user-friendly interface, especially in website design and development. For example, a study entitled "*Redesigning Website Based Company Profile UI (User Interface) Design Using the UCD Method*" shows that the UCD approach is effective in increasing user engagement by focusing design on needs (Zen et al., 2022).

This study proposes the design and development of a *prototype* of a handyman service website for PT SID using *the User Centered Design* (UCD) method. The *User Centered Design* method was chosen because this research requires a clear understanding of the context of use and user needs and targets specific markets. The UCD approach is user-centred with supported methods, tools, and processes that help design interactive systems (Andiny et al., 2021).

To evaluate the success of this *prototype* design, the researcher used *the Black Box Testing* testing tool. Black box testing is a method of testing software quality that focuses on aspects of its functionality. The purpose of this test is to identify functions that are not running correctly (Ningrum et al., 2019). The *Black Box Testing* process is carried out by

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trying *out prototypes* that have been made by the developer. This test aims to ensure that the *prototype* functions according to the *needs of the user* that has been determined. (Hudi & Karyanti, 2022).

1.1 Problem Formulation

Based on the background that has been explained, the following is a formulation of problems that can be raised:

1. How is the application of *the User Centered Design* (UCD) method in the design and development of *prototype* handyman services websites at PT Semen Indonesia Distributor?
2. How are the results of the implementation of the *prototype* design of the handyman service website at PT Semen Indonesia Distributor that suits the needs of users reviewed based on *black box testing*?

1.2 Research Objectives

Based on the formulation of the problem above, the objectives of this study are as follows:

1. Apply the UCD method to ensure the resulting website design is needs-focused.
2. Evaluating the results of *the prototype of* PT Semen Indonesia Distributor's handyman service website to ensure that the resulting design is in accordance with the needs of the user which is reviewed through *black box testing*.

1.3 Research Benefits

This research is expected to make a significant contribution in various theoretical and practical aspects. The benefits of this study include:

1.3.1 Theoretical Benefits

This research contributes to the development of science, particularly in interface design and user experience. The website for handyman services is based on *the User Centered Design* (UCD) method. It is an academic reference for similar research that wants to explore the use of the UCD method in the development of website technology-based systems.

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1.3.2 Practical Benefits

a. For PT Semen Indonesia Distributor

This study provides accurate information about the stages of design and development of a *prototype* of a handyman service website at PT Semen Indonesia Distributor. In addition, the results of the study help identify usability obstacles faced by users, which can be used as a reference to improve website design to be more *user-friendly* and efficient. The implementation of the research results can also provide solutions in the form of a website prototype to PT Semen Indonesia Distributor regarding its needs in developing a website as an innovative company that cares about the digital experience of users.

b. For Website Developers

This research provides practical guidance in designing an interactive, attractive, and easy-to-use website with the application of the *effective User Centered Design* (UCD) method to create a user-centered handyman website design. In addition, this study provides insights related to functionality evaluation using *the Black Box Testing* method to ensure the resulting design works according to the expected specifications.

c. For Users

Website users, namely the general public who are looking for construction services or construction service workers, will benefit in the form of easier, organized and transparent access to services. *The prototype* website created is expected to strengthen a positive perception of the company as a modern digital service provider that is responsive to user needs.

1.3.3 Bidang *Information and Technology* (IT)

This research can serve as a reference for other developers in creating user-centered technology-based solutions. The results of the research can be used as an example to improve the quality of interface design (UI) and user experience (UX) on the website through *prototypes*

1.3.4 Business Field

- a. The website developed is expected to be able to increase the competitiveness of handyman service providers by offering more transparent, organized, and accessible services

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- b. A better user experience through an intuitive and easy-to-use website can improve customer satisfaction, which ultimately contributes to customer satisfaction with the service

1.4 Problem Limitations

1. This research only focuses on the design and development stage of the website prototype, without involving the full implementation or development of the website
2. The research is focused on the application of the *User Centered Design* (UCD) method, starting from collecting data on user needs, designing *prototypes*, to evaluating designs
3. Functional testing on the use of the *black box testing method* as an evaluation tool to ensure that the system functions are running according to the specified specifications. Testing includes our home page, our services, products, profiles, articles, and select us.
4. The need for a *prototype* website design for PT Semen Indonesia Distributor only includes the perspective of some users, not all users as a whole.

METHOD

This research is a *Research and Development* (R&D) research that not only focuses on product design, but also develops, refines, and tests effectiveness to suit user needs. With Technology Readiness Level (TKT) 6, which aims to design and test (Sugiyono, 2014) *prototypes* in conditions that suit user needs (Dedi Suhendri et al., 2019). The *designed prototype* is tested to ensure its functionality and suitability to the needs before being implemented more widely. This research aims to develop an interactive and easy-to-use handyman service website, with existing service features, location-based search, customer reviews, and price information that can support user efficiency in finding services.

