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Development E-Catalogue Portfolio Design Architecture with Android Mobile Apps using Kodular Framework

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Abstract— **The Bisma Kasada (Commanditaire Vennootschap/CV) is a company that provides technical consulting services to communities and governments. The Bisma Kasada covers various aspects of the field of work with minimal qualifications, including the process of promoting consultant services aspecially in the field of architecture. The Bisma Kasada continues to operate conventionally, with architects creating design portfolios of 2-dimensional and 3-dimensional architectural drawings of buildings or spatial layouts. Then, architects promote or market the portfolio to the public through printed brochures and social media. Using this method still presents several challenges, including the time, costs, and energy required for promotional activities, the challenge of updating product data, and the limited scope of promotion and marketing in the surrounding environment. The goal of this research is to develop an Android mobile-based E-Catalogue application, which can serve as a promotional and marketing tool for architectural design of the portfolios. The application, designed by the Bisma Kasada, incorporates a feature for cost estimation and calculation. In building the application, the author used the waterfall method, which consists of analysis stages, design stages, coding stages, and testing stages. We build the application based on android platform using the Kodular framework and Airtable database to strongly interfaced but simplify in the system.**

Index Terms—E-Catalogue, Portfolio, Kodular, Android Platform, Airtable Database

I. INTRODUCTION

To encourage company progress, competitors must make strategic decisions and implement new innovations. The application of information technology will significantly contribute to the company's progress. Information technology serves as a platform for companies to foster innovation by transforming activity processes that were previously exclusive to local operations [1].The company's goal in utilizing technology, information, and promotional media is to facilitate the introduction of its products and services more efficiently. The businesses are facing fiercer competition in marketing their products, offering a range of product qualities from low prices to large promotional budgets. In competition to victory, every organization must innovate by looking for new techniques, especially in the field of promotion, in order to successfully achieve predetermined goals. To make this happen, various strategies need to be implemented, one of which is utilizing promotional media.

Current technology can use software implemented through computer hardware as a means to achieve desired results. Android-based applications on smartphones are a growing trend [2]. Android-based phones are now beginning to incorporate the latest improvements to the transaction data architecture. Android is a Linux-derived platform designed for use on mobile phones and tablet PCs. The use of Android-based regulatory data frameworks offers many advantages for Android-based applications. This framework allows application customers to access data conveniently and at any time [3]. Individuals from various age groups, including children, teenagers, and adults, use mobile devices, especially smartphones. The reason is that mobile devices can help complete important or challenging work. The advent of smartphones has revolutionized information accessibility, facilitating rapid and convenient communication and information retrieval.

The Bisma Kasada is a company that provides technical consulting services to communities and governments. Founded in 1998, the Bisma Kasada occupies a location on Jl. Alfalah/Suka Bhakti 20 in Medan 20146, North Sumatra, Indonesia. The Bisma Kasada covers various aspects of the field of work with small qualifications, including environmental management, architecture, and civil works. In carrying out company management, the Bisma Kasada is run by

professionals who are experts in their respective fields. As a consulting services company, the Bisma Kasada has been registered as a member of the National Association of Indonesian Consultants (INKINDO), as have staff and experts who are members of various professional associations in accordance with their field of expertise.

The marketing process for consulting services on the Bisma Kasada, especially in the field of architecture, is still done conventionally. Architects create design portfolios of architectural drawings of buildings or spatial layouts in the form of 2-dimensional and 3-dimensional drawings. Then, the portfolio will be promoted or marketed to the public through printed brochures and social media. By using this method, there are still several problems faced, especially with the time, costs, and energy used in carrying out promotions, the difficulty of updating data on products offered, and the limited scope of promotion and marketing in the surrounding environment. The online company promotion and marketing based on mobile phone have increased dramatically during now and the future trend.

II. LITERATURE REVIEW

Similar research previously discussed Sahabatkoe Ponsel's use of printed catalogs as a means of providing product information to consumers during the sales process. The print catalogs available are very limited, and the products listed in them are not always accurate, so the information presented is often out of date. The lack of staff and catalogs prevents consumers from receiving optimal service, as promotions are constantly changing and products are always the newest. This research aims to develop a website-based computer system that functions as a comprehensive online information platform, a powerful promotional tool, and a product ordering mechanism that utilizes barcodes as proof of purchase. The system has the ability to present comprehensive information efficiently and quickly to users, making it simple to access and ensuring consumers can easily find the information they are looking for apart from that, Sahabatkoe Ponsel can speed up the transaction process, communicate promotions effectively, and provide optimal customer service [5].

