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Redesign of Residential Catalogue Websites With A Personal Extreme Programming Approach to Improve User Satisfaction

(Case Study: PT CBS Land Indonesia)

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Abstract

The property business always attracts the attention of many people, encouraging business people to compete to improve their business. One way is to use technology as an effective promotional tool to develop a business. This research involves the creation of a catalog-based website promotion system that assists PT. CBS Land Indonesia in promoting its business. The existence of this promotion system can ease the company's efforts in promoting properties to potential customers in an integrated manner. This system uses the CodeIgniter framework and employs the Personal Extreme Programming (PXP) method for website development, while website testing is conducted using black box testing and website testing is done using blackbox testing with the aim of knowing user satisfaction which is measured by increasing using SUS indicators. During Blackbox testing, the functionality of the housing catalog website is evaluated to ensure it meets user expectations. Meanwhile, the measurement of user satisfaction improvement is conducted by providing a questionnaire with SUS indicators to website users before the redesign is carried out. The result of this research is a catalog website design with various new features that PT. CBS Land Indonesia can use to reach a broader market. In conclusion, this research develops a catalog-based website promotion system for PT. CBS Land Indonesia, aimed at facilitating property promotion to potential customers. This system is built using the CodeIgniter framework and the Personal Extreme Programming (PXP) method, and a questionnaire with the System Usability Scale (SUS) indicator is used to measure the extent to which user experience satisfaction has increased.

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Abstrak

Bisnis properti selalu menarik perhatian banyak orang, mendorong para pelaku bisnis untuk bersaing meningkatkan usahanya. Salah satu caranya adalah dengan memanfaatkan teknologi sebagai alat promosi efektif untuk mengembangkan bisnis. Pada penelitian ini dilakukan pembuatan sistem promosi berbasis website catalog yang membantu Perusahaan PT. CBS Land Indonesia untuk mempromosikan bisnisnya. Adanya sistem promosi ini dapat memudahkan pihak perusahaan dalam mempromosikan property kepada calon customer secara terintregrasi. Sistem ini menggunakan Framework Codeigniter dengan menggunakan metode Personal Extreme Programming (PXP) untuk pengembangan website, dan pengujian situs web dilakukan dengan blackbox testing dengan tujuan mengetahui kepuasan pengguna yang diukur peningkatannya memakai indikator SUS. Selama Blackbox testing, fungsionalitas situs web katalog perumahan dievaluasi untuk memastikan memenuhi ekspektasi pengguna.. Sedangkan pengukuran penigkatan kepuasan pengguna dilakakukan dengan cara memberikan kuesioner dengan indikator pertanyaan SUS kepada pungguna website sebelum dilakuakan redesign. Hasil dari penelitian ini adalah design website katalog dengan berbagai fitur baru yang dapat digunakan PT. CBS Land Indonesia untuk menjangkau pasar yang lebih luas. Kesimpulannya Penelitian ini mengembangkan sistem promosi berbasis website catalog untuk PT. CBS Land Indonesia, yang bertujuan untuk mempermudah promosi properti kepada calon pelanggan. Sistem ini dibangun menggunakan Framework Codeigniter dan metode Personal Extreme Programming (PXP), serta diuji dengan metode Blackbox testing untuk memastikan fungsionlitas fitur website, dan kuesioner dengan indikator System Usability Scale (SUS) digunakan untuk mengukur seberapa besar peningkatan kepuasan pengalaman pengguna.

Kata Kunci: Website Catalog; Personal Extreme Programming; SUS; Property; Kredit Pemilikan Rumah.

INTRODUCTION

The development of the globalization era has caused many companies to be required to be more efficient and selective in maintaining business sustainability. One of the methods that can be done to compete is how companies can reach and provide information to consumers quickly, which can be done through promotion by utilizing the power of technology. Promotion is a way used to increase sales, with the aim of introducing a product to consumers and convincing them of the benefits of the product (Rangkuti, 2009).

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In technological advancements, promotions are not only carried out conventionally but also digitally. One of the media for digital promotion is a catalog website. E-catalogs facilitate interaction between companies and consumers by providing digitally structured product information, such as descriptions, prices, and images (Laudon, K. C., & Laudon, 2003). This makes it easier for consumers to make decisions because data can be accessed anytime and anywhere.

A real estate company is a type of company that uses a catalog website as a means to carry out promotional activities. According to A.Rafin, housing can be defined as a set of houses that form a residential area or environment, complete with supporting facilities and infrastructure (Rafin, 2013). Although it is fairly new because it was established in 2023, Grand Kemayoran Madura has a solid foundation because it is supported by management with more than two decades of experience in the property industry. Grand Kemayoran Housing is a housing project strategically located in the middle of Bangkalan City, designed to meet the needs of modern housing. In less than a year, this project managed to achieve the sale of approximately 150 units, reflecting the public's interest in the housing offered. With its attractive design and well-equipped facilities, Grand Kemayoran not only offers comfort, but also easy access to a wide range of public facilities, making it an ideal choice for families and individuals in the Bangkalan City area. The application of e-catalog websites can be one of the effective promotional media to expand market reach and increase the visibility of housing products. Users are facilitated to access complete information on the housing units offered, including prices, building specifications, and facilities around the housing. This is an advantage for users. In addition, the e-catalog website also allows prospective buyers to compare housing options, contact the admin directly, and be able to request further information without having to come directly to the location. Thus, e-catalog websites play an important role in supporting a more efficient marketing process for user needs.

However, since its inception, PT. CBS Land Indonesia has not maximized the use of information technology in its promotional strategy, such as in the use of catalog websites. This causes house sales not to reach their maximum potential. Based on this problem, PT. CBS Land Indonesia needs a system that can facilitate the promotion and sale of *property*. Thus, a web-based information system was created with the aim of speeding up sales and making it easier for potential buyers to find and choose existing

property information. This system allows potential buyers to get information without having to visit a marketing office, as they can view home catalogs online, access detailed information and specifications, and perform credit simulations directly on the web.

This study provides theoretical benefits by enriching the literature related to the use of *the personal Extreme Programming* (PXP) method in the development of web-based systems and *usability* evaluation by applying *the System Usability Scale* (SUS), especially in digital catalog systems in the property industry. Practically, in terms of business, this catalog website makes it easier to promote and sell houses by providing flexible access to information without time or location restrictions, improving the company's operational efficiency, user satisfaction, and PT CBS Land Indonesia will have more competitiveness in the property market, especially in terms of the use of technology in the business realm. In addition, this research is expected to improve user experience satisfaction by creating a website that is more *user-friendly*, easy to navigate, and responsive to user needs. It is hoped that users will feel more satisfied with the ease of finding property information, seeing the details of the house visually, and getting a smoother and more enjoyable experience during the exploration process. With a positive user experience, it is expected to increase user satisfaction levels, as well as encourage them to be more active in conducting property searches and recommendations to others.

