

# Marketplace Application Development for Supporting the Economic Growth in the Covid-19 Pandemic Era with Flutter Technology

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## Abstract

The Covid-19 pandemic has brought major changes in Indonesia, one of which is people's shopping habits. People are more likely to use digital media. Marketplace is the main thing that people use to shop, thereby reducing their mobility out of the house and for the practicality and safety of themselves and their families against the threat of the Covid-19 virus. When viewed from the seller's side, there are also many sellers who have been affected by the Covid-19 pandemic, especially SMEs in East Java, so that making Marketplace applications using Flutter technology can help people sell and market their products.

## Keywords

Covid-19 pandemic, marketplace application, economic growth, flutter, SMEs

## 1. Introduction

The Covid-19 pandemic is happening all over the world, including Indonesia. This has changed habits in daily life or commonly referred to as the New Normal, and one of these changes is the change in shopping behavior. During the Covid-19 pandemic, people tend to use digital media, many media are used such as social media Instagram, Facebook, Twitter and others. However, the most important thing is the use of the marketplace for shopping, thereby reducing the mobility of traveling out of the house for practicality and personal safety, for himself and his family. This is also used by several small and medium enterprises (SMEs). Based on the results of the Kadata Insight Center (KIC) survey [1], 77% of 392 micro, small and medium enterprises (MSMEs) assessed that the marketplace played an important role in marketing products. As a result, they can survive to sell during the Covid-19 pandemic. As many as 75% of MSMEs consider the marketplace to play an important role in attracting consumers because it has many promotional programs, such as shipping costs, cashback, and discounts. Then, MSMEs who consider the marketplace important for selling because the transactions are safe and easy to use are 69% and 66%, respectively. 55% of MSMEs

consider the marketplace to provide complete education to business actors on how to sell online, even 35% of MSMEs consider the marketplace to help sell their products to the realm of export (Katadata 2021).

According to data from the Department of Cooperatives and SMEs in East Java, data on SMEs in East Java is 3,447,520 (UKM 2021) and some of them are experiencing the impact of the Covid-19 pandemic, therefore it is necessary to develop a marketplace application in East Java to accommodate SMEs to expand their business. This is expected to increase sales and maximum profits and can expand the marketing area without requiring additional costs. Buyers can access this application easily anywhere and anytime using the internet. BPJS Ketenagakerjaan East Java Regional Office is a social security provider by providing basic protection for the East Java Province region as an implementation of the mandate given by the BPJS Ketenagakerjaan head office. This application development uses Flutter technology, in which Flutter has the main feature of hot-reload that makes it easy for developers to create user interfaces, add application features, and fix bugs.

Based on these problems, BPJS Employment East Java Regional Office conducted this research which aims to create a marketplace application for SMEs in East Java that can help the online buying and selling system and support economic growth in the Covid-19 pandemic era and increase participation in East Java with the title "Development of Marketplace Applications to Support Economic Growth in the Era of the Covid-19 Pandemic with Flutter Technology".

### **1.1 Objectives**

The objective of the present study was the development of marketplace application based on flutter technology for supporting the economic growth of the society, particularly the society in East Java Province which had been crushed during covid-19 pandemic time.

## **2. Literature Review**

### **2.1 Use Case Diagrams**

Use Case Diagram is one of various types of UML (Unified Modeling Language) diagram that describes the interaction relationship between system and actor. Use Case can describe the type of interaction between the user of the system and the system (Fridayanthie and Mahdiati 2016).

### **2.2 Entity-Relationship Diagram (ERD)**

A model for compiling a database in order to describe data that has a relationship with the database to be designed (Fridayanthie and Mahdiati 2016).

### **2.3 Microsoft Office Visio**

One of the products from Microsoft Office to facilitate diagramming, both for drawing flowcharts, mapping IT networks, building organizational charts, documenting business processes, or describing big plans (Microsoft Visio 2021).

### **2.4 Android**

Android is an operating system on mobile phones or platforms that give mobile phones sophistication. Android in its development has reached 18 versions starting from Android 1.0 Alpha until now, namely Android 11 (Android 2021).

### **2.5 Android Studio**

Android Studio is the official Integrated Development Environment (IDE) for Android application development, android studio provides many features, such as flexible Gradle based build system, fast and so many features, comprehensive framework and testing tools (Developers 2021).

## 2.6 Flutter

Flutter is an open-source technology from Google that can be used to create Android and IOS applications. Flutter itself is a Software Development Kit (SDK) that can help developers create cross-platform applications. Architectural Flutter structure as an expandable layered system, can be built by three layers as shown in Figure 1.