Other similar research discusses the challenges faced by the Media Kreasindo Karya is the dissemination of product information that is inadequate and unfocused. An effective way to distribute information efficiently and accurately is through the use of e-catalogs that utilize information technology. This research aims to describe the development of a web-based e-catalog system for the Media Kreasindo Karya Media, with the aim of distributing product information efficiently and accurately. The system development method uses rapid application development by involving system users throughout the process, resulting in faster development time. The system development stages include business-oriented modeling illustrations, data illustration modeling, as well as process modeling, application construction, testing and replacement. The system was built using the Unified Modeling Language and supported by the use of the PHP programming language and database [5].

Other research has also discussed that Choco Cake Shop is a micro, small and medium-scale business (MSME) that focuses on retailing culinary products, including birthday cakes. The current sales system relies on a manual approach, particularly through telephone communications or direct customer visits to physical stores for product selection and purchase. This causes a decrease in service efficiency for consumers and has a small impact on company revenue growth. Apart from that, progress in the development of the business world seems relatively slow. The e-catalog system was developed to facilitate product introductions to consumers by Chocho Cake Shop. The application developed was built using the PHP programming language and MySQL database, as well as the JavaScript and jQuery frameworks. This research uses the System Development Life Cycle (SDLC) methodology, which includes many stages including planning, analysis, design, development, testing, implementation, and operation and maintenance [6].

The research carried out is different or updated (novelty) with similar research that has been carried out, namely the E-Catalog application, which was built on a mobile basis so that it can be accessed online via an Android mobile device. The system development method oriented towards application development goals is the waterfall method, consisting of the stages of requirements analysis, design, coding and testing. Apart from that, the Android mobile-based E-Catalog application that was built is equipped with a feature for calculating estimated costs for architectural design services, making it easier for the public to obtain information regarding the estimated costs that must be incurred.

III. METHODOLOGY

A. *System Development Method*

The research that will be applied implements the Waterfall method, an organized approach to software development. In the waterfall method, the steps must be performed sequentially, without the possibility of skipping to the next level [7].

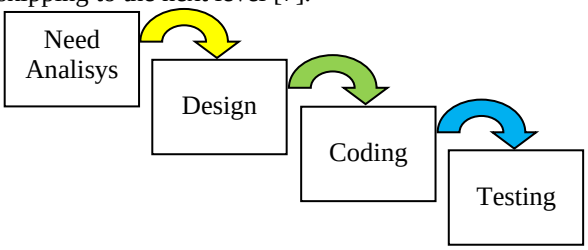

Fig.1. Waterfall Method Stage

The stages contained in Waterfall can be explained as follows [8]:

1. Analysis Stage

In the initial stage of the research, the author carried out analysis activities to extract information related to user interests. The analysis findings will then be used as a basis for building a computerized system with operational functions to carry out the intended tasks. This stage consists of three different stages: problem analysis, analysis required to create the system, and analysis of user needs.

2. Design Stage

After implementing the analysis stage, the author formulates a system design that will be built before the coding process. This approach centers on user interface design that utilizes UML diagrams, which include use case diagrams, sequence diagrams, activity diagrams, and class diagrams.

3. Coding Stage

Coding describes the process of transforming a design into computer-readable language. This step is a crucial phase in building a system. The author uses the Kodular platform and Airtable database to build the application.

4. Testing Stage

After the coding process is complete, the author continues to evaluate the functionality of the system being built. The purpose of testing is intended to identify deficiencies and errors that may occur in the system to facilitate improvements. The author uses black box testing to carry out testing.

B. Method of Collecting Data

The method used by the author to collect the data needed for this research activity is as follows:

1. Observation

Data collection through direct observation and recording of research objects. At this stage the researcher recorded matters relating to the promotion and marketing process of architectural design portfolios on the Bisma Kasada.

2. Interview

Gather information through direct conversations with the Bisma Kasada and customers. Here the researcher asks questions related to the promotion and marketing of architectural design portfolios.

