Marketplace Application Feasibility Analysis with Android-Based Black Box Testing

Hari Toha Hidayat[1,2], Husaini[1(✉)], F. Fachri Yanuar[1], and Angga Aprianda[1]

[1] Politeknik Negeri Lhokseumawe, Lhokseumawe, Indonesia
husaini@pnl.ac.id
[2] Universitas Bumi Persada, Lhokseumawe, Indonesia

Abstract. Indonesia is an agricultural country. Where has a very wide agricultural land. According to BPS data for 2022, Indonesia has an agricultural area of 10.6 million ha. With such a large land area, of course, Indonesia has a diversity of crops in the agricultural sector. A lot of yields make farmers and farmer groups sometimes have problems in marketing their products. So that many farmers do not benefit from the harvest. The use of information technology is expected to be able to overcome the problems faced by farmers in marketing their crops. One of them is by using the marketplace. By using this marketplace application it is expected to increase profits from the harvest. The existence of this marketplace platform can be used as an alternative for agricultural entrepreneurs and collectors or middlemen as their business media, then this marketplace platform can introduce business activities online. Black box testing is testing carried out to observe the results of applications that are ready to be made to test input and output functionality, so that they can function properly without knowing the code structure and testing can be applied to unit, integration, system and acceptance testing. Based on the test results using the black box testing method, there are 7 test models namely the register page, login, main, edit profile, store registration, add products and checkout with a total of 50 users, the results obtained are 93% of successful users and unsuccessful users. The results of unsuccessful use of black box testing occur due to network interference or inappropriate input from the user. Then it can be concluded that this marketplace application is suitable for use as a means of transaction.

Keywords: marketplace · black box testing · agriculture

1 Introduction

Marketplaces is a term that is already familiar in the world of buying and selling online. Many people think that a marketplace is the same as an online store, even though these two things are different terms. The marketplace company is to provide a platform for sellers and buyers to meet, where buyers can see what products are being sold and then the marketplace company takes profits through commissions from each sale. Marketplaces are different from online stores. Online store refers to a single store (not a collection of sellers on one platform), which sells its own products online. Another feature of the marketplace is that marketplace companies do not provide goods or services, because

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product supplies are provided by sellers who use the marketplace. Marketplace is one of the biggest players in the e-commerce business in Indonesia. But often, many people equate e-commerce and marketplace. Electronic commerce or e-commerce is a business model that allows companies or individuals to buy or sell goods via the internet (online). There are two types of marketplaces, namely pure marketplaces and consignment marketplaces. Marketplace is pure cooperation when the marketplace site only provides stalls for selling along with payment facilities. The seller is also obliged to independently provide product descriptions and photos. Meanwhile, the consignment marketplace is a tip-off system, where the seller only needs to provide the product and detailed product information to the marketplace. The marketplace site will then take care of sales from product photos, warehouses, shipping goods, to payment facilities [1]. Indonesia as a large country is very possible to apply the use of the marketplace as a marketing sector. Especially the marketing of agricultural products. This is because Indonesia is an agricultural country and until now there are still many problems faced in marketing agricultural products.

Indonesia is an agricultural country. Where has a very wide agricultural land. According to BPS data for 2022, Indonesia has an agricultural area of 10.6 million ha [2]. With such a large land area, of course, Indonesia has a diversity of crops in the agricultural sector. A lot of yields make farmers and farmer groups sometimes have problems in marketing their products. So that many farmers do not benefit from the harvest. There are three major problems that are often encountered in agriculture [3]:

a. Seasonal agricultural produce
b. Long marketing chain
c. Lack of market network for the sale of crops

The use of information technology is expected to be able to overcome the problems faced by farmers in marketing their crops. One of them is by using the marketplace. By using this marketplace application it is expected to increase profits from the harvest. The existence of this marketplace platform can be used as an alternative for agricultural entrepreneurs and collectors or middlemen as their business media, then this marketplace platform can introduce business activities online [4].

The development of communication technology has made the marketplace have penetrated also into commercial applications such as Instagram and TikTok. Many well-known brands are now starting to market their products through Instagram. This is because using Instagram can upload more photos and videos [5].

Currently, many marketplace applications have been developed with various platforms. Some develop on a website-based basis and some develop on an Android or mobile basis. However, each of these marketplace applications needs to be tested for the feasibility of its use first so that it is proven that the application built is ready for use.