Some theories or definitions relevant to this study will be explained. *First*, A website is an information platform that can be accessed online by internet users (Abdulloh, 2015). *Second*, user experience satisfaction is an indicator that shows the extent to which users feel satisfied when interacting with a product or service, especially in the context of applications or websites (Adoe, 2023). *Third*, As an evaluation method, *System Usability Scale* (SUS) offers an efficient and simple measuring tool, yet still reliable (Sembodo et al., 2021). *Fourth*, PHP (*Hypertext Preprocessor*) is a *Skrip server-side* which works in conjunction with HTML to create dynamic web pages. This means that all PHP syntax and commands are executed on the server, and the output is sent to the browser as HTML (Mulyana, 2016). *Fifth*, as a CSS framework, bootstrap offers a variety of basic interface components for websites that are designed to be used simultaneously to speed up development (Luplhy, 2015). *Sixth*, HTML, which stands for Hyper Text Markup Language, is a standard language used to display text, images, video, and audio on web pages (Rizky, 2011). *Seventh*, MySQL is one of the database management systems (DBMS) among various other DBMS such as Oracle, MSSQL, PostgreSQL, and others (Anhar, 2010).

Eighth, Visual Studio Code (VS Code) is a lightweight yet very powerful text editor developed by Microsoft to support a wide range of operating systems, including Linux, macOS, and Windows (Permana & Romadlon, 2019). *Ninth*, figma is a UI design tool that allows the development of user interface interfaces for desktop, mobile, and various similar platforms (Al-Faruq et al., 2022). *Tenth*, A wireframe is a basic design design used to arrange and place elements on an application page, created before the main design process begins. (Sweetania, n.d.). *Eleventh*, in the world of software development, *prototype* refers to an early version or prototype of a program.

METHODS

This research is included in the category *Research and Development* (R&D) with a Technology Readiness Level (TKT) at level 6. A descriptive qualitative approach is an option in this study, where the data collected and analyzed prioritize verbal, narrative, and visual forms, rather than purely numerical or statistical data (Thobby Wakarmamu, 2022). The function of this approach is to comprehensively describe the process of designing and developing the system, as well as assessing the user experience of the system.

This research takes place in Grand Kemayoran Madura, a housing that is strategic and easily accessible to prospective buyers because it is close to the city center. The selection of this location is based on the large market potential due to the ease of access, but the development of the existing housing catalog website is currently less than optimal. Of the 150 Madurese residents who bought property and accessed the website before the development was carried out in Grand Kemayoran Housing, 5 people were selected as the population in this study. Grand Kemayoran customers who had visited the website before development and were able to evaluate the changes after development, became questionnaire respondents in this study. In this study, 5 buyers of Grand Kemayoran Housing were selected as samples through the *purposive sampling*. They are 30-50 years old, used to using gadgets, and had previously accessed the housing catalog website before the redesign. This selection aims to gather information regarding the needs of users in the development of the website (Yusuf et al., 2018). While the sample to validate the results of the website is *Leader* and *Staff* PT CBS Land Indonesia.

The data collection techniques used were observation, interviews, questionnaire distribution, and company documentation (Scott, 2009). The

Likert scale is used as an instrument to collect research data, especially in questionnaires. In surveys, the Likert scale is often used as a psychometric measuring tool to assess the attitudes, views, or perceptions of respondents. Questionnaire data was processed using SUS (*System Usability Scale*) to determine the website usability score. In the process of developing the system, this study adopts the workflow of the *Personal Extreme Programming* (PXP), starting from the *requirement*, *planning, iteration initialization, design, implementation, testing (blackbox testing),* and *retrospective*. The seven stages can be defined as follows.

1. *Requirment*

   The requirement stage includes data collection, especially using interview techniques that are often used by researchers.

2. *Planning*

   Planning is a stage where planning is carried out thoroughly, including how the module will be done in each iteration based on *the user stories* obtained, determining *story points*, determining priorities through a ranking system, and determining the order of work based on *velocity*.

3. *Iteration Initialization*

   Iteration Initialization is the initial stage in each iteration of the work. At this stage, the *user story* to be worked on has been predetermined in the planning phase.

4. *Design*

   In the design phase, a system model to be developed during the iteration is created. The design of this system is based on the results of an analysis of *existing requirements*, without the addition of new designs despite changes in development.

5. *Implementation*

   In the implementation stage, the website-based system will be built using the CodeIgniter framework and PHP and HTML programming languages, with MySQL as a database to store all residential data, such as property data.

6. *Testing (Blackbox Testing)*

   At this stage, testing is carried out on the implementation results of the housing catalog website.

7. *Retrospective*

   This phase focuses on identifying bottlenecks in the iteration development process as well as assessing the accuracy of schedule estimates compared to the actual implementation duration.

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RESULT AND DISCUSSION

Development of the Grand Kemayoran Housing Catalog Website System Before Design

The method of designing the Grand Kemayoran housing catalog website system is *Personal Extreme Programming* (PXP), part of the *Agile* framework. PXP has seven main stages, namely needs identification, planning, iteration, design, implementation, system testing, and re-evaluation. This method divides the development process into small iterations, allowing teams to adapt to changes and make continuous improvements. This ensures that the system can continue to evolve as needed during the development process. The following are the steps that must be followed in developing a system using the PXP method:

No.	Stages	Steps
1.	*Requirment*	At this stage, data collection is carried out using the most common technique used by researchers, namely the interview technique. Interviews were conducted with five customers who had used the Grand Kemayoran website to buy houses.
2.	*Planning*	Developers will create modules gradually (in each iteration), with reference to user stories that have been collected in previous phases. After getting user stories, the next step is to determine the estimated processing time for each section, or called story points. Then, each user story is prioritized through a ranking system. This system can sort user stories based on their level of importance, ranging from the most important to the least priority. Once the estimated time and priority for each user story is obtained, the developer together with the user will determine the order of work based on the speed of completion, or what is referred to as velocity. Each iteration will focus on completing user stories until they reach a predetermined velocity limit.
3.	*Iteration Initialization*	This stage involves working on the user story that has been determined in the planning phase.
4.	*Design*	In the design phase, a system model to be developed during the iteration is created. The design of this system is based on the results of an analysis of existing requirements, without the addition of new designs despite changes in development. The following is an initial look at the Grand Kemayoran website before the redesign process was carried out. a. Grand Kemayoran Home Page Page Display 