The prototyping stage is divided into two characteristics, namely low fidelity prototyping and high fidelity prototyping (D. Tri Widiatmoko, 2022).

1. Low fidelity prototyping is a low-fidelity prototype that focuses on the development of initial concepts and layouts (Kurniati, 2021).
 - a. Wireframe: An initial description of the structure and position in the design without visual details such as colors or drawings (Miftakul Salam et al., 2024).

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2. High fidelity prototyping is a high-detail prototype that resembles the final product. It can be tested interactively by users to get a real experience (Reni Okta Nia, 2018) .
 - a. Mockup: A complete visual view of the final design including colors, text and graphic elements. (Arisa et al., 2023)
 - b. Prototype: An early model of a system that allows testing of functionality and user interaction before full implementation on a website/application. (Kurniati, 2021)

The process of the User Centered Design (UCD) method includes 4 stages, namely, Understanding the Context of Use, Detailing User Requirements, Creating Design Solutions, and Evaluating (Evaluate Against Requirements (Muhammad Syarif Hartawan, 2022)).

1. Understand Context Of Use: Understanding the context of website usage is required. This includes having to understand who the user is, what they do, and where they will use the website.
2. Specify user requirements: After understanding the context of use, the next step is to identify the specific needs of the user. Such as researching what they want and expect from the website.
3. Design solutions: Based on an understanding of the context and needs of the user, the next step is to design a design solution that can meet these needs. Such as prototyping, interaction testing, and development of appropriate features.
4. Evaluate against requirements: The final step is to assess whether the design solution that has been created can really meet the needs of the user. We will conduct testing and evaluation to ensure that the final product is in line with what users expect.

The Black Box Testing *method* is a testing method that focuses on the functional specifications of the software, the test can define the set of input conditions and perform tests on the functional specifications of the program. The *Black Box Testing* process is by trying to enter data on each form. This test is necessary to know if the program runs according to the *user* (Shadiq et al., 2021) ' s needs.

This research is located at the head office of PT Semen Indonesia Distributor Gresik, East Java. The selection of this location is based on the consideration that the head office is the company's operational control center, thus allowing researchers to obtain more comprehensive and accurate data. The population in this study consists of employees of PT Semen Indonesia Distributor of *the information communication technology* and *digital marketing divisions* who have an important role in the management of the handyman service website later. Samples are taken using *the snowball sampling* technique, which is the determination

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of samples that are initially small in number, then this sample chooses its friends to be used as samples, and so on (Andi Asari et al., 2023) . To ensure that the selected employees are truly relevant to the research. The sample of this study consists of 5 employees at the PT SID head office who have a role in managing websites, coming from the *information communication technology and digital marketing divisions*.

The data collection techniques used in this study include observation and interviews. Observations were made on several similar handyman service platforms to understand the general features, interface appearance, and flow of use, in order to be a reference in the design of prototypes. Interviews were conducted at the needs and evaluation stage with employees of PT Semen Indonesia Distributor (PT SID) in the *information communication technology and digital marketing divisions* to explore preferences, expectations, and feedback on the prototype design that has been developed. The interview data is used to ensure the *prototype* is according to user needs as well as as a basis for design improvement before further implementation.

RESULTS AND DISCUSSION

Results of the User Centered Design (UCD) Method Development Stage

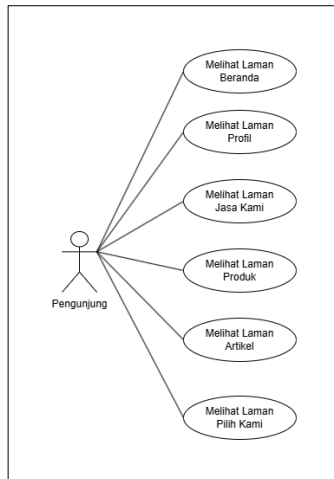
1. Hasil *Understand Context of Use*

Based on the results of observations and interviews with employees of PT Semen Indonesia Distributor (PT SID), it is known that the handyman service website is not yet available, so it needs to be designed from scratch. This study involved five respondents from the *information communication technology and digital marketing divisions* who were selected through *purposive sampling techniques*. Data collection is carried out through two stages, namely the needs and evaluation stages. At the needs stage, the researcher observed similar platforms and conducted interviews to explore user needs and preferences. At the evaluation stage, interviews are conducted again to assess the prototype that has been designed. The development process is carried out iteratively based on the results of the evaluation, in order to refine the design to suit the needs of users and be ready for the implementation stage.