1.1 Literature Review

This research was conducted to analyze the feasibility of the marketplace application in selling agricultural products that had been carried out by the team. The marketplace

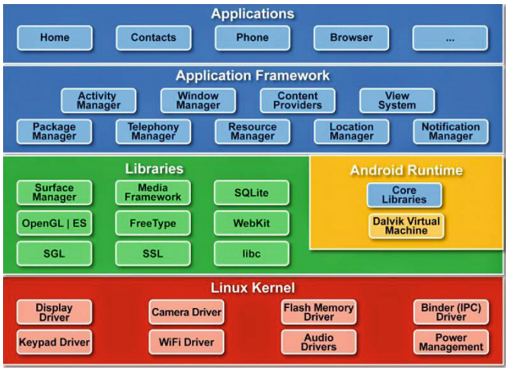

Fig. 1. Android architecture

application is built using the website platform for admin access and the use of the Android platform for user access.

1.1.1 Marketplaces

Marketplace is a third-party platform for intermediary sellers and buyers to transact online, the growth of marketplaces in Indonesia is growing and people are enthusiastic about utilizing this technology in online transactions. Several Indonesian marketplaces that have developed into unicorns in information technology-based businesses are Tokopedia, Lazada, Shopee and others. Marketplaces and traditional markets have similarities, the difference is from marketplaces, which are online transaction facilities between sellers and buyers with the services of more than one seller in distributing products [6].

1.1.2 Androids

Android is a common operating system used on Linux-based tablets and cellphone. This operating system was first developed by a Silicon Valley company named Android Inc. In 2005, Google acquired Android Inc., which at that time was driven by Andy Rubin, Rich Miner, Nick Sears and Chris White. The Android architecture generally consists of Applications and Widgets, Application Frameworks, Libraries, Android Run Time, and the Linux Kernel. Figure 1 describes the android architecture [7].

1.1.3 BlackBox

Black box testing is a test conducted to observe the results of an application that is ready to be made to test input and output functionality, so that it can function properly without knowing the code structure and testing can be applied to unit, integration, system and acceptance testing. Figure 2 describes testing in general using black box testing [8].

In black box testing, there are several testing methods that can be used, namely Equivalence Partitioning, Fuzzing, Boundary Value Analysis, Cause-Effect Graph, Orthogonal Array Testing, State Transition, and All Pair Transition. In this study using the equivalence partitioning test method.

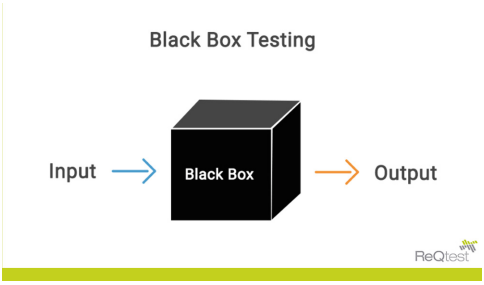

Fig. 2. Black box testing

The Equivalence Partitioning technique is a technique that is often used in grouped or domain black box testing when testing applications, especially when testing interfaces [9]. Then the purpose of the test is to find out weaknesses in the system when it is tested or the input that is entered will be produced as expected so as to avoid errors or deficiencies in the application before it is used by the user [10].

2 Method

2.1 System Design

This stage is carried out by the process between the user and the system. The system design uses UML (Unified Modeling Language), which is a method for object-oriented visual modeling of software. In designing this system using UML diagrams, namely use case diagrams, activity diagrams, user interface design and system block diagrams.

2.1.1 Use Case Diagrams

At the use case stage the diagram has 3 actors namely admin, buyer and seller. In this stage, 2 actors have their respective roles in the application created, such as from the buyer actor starting to log in, transaction history, product search, order, bill payment, product or shop access, profile and logout. Then the seller actor starts verifying payments, product uploads, ordering, store registration and shop pages. Figure 3 describes the use case of buyers and sellers.

Furthermore, this use case has 2 actors from the seller and the admin. The seller actor starts from product uploads, new orders, payment verification and logout. Meanwhile, from the admin actor, starting from login, shop registration confirmation, store data, user data, order data, transaction data, product data and logout. Figure 4 explains the seller and admin use case.