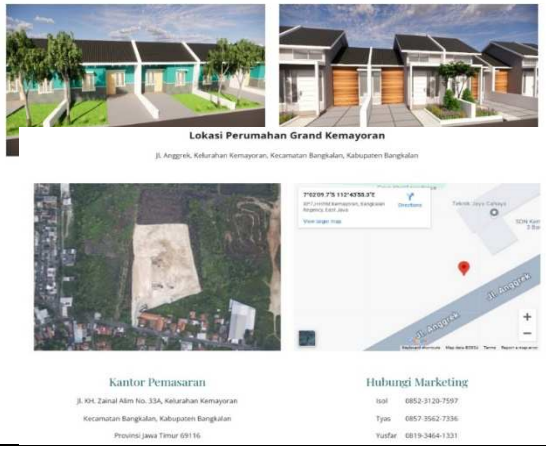
		b. Page View, Home Type and House Details c. Grand Kemayoran Housing Location Page and Contact Person Admin 
5.	*Implementation*	In the development of a website-based housing catalog system, the CodeIgniter framework will be used together with the PHP and HTML programming languages, with MySQL as the database to store all property information. CodeIgniter was selected based on its ease of use, lightweight performance, and support for the MVC (Model-View-Controller) paradigm and object-based programming, which makes code management easier and speeds up the development process. This combination allows the system to dynamically manage data from MySQL, so that property information can be presented to users accurately and in real-time. An organized and secure code structure is also guaranteed thanks to CodeIgniter's existing routing and templating features.
6.	*Tasting (Blackbox Testing)*	At this stage, testing is carried out on the implementation results of the housing catalog website. The following is a blacbox testing scenario that will be carried out on the Grand Kemayoran housing catalog website.
7.	*Retrospective*	The final phase in each iteration is retrospective. In this phase, we will discuss various obstacles that arise during the iteration development process. In addition, this phase also evaluates the extent to which the estimated development schedule is in accordance with the actual implementation time. If there is a discrepancy between the estimate and the actual time, this will be a matter of introspection for the developer so that similar issues do not repeat in the next iteration.

Table 1 Stages and Steps of Grand Kemayoran Housing Catalog Website System Development Before Design

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Results of User Experience Satisfaction Calculation Using *System Usability Testing* (SUS) Before Redesigning the Grand Kemayoran Housing Catalog Website

The test was carried out by sharing a Google Form link containing a questionnaire to five respondents who had accessed the Grand Kemayoran housing catalog website. Respondents can fill out a questionnaire after receiving a form link from the researcher, which contains survey questions using *the System Usability Scale* (SUS).

The table below outlines the results of the calculation of the user experience satisfaction questionnaire (*System Usability Scale* - SUS) before the Grand Kemayoran housing catalog website was redesigned.

NO	Responden	Skor Hasil Hitung										Jumlah	Nilai (jumlah x 2.5)
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10		
1	Responden 1	1	3	2	1	3	2	1	1	3	2	19	47.5
2	Responden 2	2	1	3	2	2	3	3	2	2	3	23	57.5
3	Responden 3	1	2	1	1	1	3	2	3	3	2	19	47.5
4	Responden 4	1	1	2	2	1	2	2	1	2	1	15	37.5
5	Responden 5	3	3	2	1	3	3	2	3	2	1	23	57.5
Jumlah skor Rata-rata													40

Figure 1 Questionnaire Calculation Results
Source: Processed by the author

The calculation provides a score which is then visualized in the form of *an adjective rating*. The following are the visual results of the SUS test that has been carried out.

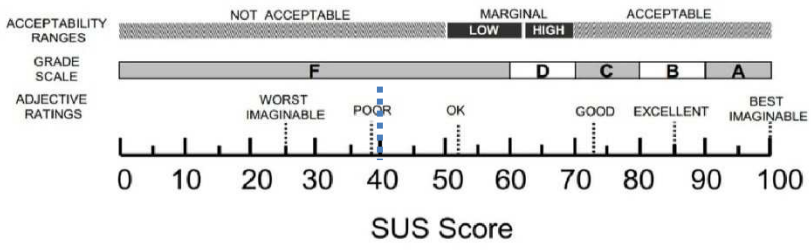

Figure 2 Adjective Rating SUS Score
Source: Processed by the author

The Grand Kemayoran housing catalog system received a score of 40 (*Poor*), well below the eligibility limit of 68. This indicates that the website *usability* level is still low and needs significant improvement. Users feel that the system is not easy to use, there are confusing or inefficient elements, and there is a need for improvements to the display design, features, integration of functions, and the overall user experience.

Development of Kemayoran Housing Catalog Website with a *Personal Extreme Program* Approach After Design

1. **Application of *Personal Extreme Programming Method***

The *Personal Extreme Programming* method was used in this study to build a catalog website system. Here are the seven stages of implementing PXP as a software development method.

a. Collection of User Needs (*Requirement*)

Before designing the system with *the Personal Extreme Programming method, user stories* became a crucial step in this study. To get *user stories*, it is necessary to conduct interviews with Grand Kemayoran customers who had used their website before the redesign, as well as with company representatives. The content includes the necessary and essential features for the construction of the system. The following is a design of user stories at the beginning of user needs.

1. As a user, I want to be able to contact the admin through the chat feature that is integrated into the WhatsApp application.
2. As a user, I want to use the mortgage calculation feature.
3. As a user, I would like to see the full details of each available property price, location, and surrounding facilities.

Table 2 Design of User Stories at the Beginning of Needs

In the development process, there are several changes to the design of the system that is built, the company asks to change some points from the initial needs which will then be redesigned, but these changes are also adjusted to the process of the stages that have been running.

The following are the updated user stories.

1. As a user, I want to be able to contact the admin through the chat feature that is integrated into the WhatsApp application.
2. As a user, I want to use the mortgage calculation feature.
3. As a user, I would like to see the full details of each available *property* price, location, and surrounding facilities.
4. As an admin, I want to see As an admin, I want to see a graph of the growth of the number of website visitors every day and every month to analyze the effectiveness of the website.

Table 3 Designed User Stories After Updated

b. Planning

After designing *the user story*, an estimated work time is carried out based on the level of difficulty. Initially, it was identified into three *user stories* with the following estimates: WhatsApp chat

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feature for 2 days, mortgage calculation for 3 days, and property details for 4 days. After the update, a fourth *user story* was added by viewing the website visitor graph for admins for 3 days.