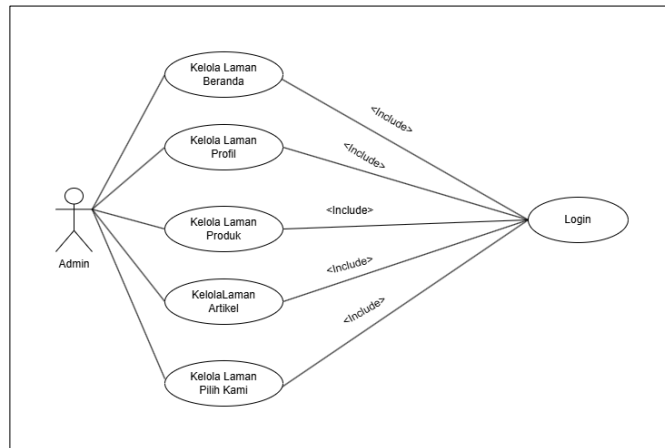
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2. Hasil *Specify User Requirement*

3. Use case diagram



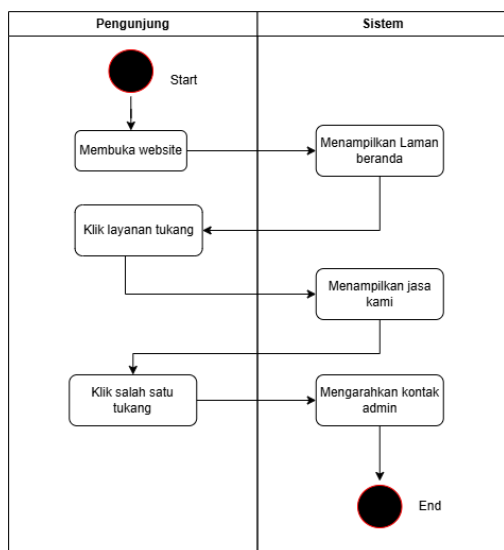
Picture 1 Use case Visitor Diagram



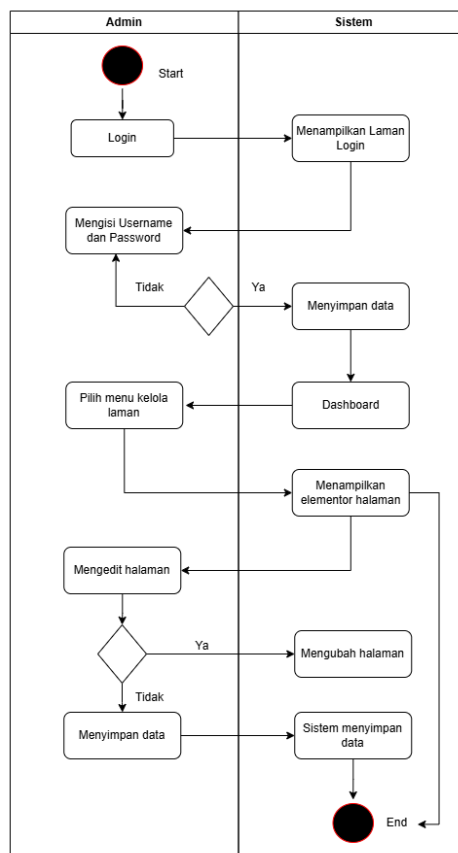
Picture 2 use case diagram admin

4. Activity Diagram

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Picture 3 Visitor Activity Diagram



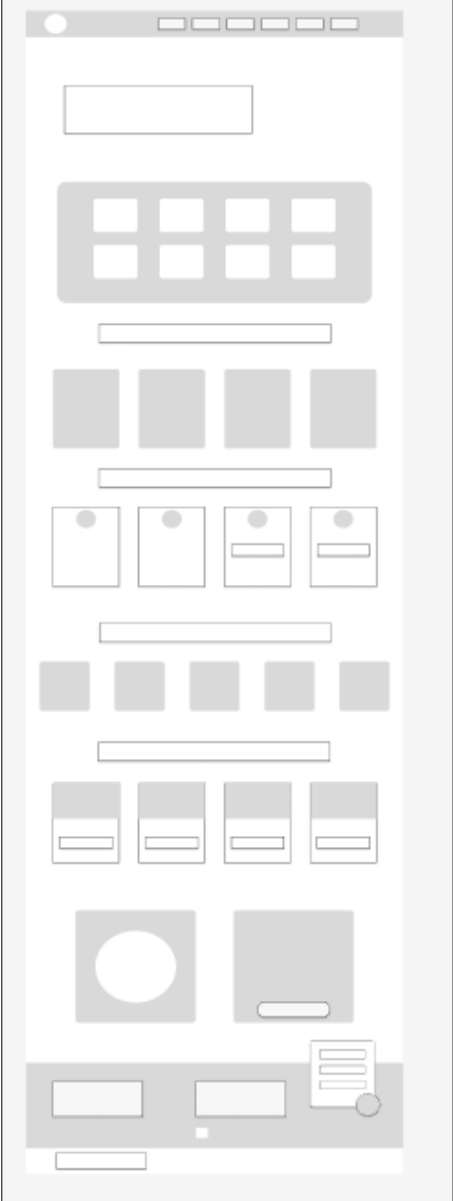
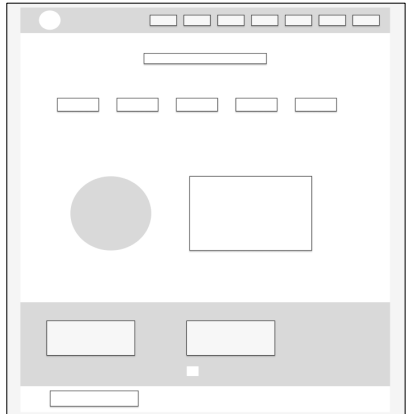
Picture 4 Activity Diagram Admin