Then a detailed explanation of the agricultural product marketplace application design system from the 3 actors who use this system is as follows:

a. Buyers, actors who will purchase agricultural products from sellers in the system, can then access features such as searching for products, making payments, placing orders for the desired product, billing payments for the product purchased, viewing

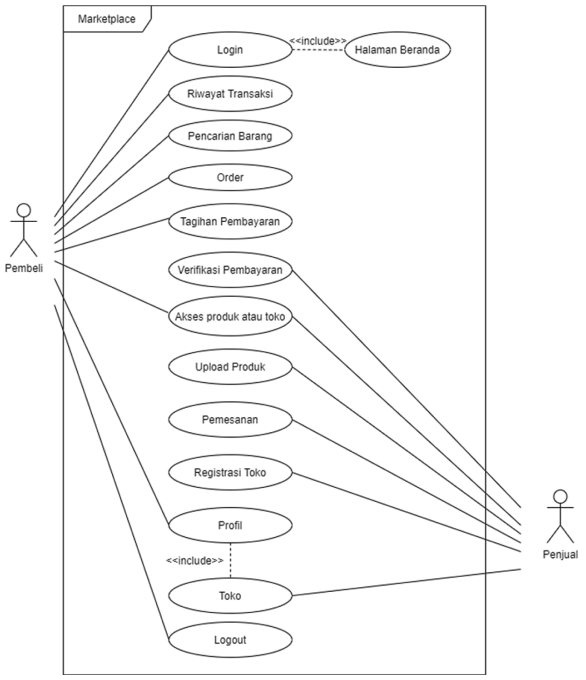

Fig. 3. Use case between buyer and seller

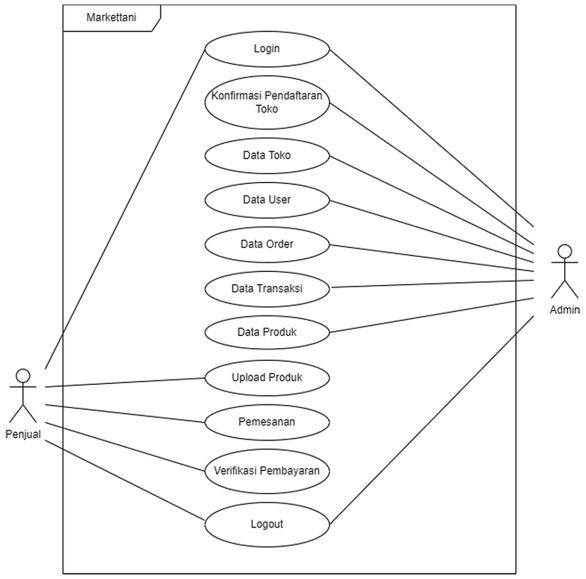

Fig. 4. Use case between seller and admin

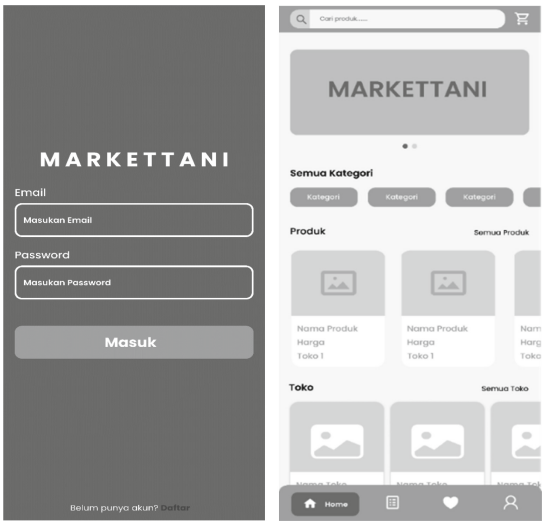

Fig. 5. Login and home page UI design

the product and the designated shop, then see transactions that are in progress from sellers or transactions that have been successfully ordered, and can open a shop through the profile menu.

b. Sellers, actors who have agricultural products to sell are accessed through the user profile menu which has a payment verification feature from buyers, then uploads products from agricultural products, as well as a list of orders from buyers who have made payments, then sellers can see their own products from the application and store registration to register open a store.
c. Admin, the actor in charge of being responsible for product data from sellers, transaction data from buyers, order data, then user data from account registration, manage store data from sellers and manage registration from store registration from sellers.