The priority *of the user story* is determined through discussion, taking into account the value (*critical, significant business value,* or *nice to have*) and risk. For value, chat features, mortgage calculations, and property details are categorized as critical, while viewing visitor graphs as *significant business value*.

The risk level is determined based on completeness, *volatility*, and complexity, divided into *low* (0-1), *medium* (2-4), and *high* (5-6) levels. Based on this assessment, chat features, mortgage calculations, and property details have medium risk, while *user stories* to view visitor graphs have a *high risk*. The following are the results *of the risk story* after it was updated.

Code	Kode *User Story*	Completeness	Volatility	Complexity	Risk Index	Risk Level
Story-01	As a user, I want to be able to contact the admin through the chat feature that is integrated with the WhatsApp application.	1	1	1	3	Medium
Story-02	As a user, I want to use the mortgage calculation feature to find out the estimated monthly installment.	1	1	2	4	Medium
Story-03	As a user, I want to see the details of each *available property* price , location, and surrounding facilities.	1	0	1	2	Medium
Story-04	As an admin, I want to see a graph of the growth of the number of website visitors every day and every month to analyze the	1	2	2	5	Hight

	effectiveness of the website.					

Table 4 Risk Story After Updated

c. *Iterantion Initialization*

1) Iteration 1

This process is carried out after the implementation of the program has been carried out, then *the user stories of initial needs will be adjusted to the features of the system that has been built.* The following table presents detailed user stories from the first iteration.

No	Date	***User Stories***
1	31 October 2024	1. As a user, I want to be able to contact the admin through the chat feature that is integrated into the WhatsApp application.
2	31 October 2024	2. As a user, I want to use the mortgage calculation feature.
3	31 October 2024	3. As a user, I would like to see the full details of each available *property* price , location, and surrounding facilities.

Table 5 User Stories Iteration 1

2) Iteration 2

The results of iteration 1 contain input to add *user stories*, then the addition is implemented in the second iteration *of user stories*. The implementation of the first iteration can be seen in the following table.

Yes	**Date**	***User Stories***
1.	October 31, 2024	As a user, I want to be able to contact the admin through the chat feature that is integrated into the WhatsApp application.
2.	October 31, 2024	As a user, I want to use the mortgage calculation feature.
3.	October 31, 2024	As a user, I would like to see the full details of each *available property* price , location, and surrounding facilities.
4.	20 February 2025	As an admin, I like to see the number of website visitors every day and every month to analyze the effectiveness of the website.

Table 6 User Stories Iteration 2

In the second iteration, all *user stories* are accepted and there are no additions or changes to features. The iteration of the system design is completed and according to the needs of the users in iteration 2. The results of the entire iteration will be implemented into the program based on *user stories* iteration 2.

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d. *Design*

In the design phase, a system model is developed during iteration, based on a needs analysis. In this study, the design includes a Use Case Diagram, Activity Diagram, and System Architecture.

1) *Use Case Diagram*

a) Use Case User Diagram

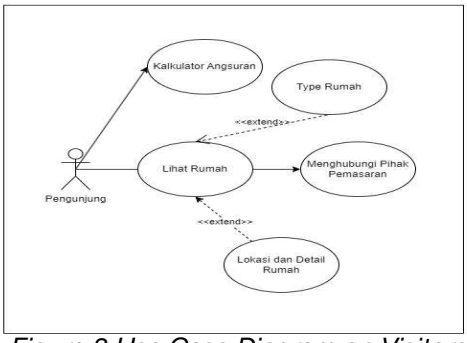

Figure 3 Use Case Diagram on Visitors

The main feature of this system is "View Houses", which allows visitors to access property listings. This feature can be expanded with "Home Type" and "Home Location and Details" for additional information. After seeing the house, visitors can immediately "Contact the Marketing Party" for further information or transactions. In addition, users can also calculate installments using the installment calculator feature.

b) Use Case Diagram Admin

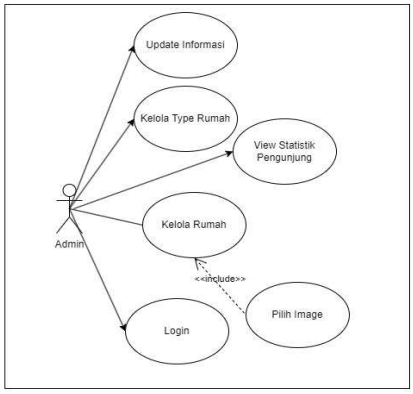

Figure 4 Use Case Diagram on Admin

Admins have two main *use cases*, namely *Login* and managing data. *Logging in* is the first step. In Manage Home Types, admins can add, edit, or remove home categories, which are important for classification. Meanwhile, in Manage

House, admins can add, edit, and delete home data. When adding a house, the admin must choose the type of house that already exists and upload a picture of the house and a brochure. Admins also have access to *Statistics View* to view visitor data.

2) *Use Case Diagram Description*

The following is an explanation of the actors and *use cases* in the *use case diagram* after the redesign for the Grand Kemayoran Housing Catalog.

Actor	Description
Admin	The admin actor is aimed at the website manager where this actor has access to login and manage house type data, house data, and website information
Pengunjung	Visitor Actor is a party who wants to use the website for the purpose of seeking information about *property.*

Table 7 Definition of Actor

Use Case	Description
View Home	This activity is carried out by visitors to see the houses available from the website. Visitors can view the details of the house and also print brochures of the selected house.
House Type	This activity is carried out by visitors to see the types of houses available from the website. The user chooses the type of house that suits his needs (Type 27/72 or Type 36/84).
House Details	This activity is carried out by visitors to see the details of the house such as information about the location, building area, land area, and facilities provided.
Installment Calculator	This activity is carried out by visitors to find out the range of house installments by entering some data
Contacting Marketing	This activity is carried out by *the user* to communicate with the marketing party, by pressing the whatsapp button which will lead to the marketing party's number for further discussion.
Login	This activity allows admins to log in to the admin dashboard.
View Visitor Statistics	This activity is carried out by the admin to see visitor data on a daily or monthly basis.
Manage home data	This activity is carried out by the admin to manage house data on the website. Admins can perform CRUD activities for home data.
Manage home type data	This activity is carried out by the admin to manage house type data on the website. Admins can perform CRUD activities for home-type data.
Update information	This activity is carried out by the admin to update location and contact information on the website.
Select Image	This activity is carried out by the admin to complete the house data by filling in the house pictures and brochures. The image data will be connected to the home data.