3. Design Solutions *Results*

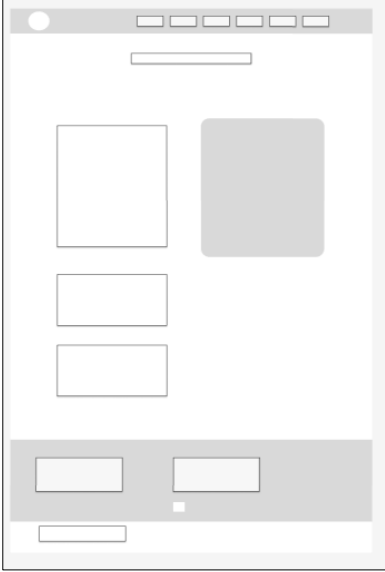
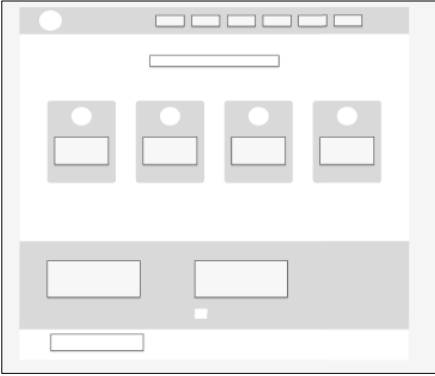
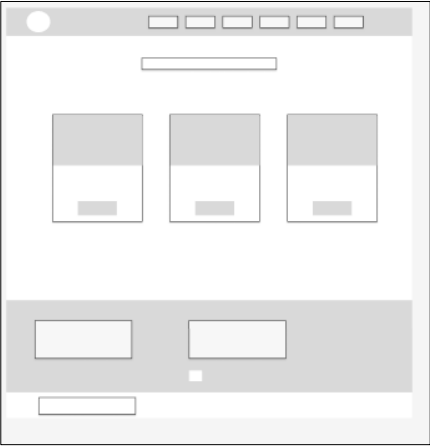
a. Low Fidelity Prototyping (Wireframe)

Table 1 Wireframe design

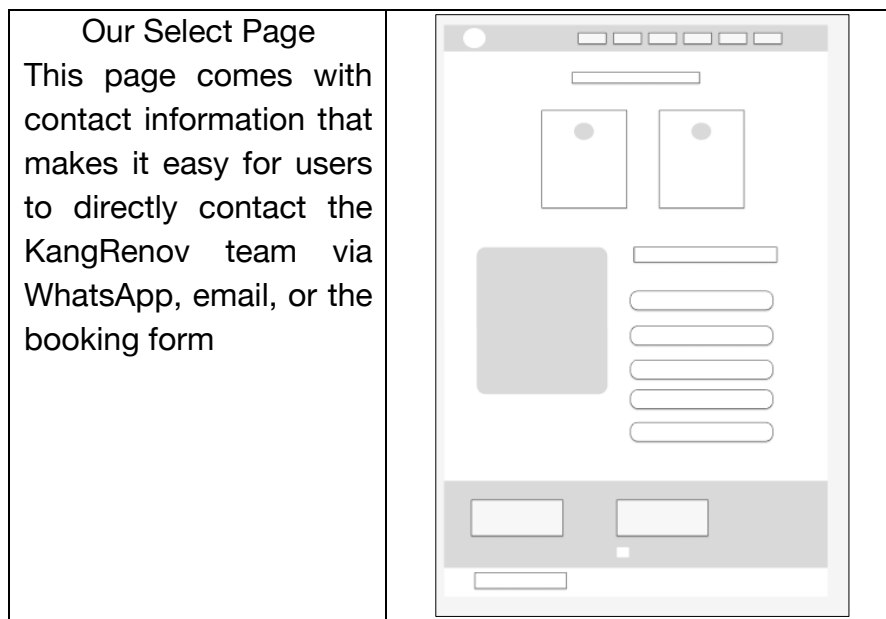
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<p>Home page</p> <p>From the results of interviews with users, it was concluded that the home page needs to be adjusted by removing the portfolio and partnership sections, as well as adding product information from handyman services to better suit the needs and expectations of users.</p>	
<p>Product page</p> <p>The product page added to the website aims to display various building material products or supporting equipment for handyman services available.</p>	