3. Literature Review

Conducting a literature review is the initial stage in the process of gathering data. A literature study is a research technique that gathers facts and information from various sources, including written papers, photographs, drawings, and electronic documents, to support the writing process. Therefore, we can assert that the study of literature has the potential to influence the credibility of the research findings [9].

IV. Results And Discussion

A. Problem Analysis

At this stage, the author carries out a running system analysis regarding the marketing process of consultant services at the Bisma Kasada, especially in the field of architecture, is still done conventionally, architects create design portfolios of architectural drawings of buildings or spatial layouts in the form of 2-dimensional and 3-dimensional drawings. Then, the portfolio will be promoted or marketed to the public through printed brochures and social media. By doing this, there are still several problems faced, namely:

1. Customers find it difficult to obtain information about the portfolio being offered.
2. Customers find it difficult to obtain information regarding the estimated costs that must be incurred.
3. Time, costs and energy used in carrying out promotions.
4. Difficulty in updating product data offered.
5. The scope of promotion and marketing is limited to the surrounding environment.

B. System Requirements Analysis

The author identifies a solution to address the challenges that arise from the problem analysis. By using the development of Android mobile information technology as a medium for promoting or marketing a product. Therefore, the author conducted research aimed at creating an Android mobile-based E-Catalog application that can be used as a promotional and marketing medium for architectural design portfolios on the Bisma Kasada. With this application, it is hoped that it will make easier the Bisma Kasada in promoting and marketing the architectural design portfolio to the public and expanding the scope of marketing and promoting the architectural design portfolio.

C. Design System

The application design process that will be built uses the Unified Modeling Language (UML) model. Unified Modeling Language (UML) is a graphical language used to visualize, design, construct, and document software development systems that are based on object-oriented principles [10]. The use of UML is not limited to certain methodologies, although in fact it is most widely used in object-oriented methodologies [11].

1. Use Case Diagram

Use case diagrams are used to simulate the behavior of the information system that will be developed. Use case diagrams are employed to determine the system's functionalities and the individuals or entities authorized to access and utilize these functionalities [12].

Use case diagrams depict the possible interactions that a user can engage in with the system. The E-Catalog program was developed with a multiuser architecture, allowing it to be accessed by many types

of users, specifically customers and administrators. Figure 2 displays the use case diagram.