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Home Data Select Type	This activity is carried out by the admin to complete the house type data by filling in the available house type data.

Table 8 Use Case Definitions

3) Flowchart of Users and Admins of the Grand Kemayoran Housing Catalog Website
   a) Flowchart Website Catalog Housing Grand Kemayoran (User)

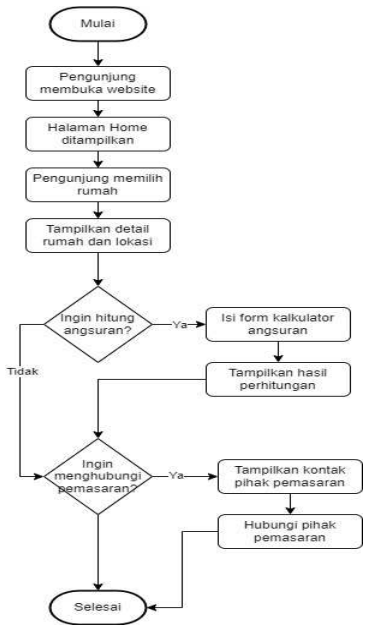

Figure 5 Flowchart Website Catalog of Grand Kemayoran Housing (User)

The flowchart above outlines the user's interaction with the residential website, starting from accessing the main page to completing the process. Users can select and view the details of the home, including its location. Furthermore, they can calculate the estimated installment via a calculator; If filled, the system displays the results. If not, or after the calculation, the user is offered the option to contact the marketing party. If you agree, marketing contact information and direct communication options will be displayed. The process ends after the communication is complete or if the user chooses not to call.

b) Flowchart Website Catalog Housing Grand Kemayoran (User)

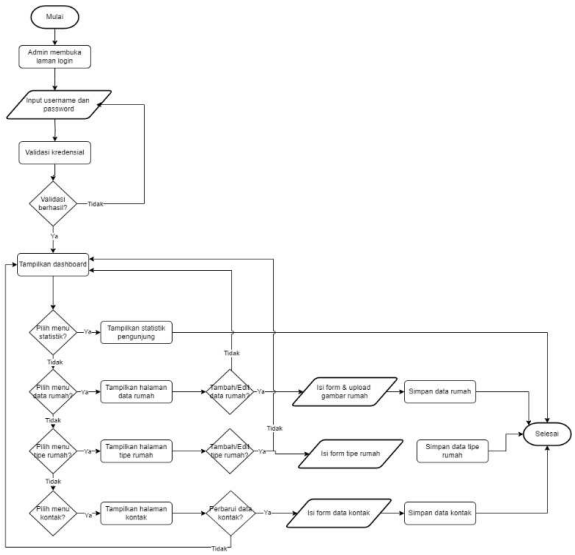

Figure 6 Flowchart Website Catalog of Grand Kemayoran Housing (Admin)

The flowchart above outlines the admin workflow on a residential website. Starting with login, the admin enters the system-validated credentials. After success, the admin is redirected to the dashboard to access menus such as visitor statistics, home data, home type, and contacts. Selecting statistics will display visitor data. In the home data menu, admins can add or edit via input forms with the image upload feature, then the data is saved. The same applies to the home-type menu, where the admin fills out a form for additions or updates. For the contact menu, admins can fill out and save the information update form. This process ends after all administrative activities are completed.

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e. Implementation

1) Application *of Mockups* and *Prototypes* in the Development of the Grand Kemayoran Housing Catalog Website

a) Home Detail Display Design

The property details page presents complete information about the home unit, including prices, types, specifications and a brief description. Available features include an installment calculator to help calculate installments, brochure download options, and admin contact

button for more information.

Figure 7 Home Detail Page Mockup View

b) Mortgage Installment Calculation Display Design

The installment calculator page allows users to calculate the estimated monthly home installment. Simply enter the house price, down payment, and payment duration, and the system will automatically calculate the installments based on the assumption of interest. This feature helps potential buyers plan financing.

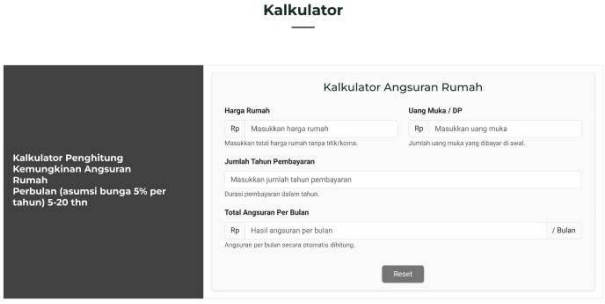

Figure 8 Mortgage Installment Calculation Mockup Display

c) Display Design Contacting Admin Integrated with WhatsApp

The "Contacting Admins" section features marketing and social media contacts, designed to make it easy for users to access more information.

Figure 9 Admin Contact Mockup View

d) Visit and Visitor Display Design

The Visitor Data page presents statistics of website visitors by time. Equipped with graphs and tables, it makes it easy for admins to monitor the number of visitors and daily, weekly, and yearly visits.

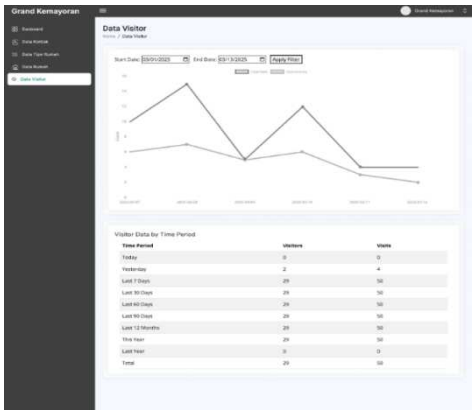

Figure 10 Mockup Display of Visit and Visitor

e) Prototype Website Catalog Perumahan Grand Kemayoran

Grand Kemayoran Housing Website Navigation

The *landing page* provides intuitive navigation for users:

- "Home" button: Go directly to the property listing, and clicking on one will bring up its full details.
- "Amenities" button: Auto-scrolls to the available amenities section.
- "Calculator" button: Directs to the installment simulation calculator for installment estimation calculation.
- "Location" button: Displays residential location details, including Google Maps.
- "Contact" button: Goes to the marketing contact information page (WhatsApp, social media).

Access and Admin Dashboard

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The "Dashboard" button in the navigation will redirect the user to the admin login page. Once the login is successful, the admin will enter the main dashboard which displays the management menus in the sidebar.