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<p>Profile page</p> <p>The profile page on this website provides complete information about the company's background. It contains a brief description of the company's main focus and services, as well as the vision and mission that are the basis for running a business</p>	
<p>Our service page</p> <p>Our service page on this website displays various kinds of handyman services and their explanations offered by KangRenov, such as architectural design, RAB calculation, etc.</p>	
<p>Article page</p> <p>The article page on this website contains various informative and educational content about renovation, home care, and building tips written directly by the KangRenovav team.</p>	

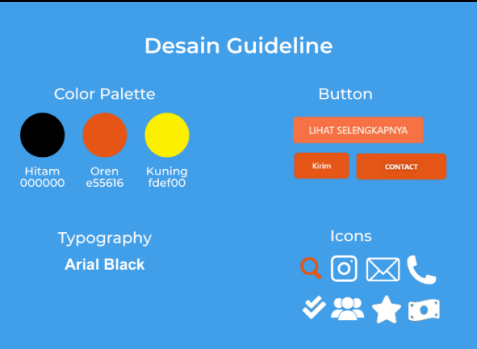

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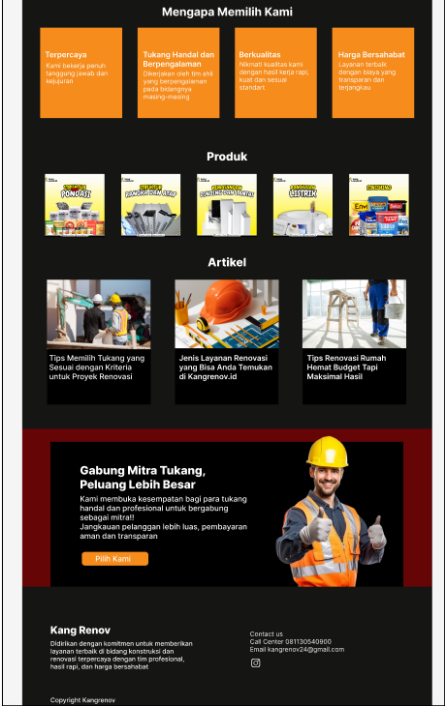

b. *High Fidelity Prototyping* (Mockup)

Table 2 Mockup design

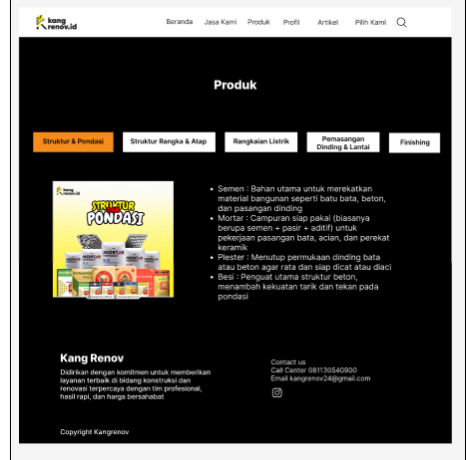

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<p>Design guideline</p> <p>It is composed based on the principles of consistency and uniformity in the use of colors, typography, icons, and buttons that are applied in the mockup creation process</p>	
<p>Home page</p> <p>Featuring various categories of handymen with attractive visuals. The booking process is designed to be simple through a step-by-step flow that makes it easy for users to book in just a few clicks. In addition, educational information is available in the form of reasons for choosing services and articles about homes to increase user trust.</p>	

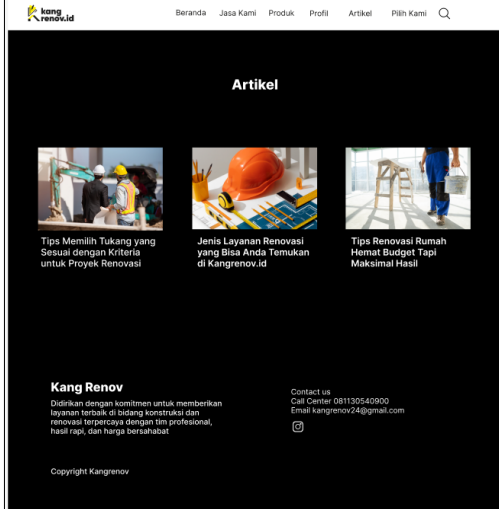
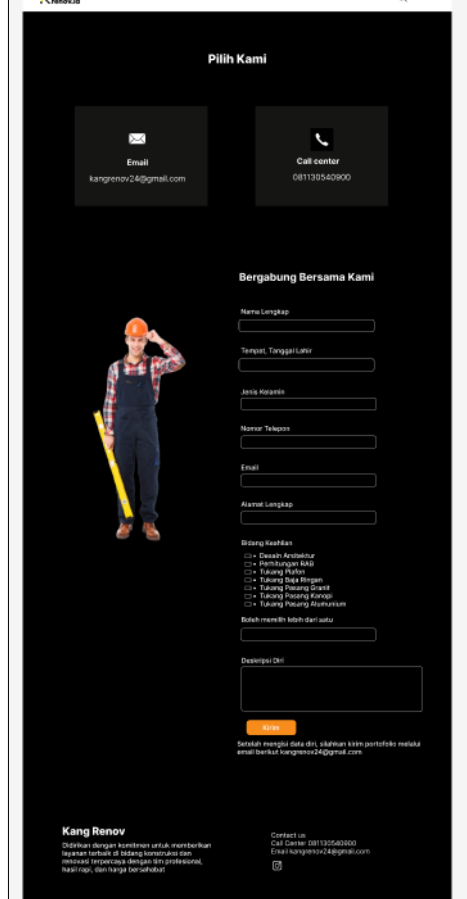
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<p>Our service page Featuring construction and renovation services with a neat design and a dark background that gives a professional feel. Each service is accompanied by a picture and a brief description to make it easier for users to understand.</p>	