2.1.2 User Interface Design

The user interface is designed to suit the needs of the system based on the use case diagram design.

1. Main homepage and login page design

   On the login page and the initial process when opening the application. Figure 5 The login page and homepage as follows

2. Product and cart detail page design

   On the product and basket detail pages, namely the process of viewing product details and the basket page to continue payment, where the product detail page has an add product button and a view shop button. Meanwhile, on the basket page there are buttons to increase the quantity and reduce the quantity of cart items. Figure 6 Product and basket detail pages as follows

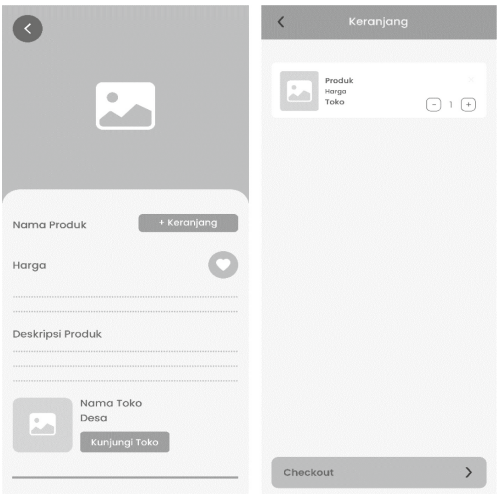

Fig. 6. Product and basket detail design

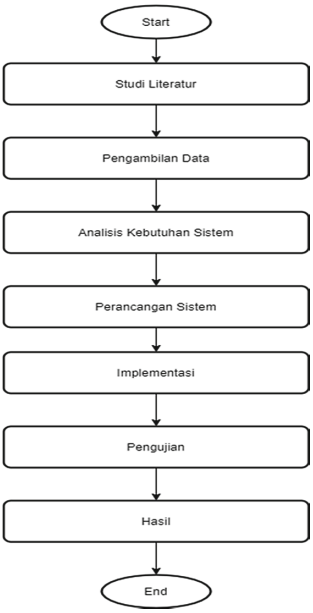

Fig. 7. Research stages

As for the stages of research to be carried out as shown in Fig. 7.

a. Literature study at this stage carried out related research search stages through journals, books and other references either through internet references or libraries. The

purpose of this literature lies in the data in the farmer's market system, then testing applications with the black box method and testing application satisfaction with questionnaires.

b. Data collection is done through secondary data, namely agricultural products.
c. Requirements analysis required 3 stages to describe the creation of the system. The analysis phase consists of two as follows:

1. System requirements

   In this need, it is necessary to find out what needs are needed in making marketplace applications. This need is also based on user needs.

2. Hardware

   The devices needed in carrying out this research are laptops/PCs and smartphones. Laptops/PCs are used for making applications and doing research. Meanwhile, smartphones are used to run mobile-based applications.

3. Software

   The required software requirements are:

   a. text editor for application development.
   b. Postman application for testing web services.
   c. Android studio for android sdk manager needs
   d. System design in making this marketplace application uses UML, namely use cases and activity diagrams as well as user interface design.
   e. Implementation, namely this research was made based on system design.
   f. Testing in this study was carried out after the completion of system implementation and data collection, this system began testing the feasibility of applications using the black box method, then testing webservices in offline and online conditions to get time speed and testing application satisfaction with a questionnaire conducted with 50 respondents.
   g. The conclusion of this test is the percentage of application satisfaction and webservice testing.

2.2 Black Box Testing Testing

Black box testing to carry out application feasibility checks for errors or not by using the Equivalence Partitioning technique which is divided into several domains with 50 users. In Table 1 one of the black box testing domains on the register page.

Black box testing is testing that is carried out by simply observing the results of execution through test data and checking the functionality of the software to be tested. Testing is carried out without looking at the source code and only looking at the input and output of the application [12].

3 Results and Discussion

The store management page on the website, the admin can control the incoming store data from the database carried out by the seller to open the store, then the admin can verify from opening the store. Figure 8 displays the store management page.

Fig. 8. Store management page

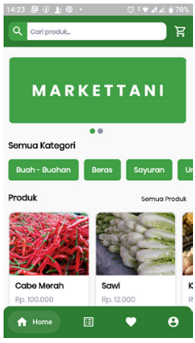

Fig. 9. The main page of the marketplace display

The store management page as shown in Fig. 8 is access rights for store owners who have registered in the marketplace application to manage merchandise to be sold on the marketplace. Store management managers are accessed using the website.