- Contact Data: Displays address information, WhatsApp marketing, Instagram, and Google Maps location.
- Home Type Data: Displays a list of home types and options for adding new types.
- Home Data: Displays all existing home data and new data addition features.
- Visitor Data: Displays a *real-time graph of website visitor statistics*.

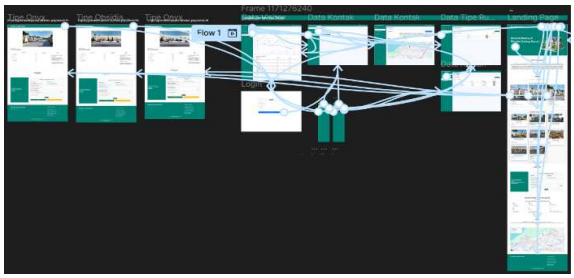


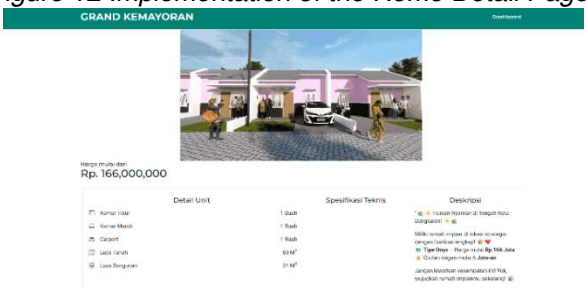
Figure 11 Prototype of Grand Kemayoran Housing

2) Grand Kemayoran Website Display

a) Home Detail Page View

The house details page presents complete information about the selected unit, including price, drawings, details (number of rooms, carport, land/building area), technical specifications, and description of advantages. The goal is to help visitors understand the property before deciding to buy.

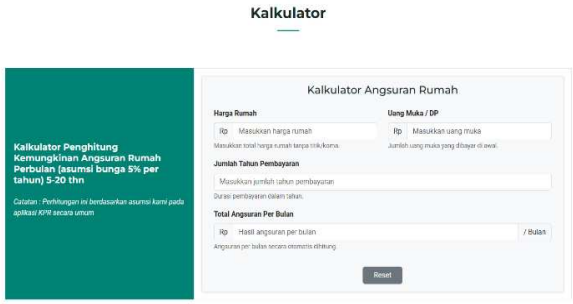
Figure 12 Implementation of the Home Detail Page



b) Mortgage Budget Calculation Page Display

The installment calculator feature allows users to calculate the estimated monthly home installment. Users only need to enter the house price, down payment, and payment duration (5-20 years). The system will automatically display the results based on interest rate assumptions, helping users get an idea of the cost before purchasing a property.

Figure 13 Installment Calculation Page Implementation



c) Contacting Admin Page Display Integrated with WhatsApp

The website's contact page displays communication information such as WhatsApp marketing contacts and official social media links (Instagram, TikTok). The goal is to make it easier for users to contact the marketing team for information or property purchases.

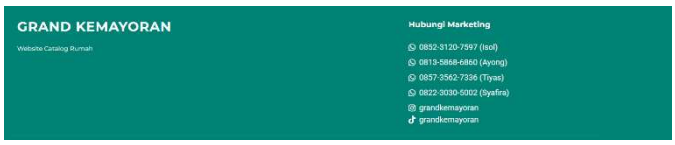


Figure 14 Implementation of the Contacting Admin Page

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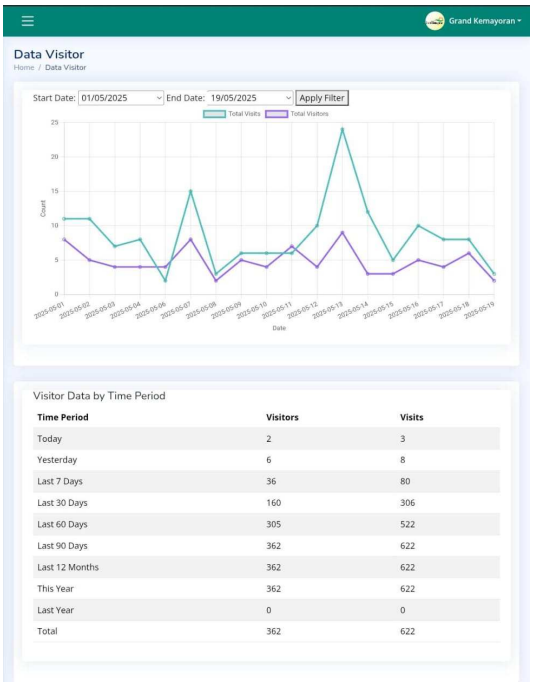
d) Visit and Visitor Page Views

The Visitor Data page presents statistics on the user's website visits. Admins can use date filters to see the number of visitors and visits in a specific time period.

Figure 15 Implementation of Visit and Visitor Pages



f. Testing (Pengujian *Blackbox Testing*)

1) Test Results

a) Blackbox Testing Table Website Page (To the Company, Marketing Team and President Director of PT. CBS Land Indonesia)

Yes	Test Class	Test Steps	Expected Results	Test Results	Result
1.	WhatsApp Chat Features	1. Users click the WhatsApp icon on the website 2. The user is redirected to WhatsApp Web.	The user is redirected to WhatsApp Web with the conversation ready to use.	WhatsApp icon works well, open conversation on WhatsApp web.	Succeed
2.	Mortgage Calculator (Web)	1. User fills in the parameters of the mortgage calculator. 2.Change parameters and recalculate installments.	The calculator displays installments as per input, is changeable, and works on mobile devices.	The calculator works well, and can update installments.	Succeed

		3. Use a calculator on a mobile app.			
3.	Property Page (Web)	1. Users view property details, prices, specifications, and residential location maps.	Clearly displays property details, prices, specifications, and a map of residential locations.	The *property details*, prices, and maps of the residential location are well and clearly visible.	Succeed

Table 9 Test Blackbox on Website Pages

b) Blackbox Testing *Test Table* for Category Admin Pages

Yes	Test Class	Test Steps	Expected Results	Test Results	Result
1.	Admin Features to Add Housing Categories	1.Admin adds a new category 2. Fill in category information. 3. Save categories.	The new category appears on the residential category page after it is saved.	The admin managed to add a new category, appearing complete.	Succeed
2.	Admin Feature Edit Housing Categories	Admins can edit housing categories.	Admins can see updates to the housing category after the information is updated.	Admins managed to see updates to the residential category with the updated information performing as expected.	Succeed
3.	Admin Feature Deletes Housing Categories	Admins can delete housing categories.	Admins can delete the selected housing category, so that it no longer appears in the housing category list.	The admin successfully deleted the selected housing category, and the category no longer appears in the housing category list, as expected.	Succeed