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<p>Product page</p> <p>Each product group is displayed in the form of an image to give a creative impression and attract users. Each product in the category also has a brief description</p>	
<p>Profile page</p> <p>The title text is written in yellow and the description is white, so that the centralized text arrangement gives the main focus to the content.</p>	


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<p>Article page</p> <p>Each article is displayed in the form of a thumbnail image at the top, followed by the article title and a snippet of the contents in the form of an initial sentence. The main text uses white with the title displayed in bold.</p>	
<p>Our Select Page</p> <p>The top of the page displays a white email and admin contact for a professional feel, while the bottom contains a handyman registration form with a black background and an orange submit button. This design highlights the ease of access and professionalism for prospective handyman partners.</p>	

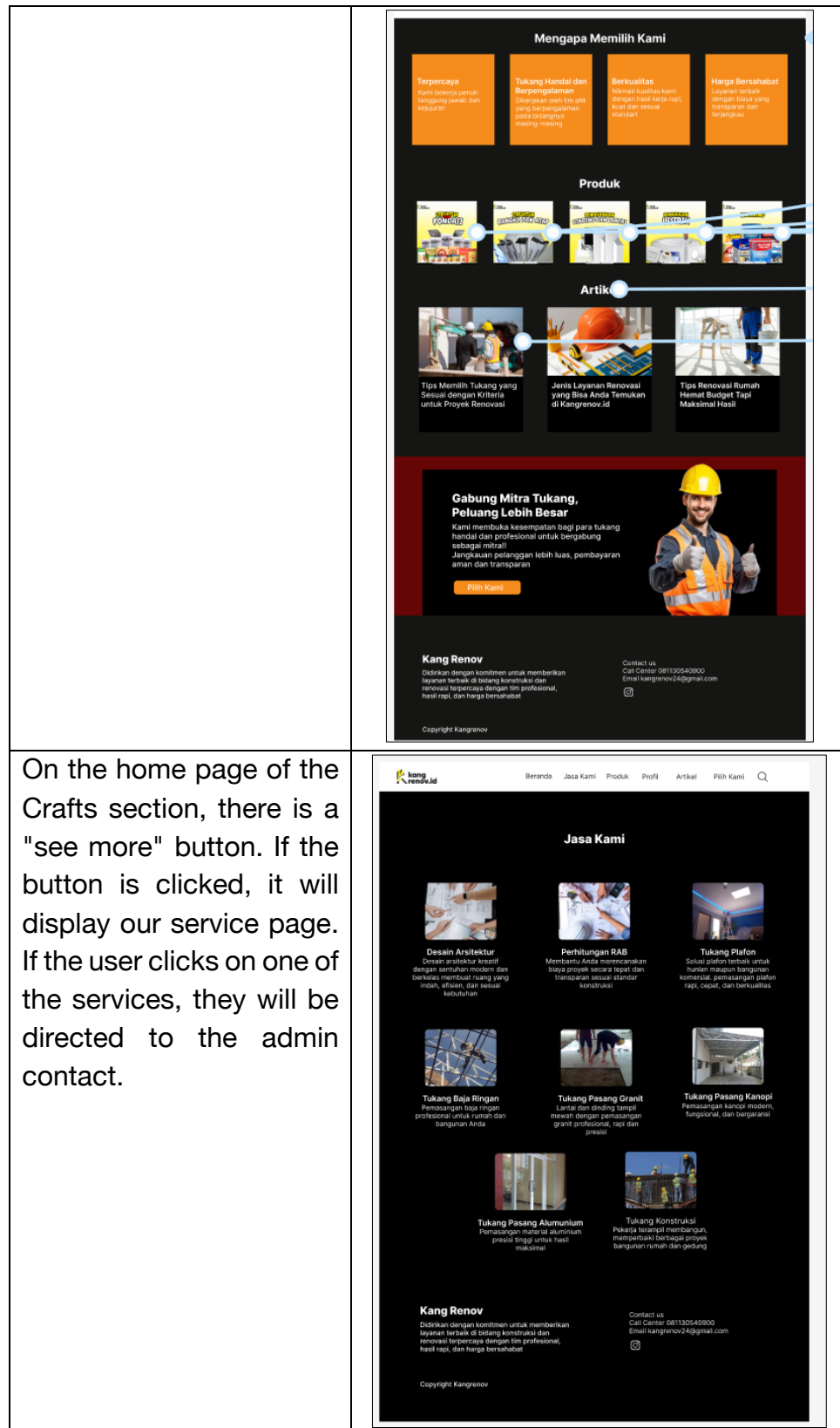
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c. High Fidelity Prototyping (Prototype)