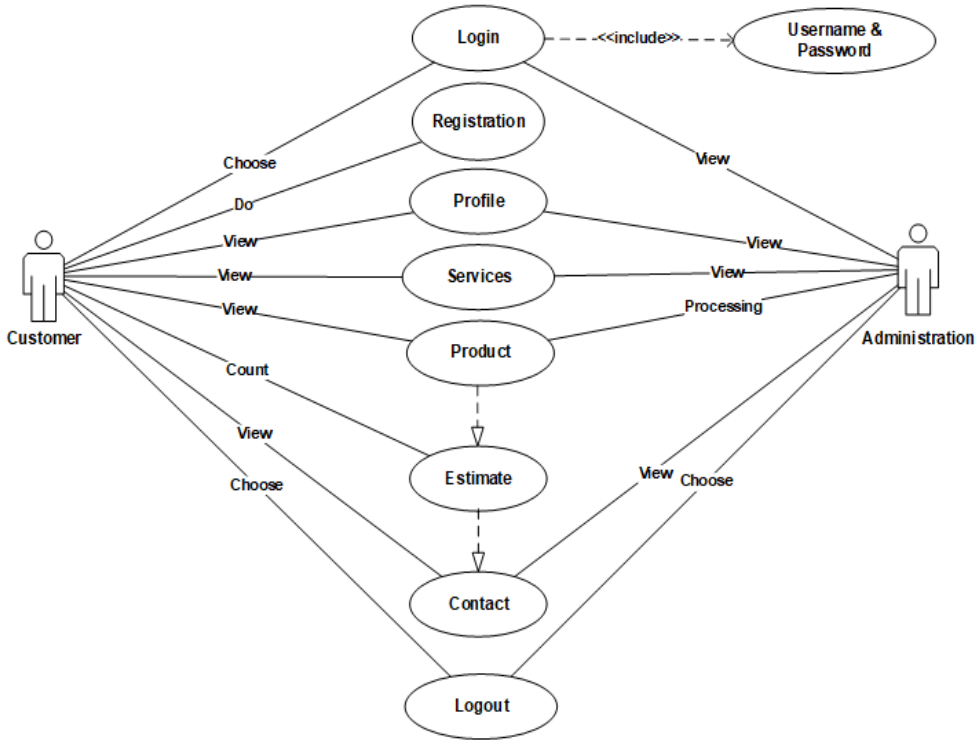

Fig.2. Use Case Diagram

Figure 2 displays a use case diagram of the application that will be built. Use case diagrams describe the actions that actors can perform in the application being developed. The mobile-based E-Catalog application can be accessed by customers and the admins company (Bisma Kasada). Before accessing the application, each user is required to log in by entering the username and password that have been previously set. Customers can get a login account by registering an account first and entering the required data. After logging in, customers can see information related to the company profile, scope of company services and company contacts. Customers can also view information about the available portfolio and calculate estimated costs incurred. Admin has the authority to manage portfolio data including additions, changes and deletions.

2. Sequence Diagram

Sequence diagrams are utilized to portray the interactions that occur between items within and surrounding the system, represented as messages that occur over a specific period of time. Sequence diagrams comprise a temporal dimension (vertical) and an object-oriented dimension (horizontal) [13].

The Sequence Diagram illustrates how customers interact with the E-Catalog application to get the information they need. The customer sequence diagram can be seen in Figure 3.