Table 10 Testing Blackbox Testing Admin Page Categories

c) Housing Data Admin Page

Yes	Test Class	Test Steps	Expected Results	Test Results	Result
1.	Housing CRUD Admin Features (Create)	1. Admin adds a new home catalog. 2. Fill in housing information. 3.Storing data.	New housing data is stored correctly.	The admin successfully added a new housing, and it was successfully displayed in the housing list.	Succeed

2.	Housing CRUD Admin Features (Read)	1.Admin can view the details of the home catalog. 2.Check the price information, specifications, and drawings.	Displays complete detailed housing information.	The admin managed to see the housing details completely.	Succeed
3.	Housing CRUD Admin Features (Update)	1.Admin edit the home catalog. 2.Change price information, location, description, and drawing. 3. Save changes.	Changes are saved correctly and visible in the housing details.	The admin successfully edited the housing data, the changes appeared correctly.	Succeed
4.	Housing CRUD Admin Features (Delete)	1.Admin deletes the home catalog.	Removed housing will disappear from the list.	The admin managed to remove the housing, it disappeared from the list.	Succeed

Table 11 Testing Blackbox Testing Admin Housing Data Page

d) Visitor Data Admin Page

No.	Test Class	Test Steps	Expected Results	Test Results	Result
1.	Data Visitor Admin Features	1. Admin logs in to the dashboard page and opens the "Visitor & Visit" menu. 2.Admin checks the number of visitors and visits recorded in the system. 3.Admin uses filters to view data by day and month.	Admins can see the number of visitors and visits per day and per month accurately.	1.The dashboard page is successfully displayed with the "Visitor & Visit" menu accessible. 2. The data on the number of visitors and visits appears accurately according to the data stored in the system. 3. Filter data by day and month works correctly.	Succeed

Table 12 Testing Blackbox Testing Admin Data Visitor Page

e) *Blackbox Testing* Table Website Page (To Users)

Yes	Test Class	Test Steps	Expected Results	Test Results	Result
1.	WhatsApp Chat Features	1. Users click the WhatsApp icon on the website	The user is redirected to WhatsApp Web with the	WhatsApp icon works well, open conversation on WhatsApp web.	Succeed

		2. The user is redirected to WhatsApp Web.	conversation ready to use.		
2.	Mortgage Calculator (Web)	1. User fills in the parameters of the mortgage calculator. 2.Change parameters and recalculate installments. 3.Use the calculator in the mobile shortener.	The calculator displays installments as per input, is changeable, and works on mobile devices.	The calculator works well, and can update installments.	Succeed
3.	Property Page (Web)	1. Users view property details, prices, specifications, and residential location maps.	Clearly displays *property details*, prices, specifications, and a map of residential locations.	The *property details*, prices, and maps of the residential location are well and clearly visible.	Succeed

Table 13 Testing Blackbox Website Page Testing

System testing involves a total of 11 tests across various pages and features. A total of 8 tests (11 total - 3 external) were carried out internally, while 3 website page tests were carried out with external parties. There were 7 different testers involved, and all tests showed results that corresponded to the 11 predefined test scenarios.

$$\text{Validitas sistem} = \frac{(JSK - JTSH)}{TSP} \; x \; 100\%$$

Figure 16 Calculation of Boundary Value Analysis Technique
Source: (Ichsanudin, M.N. and Yusuf, 2022)

Description:
*JSK = Number of Test Scenarios
*JSTH = Amount Not Expected
*TSP = Total Test Scenarios
Calculation Results of Blackbox Testing to the Company

Yes	Name	Test Scenarios & Test Calculation Results
1.	President Director of PT. CBS Land Indonesia	1. Website Page Table System Validity $= \frac{(3-0)}{11} \times 100\% = 100\%$ 2.Category Admin Page Table System Validity $= \frac{(3-0)}{11} \times 100\% = 100\%$ 3.Housing Data Admin Page Table

		System Validity = $\frac{(4-0)}{11} \times 100\% = 100\%$ 4. Visitor Data Admin Page Table System Validity = $\frac{(1-0)}{11} \times 100\% = 100\%$
2.	Tim Marketing	1. Website Page Table System Validity = $\frac{(3-0)}{11} \times 100\% = 100\%$ 2.Category Admin Page Table System Validity = $\frac{(3-0)}{11} \times 100\% = 100\%$ 3.Housing Data Admin Page Table System Validity = $\frac{(4-0)}{11} \times 100\% = 100\%$ 4. Visitor Data Admin Page Table System Validity = = $\frac{(1-0)}{11} \times 100\% =$ 100%

Table 14 Calculation Results of Blackbox Testing to the Company

Blackbox Testing Calculation Results to Users

Yes	Name	Test Scenarios & Test Calculation Results
1.	R-1	1. Website Page Table System Validity = $\frac{(3-0)}{11} \times 100\% = 100\%$
2.	R-2	1. Website Page Table System Validity = $\frac{(3-0)}{11} \times 100\% = 100\%$
3.	R-3	1. Website Page Table Validity of the systemm = $\frac{(3-0)}{11} \times 100\% = 100\%$
4.	R-4	1. Website Page Table System Validity = $\frac{(3-0)}{11} \times 100\% = 100\%$
5.	R-5	1. Website Page Table System Validity = $\frac{(3-0)}{11} \times 100\% = 100\%$

Table 15 Blackbox Testing Calculation Results to Users

g. *Retropective*

In this study, some important points obtained at the retrospective stage include:

1) Things That Go Well:

a) The process of collecting user needs can be done effectively through a personalized approach.
b) The use of the PXP method helps maintain the consistency of the work because it has systematic stages.
c) Communication between users and developers is effective because it is carried out in a focused and personal scope, thus minimizing misunderstandings in the delivery of needs.

2) Obstacles Faced:
The time needed to complete each phase is quite limited because the entire process is done by one person (*personal developer*).

3) Improvement Plan
In order for a project to be completed on time, a developer who works on all tasks needs to implement more effective time management through the creation of a structured and realistic work schedule.