Table 3 Prototype design

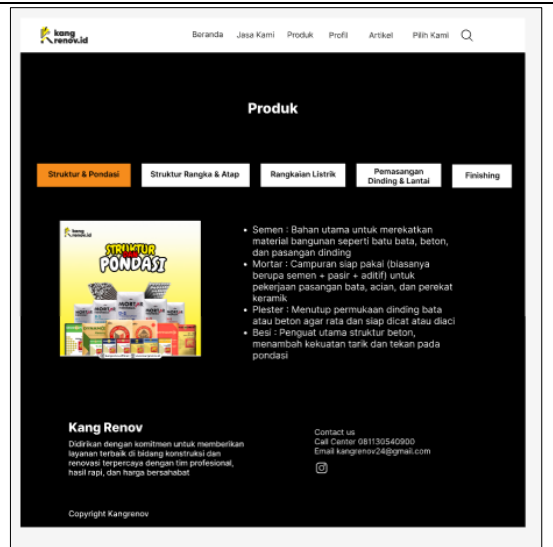
<p>Home page</p> <p>The first page appears when the user accesses the website. This page contains opening sentences, types of handyman services, various kinds of products, articles and supporting sentences inviting you to join as a partner.</p>	
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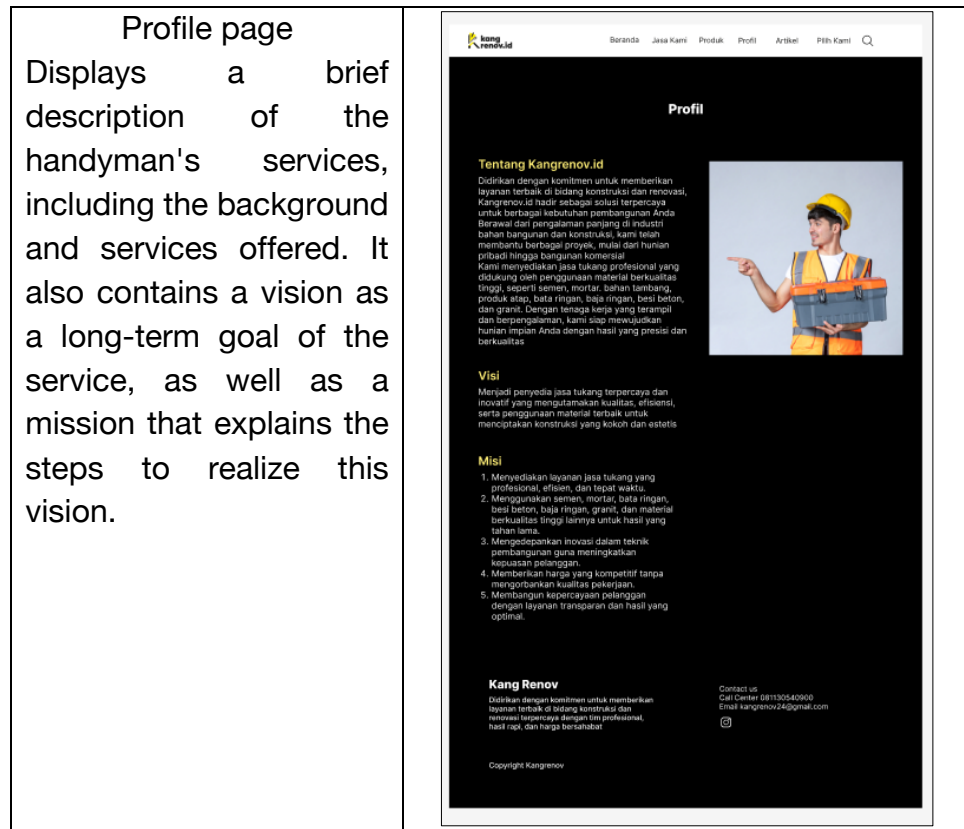
On the product page there are several categories of products. If one of the categories in the click will be displayed, there is also an explanation for each product.