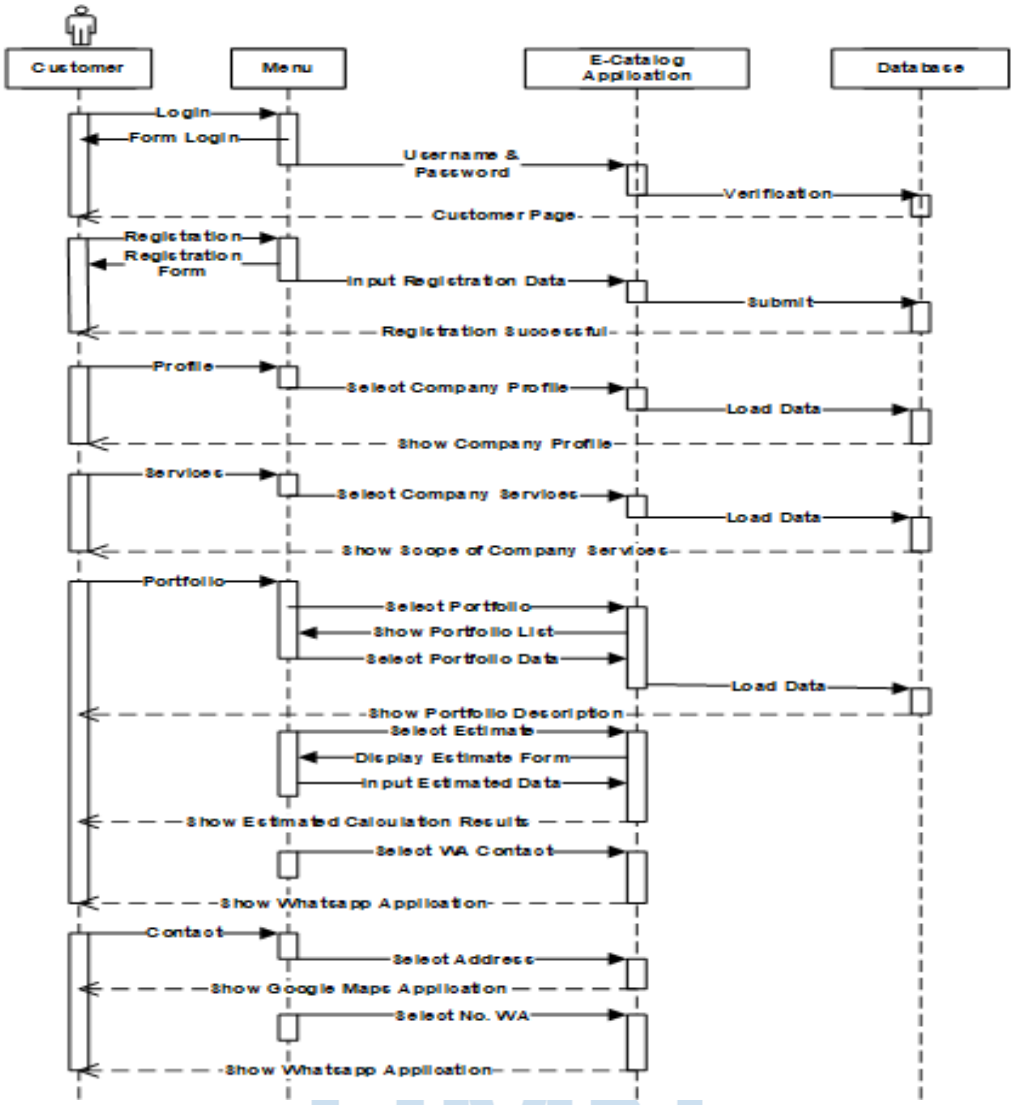

Fig.3. Sequence Diagram

Figure 3 depicts the sequence diagram of the application being built. The sequence diagram for the upcoming mobile-based E-Catalog application begins with the customer authentication process into the application. When the username and password are entered during login, the system verifies the credentials against the database. If the customer does not have a login account, then the customer can register an account and the account will be saved to the database. Next, customers will navigate to the specified page. When a customer selects the company profile menu, the application will display the company profile to the customer. When a customer selects the service menu, the application will display the scope of the company's services. The application can display portfolio data that has been processed by the admin to customers. Customers can view available portfolio information and calculate cost estimates on the form provided by the application.

3. Activity Diagram

Activity diagrams depict the sequential flow of actions or tasks performed by a software system. The distinction between use case diagrams and activity diagrams is in the fact that use cases delineate the level of involvement and actions of active actors or entities when utilizing the system to execute activities. Activity diagrams delineate system activities rather than the actions performed by actors [14]. The customer activity diagram can be seen in Figure 4.