2. User Satisfaction Test Results Using *System Usability Scale* (SUS) After Design

a. User Satisfaction Level Testing

User satisfaction testing for the Grand Kemayoran Housing catalog website was carried out using *the System Usability Scale* (SUS) questionnaire. The questionnaire consists of 10 structured statements on a multiple-choice scale from 'Disagree' to 'Strongly Agree', designed to measure the ease and efficiency of using the system, as well as its conformity with user expectations. The questions are divided into positive (odd) and negative (even). This testing instrument is in the form of a SUS questionnaire, assessing user perception and satisfaction with the ease of use of the website, including interface interaction, feature access, and user confidence. Five participants who were potential buyers and had accessed the website filled out the questionnaire through Google Form. The results are presented as a percentage of responses for each Likert scale option.

b. Data Validation

Researchers evaluated the usability of Talent Applications using *the System Usability Scale* (SUS), a questionnaire developed by John Brooke in 1986 to measure *usability* from a user's point of view. The use of SUS was chosen because:

- Easy to understand by respondents.
- Can generate reliable data even with limited samples.

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- Efficient in identifying the feasibility of a software (Ependi et al., 2019).

The rules in calculating the System Usability Scale (SUS) include:

a) For each question with an odd (positive) number, the answer score given by the respondent will be reduced by 1.
b) For each question with an even number (negative), a score of 5 will be subtracted by the answer score given by the respondent.
c) The SUS score is calculated by summing all the answers to the question and then multiplying the result by 2.5 (D. Saputra, E. A. Syah, F. Darnis, 2022).

In this study, the SUS questionnaire was measured using a 5-point Likert scale, where respondents assessed statements related to the Grand Kemayoran Housing catalog website with choices: 1 (strongly disagree) to 5 (strongly agree). The questionnaire was distributed directly by the researcher to the respondents.

Respond	Original Score									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R 1	5	2	5	1	4	1	5	5	3	2
R2	4	1	5	2	4	1	5	2	5	2
R 3	5	1	5	1	5	1	5	1	5	1
R4	3	2	4	3	5	2	4	1	4	2
R5	5	1	5	2	5	4	5	5	4	2

Table 16 SUS Questionnaire Results

System Usability Scale (SUS) has several calculation rules as below (Saputra et al., 2022):

1) Odd (positive) question: Respondent's score subtracted by 1 point.
2) Even (negative) questions: The respondents' answer score is subtracted by 5 points.
3) SUS final score: Add up all the adjusted scores, then multiply by 2.5.

Respond	Question									
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
R-1	5-1	5-2	5-1	5-1	4-1	5-1	5-1	5-5	3-1	5-2
R-2	4-1	5-1	5-1	5-2	4-1	5-1	5-1	5-2	5-1	5-2
R-3	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1	5-1
R-4	3-1	5-2	4-1	5-3	5-1	5-2	4-1	5-1	4-1	5-2
R-5	5-1	5-1	5-1	5-2	5-1	5-4	5-1	5-5	4-1	5-2

Table 17 Score Calculation Based on SUS Formula

Respond	Score Results										Sum
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	
R-1	4	3	4	4	3	4	4	0	2	3	31
R- 2	3	4	4	3	3	4	4	3	4	3	35
R- 3	4	4	4	4	4	4	4	4	4	4	40
R- 4	2	3	3	2	4	3	3	4	3	3	30
R- 5	4	4	4	3	4	1	4	0	3	3	30

Table 18 Respondents' SUS Score Results (Before multiplied by 2.5)

Respond	Value (sum x 2.5)
R-1	77,5
R-2	87,5
R-3	100
R-4	75
R-5	75
Sum	415

Table 19 Respondents' SUS Score Results (After multiplying 2.5)

The calculation of the SUS score shows that the maximum score of the respondents reached 100, the minimum score of 75, and the score of 75 were the most dominant. Furthermore, to get the average SUS score, the total score of the five respondents, which is 415, is divided

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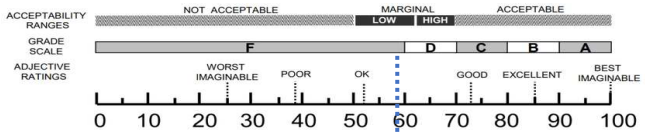
by the number of respondents. The formula below is used to calculate the average SUS score.

$$\bar{x} = \frac{415}{5}$$

$$= 83$$

The results of the average score obtained were then correlated with the SUS Score scale to determine the usability level of the Grand Kemayoran Housing Catalog website. The calculation provides a score which is then visualized in the form of *an adjective rating*. The following are the visual results of the SUS test that has been carried out.

Figure 17 SUS Score Rating Adjective



The acquisition of SUS score in this study was 83 (*Excellent*). Based on the grade scale in the image, the score obtained is Grade A, meaning that the system has a very high level of usability. Refer to opinions (A. Bangor, P. Kortum, 2009) in a journal titled *"Determining What Individual SUS Scores Mean: Adding an Adjective Rating Scale"*,

Skor SUS	Grade	Adjective Rating	Acceptability
> 80.3	A	Excellent	Acceptable
69 – 80.3	B	Good	
68	C	Okay	Marginal
51 – 67	D	Poor	
< 51	F	Worst Imaginable	Not Acceptable

explained that the SUS assessment scale can be interpreted through two approaches, namely **grade scale** and **adjective rating**.

Figure 18 SUS Score Interpretation Table
Source: (Ticoalu et al., 2023)

The results of the study show that users are very satisfied with the convenience, efficiency, and interaction of the new housing catalog website. This provides a real solution for PT CBS Land Indonesia to optimize the user experience and increase competitiveness in the property market.

The application of PXP has been empirically proven to increase user satisfaction, becoming a reference for the development of UX-based websites in the property industry and others. This website makes it easier and faster to access property information, increasing the convenience of users in choosing a property without the need to come directly to the location.

CONCLUSION

This research successfully designed and rebuilt the PT CBS Land Indonesia housing catalog website using the Personal Extreme Programming (PXP) approach, with the main goal of improving user experience satisfaction. Previously, PT CBS Land had not maximized the potential of the website as a promotional medium. Through the structured stages of PXP (from need identification to evaluation), the website is developed with important features such as visual catalogs, mortgage installment simulations, and complete property information. Developed using CodeIgniter, the website was tested with a System Usability Scale (SUS), and the results were very satisfactory with a score of 83 ("excellent"), a drastic increase from the previous score of 40. This high score, obtained from five respondents (potential buyers, marketing, management), shows that users are very satisfied with the website's appearance, functionality, and ease of navigation. In conclusion, the implementation of PXP has proven to be effective and efficient in creating a user-focused digital information system, helping PT CBS Land expand its market reach while providing added value for potential buyers.

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