On the mobile application page, the homepage is the main page when the user has logged in and registered. This page displays products, shops and their categories, then on the page there are buttons to search for products. Then the shop that has been registered through the application will be displayed on the main page used by the user to order agricultural products and on the main page there is a menu to view the basket page for the product to be purchased. All registered stores will be verified by the markettani admin so that the seller's products can be displayed on the main application page of the store as shown in Fig. 9 showing the main view of the application.

3.1 Black Box Testing Results

Black box testing is to test system functions or deficiencies in the software being tested so that it becomes better and can minimize the occurrence of deficiencies in the system.

Table 1. Register page test

ID	Test Details	Expected results	User user	Results obtained	Information
R01	Fill in the name, username, email and password and click create account	The list of successful user accounts is directed to the application's main page	1	The list of successful user accounts is directed to the application's main page	Succeed
			2		Succeed
			3		Succeed
			4		Not successful
			5		Succeed

Table 2. Login page test

ID	Test Details	Expected results	Users Users	Results obtained	Information
L01	Enter your email and password, then click enter	*Login* successful and the user is redirected to the main page	1	*Login* successful and the user is redirected to the main page	Succeed
			2		Succeed
			3		Not successful
			4		Succeed
			5		Succeed
			6		Succeed
			7		Not successful
			8		Succeed
			9		Succeed
			10		Succeed

a. Registration page

The domain register tested uses black box testing with the Equivalence technique. In Table 1, the registration page is tested.

b. Login page

The login domain tested uses black box testing with the Equivalence technique. In Table 2, test the login page

c. Main page

In the main domain tested using black box testing with Equivalence Partitioning technique. In Table 3 the main page test.

d. Product add page

In the added domain, the products tested use black box testing with the Equivalence Partitioning technique. In Table 4, test the added product page.

Table 3. Main page test

ID	Test Details	Expected results	User user	Results obtained	Information
U01	Input search for a product and fill in the name of the product you are looking for then click the product search button	The system receives product requests from user searches and displays product search results pages	1	The system receives product requests from user searches and displays product search results pages	Succeed
			2		Succeed
			3		Succeed
			4		Succeed
			5		Not successful

Table 4. Product add page test

ID	Test Details	Expected results	User user	Results obtained	Information
TP01	Fill in all inputs and click save product	The product save was successful and the system displays the product page and added products	1	The product save was successful and the system displays the product page and added products	Succeed
			2		Succeed
			3		Succeed
			4		Succeed
			5		Succeed

Table 5. Black box test results

Test Case ID	Successful User	Unsuccessful Use	Percentage	Results
R01	44	6	$\frac{44}{50} \times 100\%$	88%
L01	46	4	$\frac{46}{50} \times 100\%$	92%
U01	46	4	$\frac{46}{50} \times 100\%$	92%
EP01	47	3	$\frac{47}{50} \times 100\%$	94%
RT01	48	2	$\frac{48}{50} \times 100\%$	96%
TP01	48	2	$\frac{48}{50} \times 100\%$	96%
C01	49	1	$\frac{49}{50} \times 100\%$	98%
Average				93%

3.2 Discussion of Test Results

This test was carried out to determine the feasibility of the application which was carried out using the Equivalence Partitions method, namely as many as 7 tests, namely the register, login, main page, edit profile, store registration, add product and checkout. In Table 5 to show calculating the percentage of application eligibility.

Based on the table above, it is explained that the feasibility test of the application using the black box method with 50 users obtained 93% results from successful users and unsuccessful users, the results of unsuccessful use of the black box testing occurred due to network interference or inappropriate input from the user. Then it can be concluded that this application is suitable for use as a means of transaction and without looking at the source code of this application.

4 Conclusion

Based on the test results using the black box testing method, with 7 test models namely register, login, main, edit profile, store registration, add product and checkout pages with a total of 50 users, the results obtained were 93% of users were successful in application usage. While the rest of the failure is only caused by network conditions and data input.

With this research, it is hoped that it will be able to contribute in terms of using marketplace technology as a means to promote agricultural products. In addition, the use of the black box method can be an alternative as an assessment of the quality of the application. It is hoped that for further research it can be developed towards a marketplace with the use of cloud computing technology.

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