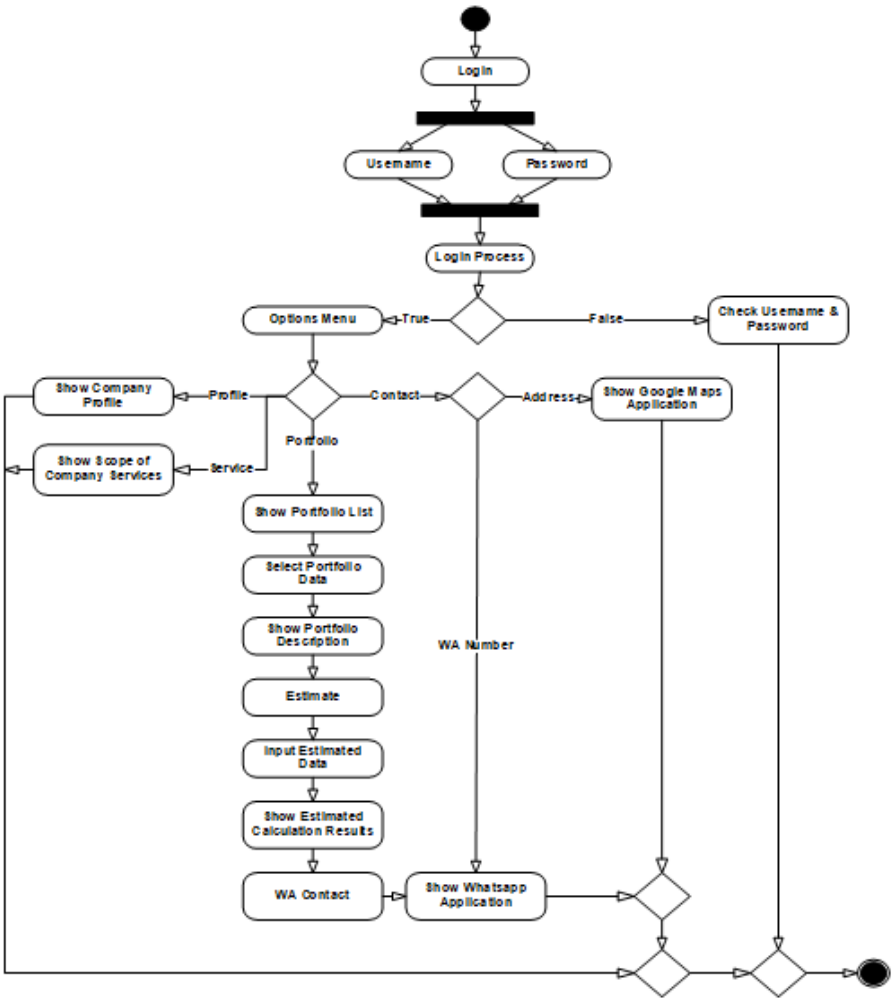

Fig.4. Activity Diagram

Figure 4 illustrates the activity diagram. The activity diagram in the upcoming mobile-based E-Catalog Application begins with the customer logging into the application, which is equipped with a predetermined username and password input. Next, the application authenticates the username and password provided by the customer. If the username and password are correct, customers can access the options menu page and select available menu items. If the login and password provided are incorrect, customers cannot access the application and need to verify the authenticity of the username and password submitted. In this application, customers can see the company profile, scope of company services, company contacts. Apart from that, customers can also view portfolio data that has been processed by the admin and can calculate estimated costs incurred.

4. Class Diagram

Class diagrams are used to illustrate and define classes, properties, and objects, as well as their interconnections. Class diagrams offer a comprehensive overview of a system. This is evident in the current classes and their relationships. A typical system often comprises multiple class diagrams. Class diagrams are quite beneficial for illustrating the class hierarchy of a system. This diagram is frequently utilized in the modeling of object-oriented systems. Class diagrams serve the purpose of elucidating the many categories of system entities and their relationships with other entities [15].

Classes or tables contained in the E-Catalog application database. The E-Catalog application class or database consists of customer tables, admin tables, portfolio tables, category tables and calculation tables.

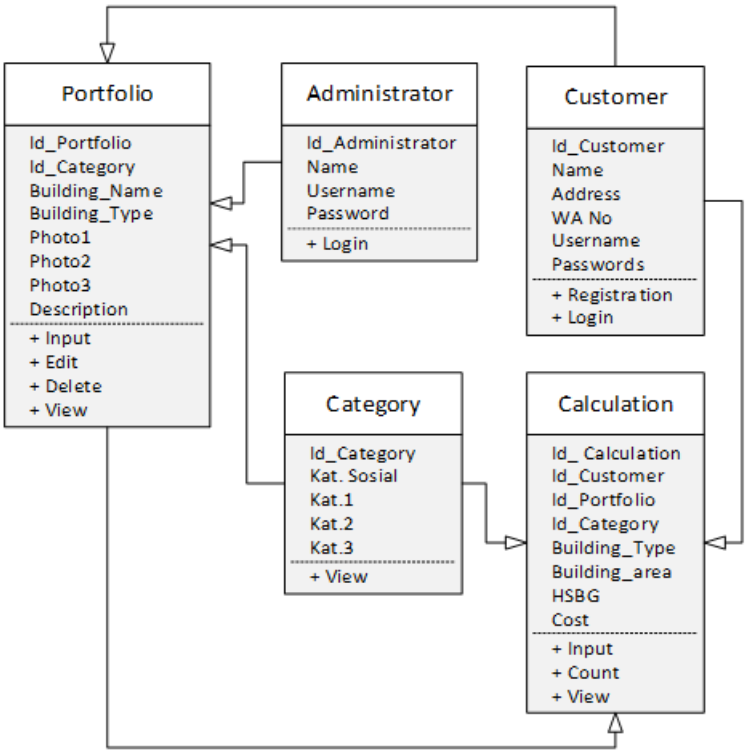

Fig.5. Class Diagram

Figure 5 illustrates the correlation of each table in the mobile-based E-Catalog Application. The customer table structure consists of id_customer, name, address, No. Wa, username and password. The administrator table consists of id_administrator, name, username and password. The portfolio table structure includes id_portfolio, id_category, building_name, building_type, photo1, photo2, photo3 and description. the category tab consists of id_category, kat. social, kat.1, kat.2, kat.3 and the calculation table consists of id_calculation, id_customer, id_portfolio, id_category, building_type, building_area, HSBG and cost. Administrators have the authority to process portfolio data, such as adding, changing and deleting.

D. System Implementation

The application page displays that are built consist of a login page display, registration page display, portfolio page display and estimation page display.