In the article section, if the user clicks on one of these articles, the article page will appear. If the user presses the "choose us" button, the user will be directed to the whatsapp admin of the handyman service.



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4. Hasil Evaluate Against Requirements

a. Home page

Table 4 Result blackbox testing home page

No.	Test Class	Test Steps	Expected Results	Test Results	Status
1.	Handyman Services	Click on the category of handyman services to make sure the link points to the correct page	The handyman service category feature can display a list of handymen that are relevant to the selected service	The service category feature works as expected, displaying relevant results	Succeed
2.	Booking flow	User tutorial for the	Users can understand	Users complete the	Succeed

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		handyman service ordering flow	the booking flow without confusion	booking flow easily, and no confusion	
3.	Product	The user opens the product page through product clicks	The page displays the details of the products that the user clicked on	Users successfully display the entire product with detailed information	Succeed
4.	Article	The user opens the article page via the homepage	The system displays the full article, such as title, image, content	The article page is successfully displayed with all the expected elements, When clicking on the article redirects to the full content page of the article	Succeed

b. Our service page

Table 5 Result blackbox testing our services page

No.	Test Class	Test Steps	Expected Results	Test Results	Status
1.	A Variety of Craftsmanship Services	The user accesses the "our services" page through the top header	The page displays a list of various handyman services, complete with pictures and brief descriptions	The page displays all types of handyman services in complete and appropriate	Succeed

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c. Product page

Table 6 Result blackbox testing product page

No.	Test Class	Test Steps	Expected Results	Test Results	Status
1.	Various Products	Users access the "products" page through the top header or click on the product on the homepage	The system displays a complete list of available products, including images, product descriptions	The page successfully displays the product as expected. Image, name appears correctly	Succeed

d. Profile page

Table 7 Result blackbox testing profile page

No.	Test Class	Test Steps	Expected Results	Test Results	Status
1.	History, vision and mission	Check that the company's profile information (such as name, brief history, and service description) is clearly visible	A profile description is short, concise, and reflects the company's values	Users find the profile information easily at the top of the home page and it is quite informative	Succeed

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e. Article page

Table 8 Result blackbox testing article page

No.	Test Class	Test Steps	Expected Results	Test Results	Status
1.	Article	Check if the article section is easy to find on the home page and the article, the relevance of the article to the topic of handyman services	Article content is informative, relevant, and presented in easy-to-understand language	Articles relevant to the user's needs, such as tips on choosing a handyman or a renovation guide	Succeed

f. Our Select Page

Table 9 Result blackbox testing our select page

No.	Test Class	Test Steps	Expected Results	Test Results	Status
1.	Choose us	The user opens the "Choose Us" page through the header	The page displays contact information and partner forms	All contact information is clearly displayed. Partner form appears complete, the submit button is active	Succeed

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5. Black Box Testing *Results*

a. Calculation of the value of each table

$$\text{Nilai Efektivitas Tabel} = \left(\frac{\Sigma \text{ Pengujian sesuai}}{\Sigma \text{ Jumlah skenario pengujian}} \right) \times 100\%$$

Table 10 Calculation of the value of each table

Information	Testing Module	Calculation Results
Results Accordingly	Home Page	$\left(\frac{4}{4}\right) \times 100\%$ = 100%
	Our Services Page	$\left(\frac{1}{1}\right) \times 100\%$ = 100%
	Product Page	$\left(\frac{1}{1}\right) \times 100\%$ = 100%
	Profile Page	$\left(\frac{1}{1}\right) \times 100\%$ = 100%
	Article Page	$\left(\frac{1}{1}\right) \times 100\%$ = 100%
	Select Us Page	$\left(\frac{1}{1}\right) \times 100\%$ = 100%
Inappropriate Results	-	-

b. Calculation of the overall value

$$\left(\frac{\text{Nilai tabel A} + \text{Nilai tabel B} + \dots \text{Nilai tabel n}}{\Sigma \text{ Jumlah tabel skenario}} \right)$$

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$$\left(\frac{100\%+100\%+100\%+100\%+100\%+100\%}{6} \right) \times 100\% \\ = 100\%$$

The results of the calculation above show that all test modules are suitable, so that the prototype design of the handyman service website has a very effective achievement rate with an effectiveness ratio of above 80%. Thus, the total effectiveness value of the prototype design is 100%. Thus, the prototype design can already run according to the mechanism and function properly.

CONCLUSION

This study shows that the User Centered Design (UCD) method is effective in designing a prototype of a handyman service website that suits the needs of users. The process was carried out through four stages of UCD and two iterations of the design based on input from five PT SID employees. The results of the test with black box testing show that key features such as our homepage, services, products, profiles, articles, and select work according to the specifications. Further development is suggested to include the integration of ordering and payment systems, testing with the System Usability Scale (SUS) method, and the addition of reviews, ratings, and service notification features to increase user trust and convenience.

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