1. Login Page Display

On this page display, customers must log in first by entering the specified username and password. The page display can be seen in Figure 6.

Fig.6. Login Page Display

2. Registration Page Display

On this page, customers can register for an account by entering the data needed to get the account used in the login process. The page display can be seen in Figure 7.

Fig.7. Registration Page Display

3. Portfolio Page Display
On this page, customers can see a description of the portfolio that has been selected in the list provided. The page display can be seen in Figure 8

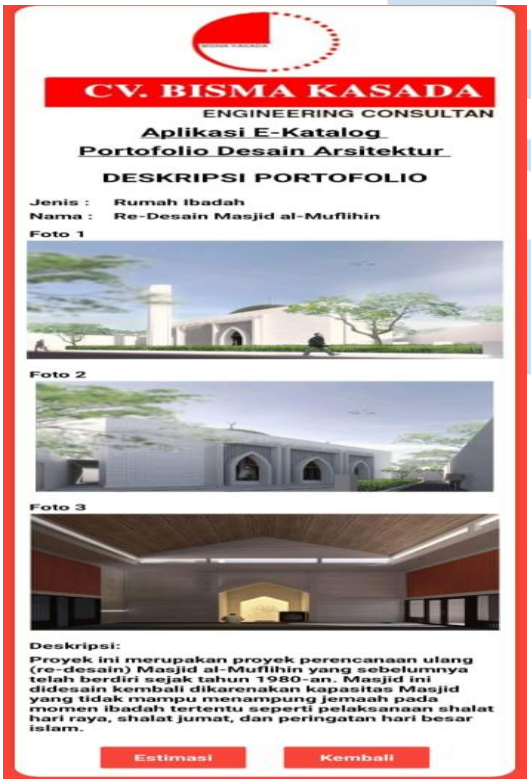

Fig.8. Portfolio Page Display

4. Estimation Page Display
On this page, customers can calculate the estimated costs incurred by filling in some of the data needed in the calculation. The page display can be seen in Figure 9.

Fig.9. Estimation Page Display

E. Application Testing

Black Box testing is used to detect defects and deficiencies such as incorrect or missing functionality, interface errors, errors in data structures or access to databases and others [16]. Black Box testing focuses on specifications from the functional side of a software. In Black Box testing using limit value analysis techniques, each function to be tested is given an upper limit value and a lower limit value to see whether the input and output are appropriate or not [17]. The frequent occurrence of errors in input is one of the principles of software testing using boundary value analysis techniques, where using this technique the input will be tested for its functional requirements [18].

TABLE I. BLACK BOX TESTING

Testing Module	Testing Procedures	Input	Output	Conclusion
Customer Login Page	- Open the application - Select the login menu - Input username "arya" and password "123456" - Click Login	Username "arya" and password "123456"	Customers have successfully logged in and can see a list of available portfolios	Valid
Account Registration Page	- Open the application - Input complete registration data - Registration	Complete registration data	Customer has successfully registered an account	Valid
Admin Login Page	- Open the application - Select the login menu - Input username "imam" and password "admin" - Click Login	Username “imam” and password “admin”	Admin has successfully logged in and can process portfolio data	Valid
Portfolio Data Page	- Open the applicatio - Input complete portfolio data - Add	Complete portfolio data	Portfolio data added successfully	Valid

V. CONCLUSION

After conducting this research, conclusions can be drawn regarding the design and development of the E-Catalog application on the Bisma Kasada is mobile-based, namely the E-Catalog application which was built to help customers obtain information regarding the architectural design portfolio available at the Bisma Kasada online via Android smartphone, the E-Catalog application that was built can help customers in calculating architectural service cost estimates in making building portfolios, the E-Catalog application that was built can help the Bisma Kasada in promoting and marketing architectural design portfolios to the public or potential customers, the E-Catalog application built can expand the scope of promotion and marketing of architectural design portfolios. Bisma Kasada, the E-Catalog application that has been built can replace the architectural design portfolio promotion and marketing system. The Bisma Kasada manually becomes an information technology-based marketing system via Android smartphones, The E-Catalog application has been customized to meet the criteria of Android devices commonly used by the majority of users in order to ensure a smooth installation and usage experience without any hindrances.

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