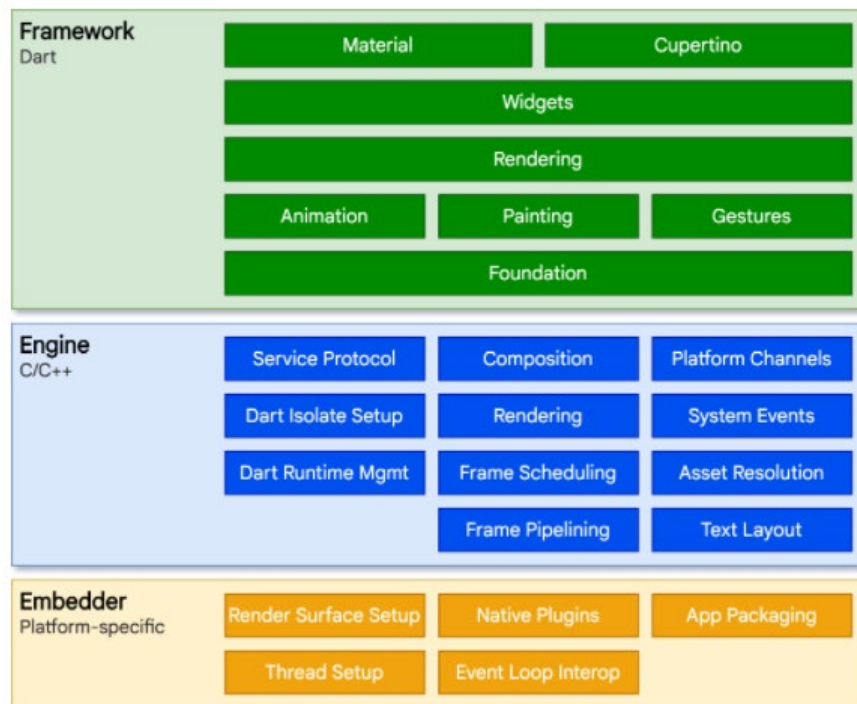


Figure 1. Architecture of Flutter layers.

Typically, developers interact with Flutter through the Flutter framework which provides a moderate and reactive framework written in the Dart language. This Flutter has a feature called hot reload so that the application development process can run faster and easier, applications can be updated in less than 1 second. Hot Reload works by injecting modified program code into the Dart Virtual Machine. In addition, Flutter is designed to make it easy to build UI views, the entire UI is built using widgets (Flutter 2021).

The advantages and disadvantages of using Flutter are as follows (Lagoo and Sorte 2021):

1. Advantages of Flutter:
  - a. Fast Progress  
Hot Reload feature helps to speed up and facilitate development, create user interfaces, speed up bug fixes.
  - b. The available UI is Flexible and Attractive  
There is a built-in material design so that the display is slightly different from the native view for designing widgets, many APIs that can be used, Layered architecture allows for customization, fast rendering and flexible design.

- c. Native Performance  
Using full native performance for Android and iOS using the flutter widget combines all important platform differences such as scrolling, icons, navigation, and Flutter code compiled to native ARM machine code using Flutter's own Dart language.
  - d. Darts  
A modern object-oriented language and is responsible for some important things regarding Flutter, Dart doesn't need an XML file, they have their own repository with their code. Dart compiles to native code directly without using Javascript.
  - e. Portability  
Flutter can run virtually on any device with a display, so it works for Fuchsia, iOS, MacOS, Windows, Linux, and the Web.
2. Disadvantages of Flutter:
- a. Darts  
Dart often loses when compared to other technologies, especially Javascript, C#, and Java, even though Dart uses object orientation.
  - b. Large File Size  
The size and overall load of the application using Flutter is quite large because for a simple program like Hello World it is only 7 to 8 MB in size.

## 2.7 Database PostgreSQL

PostgreSQL database is an alternative solution for database users that supports multiple platforms and is license-free. Postgre is included as a reliable database server with various supporting features. PostgreSQL was developed by the University of California at Berkeley Computer Science Department (Munawaroh 2005).

## 2.8 Web Services

According to Saputra and Aji (2018), Web Service is an application that is made so that it can be called and accessed by other applications via the internet by using a data exchange format as a message delivery format.

## 2.9 REST

Representational State Transfer (REST) is a standard web-based communication architecture that is often used for web-based services or distributed systems. REST Web Service, also known as REST Web API, is a web service that is implemented using HTTP and REST principles. REST is a client server architecture where the client sends a request to the server then the server processes the request and returns the response. The REST Web Service Architecture described in Figure 2, namely the HTTP Client is a client that will access Web Services and then is received by the HTTP Packet with a response that can be in the form of XML or JSON payload and is implemented on the HTTP Server (Saputra and Aji 2018).

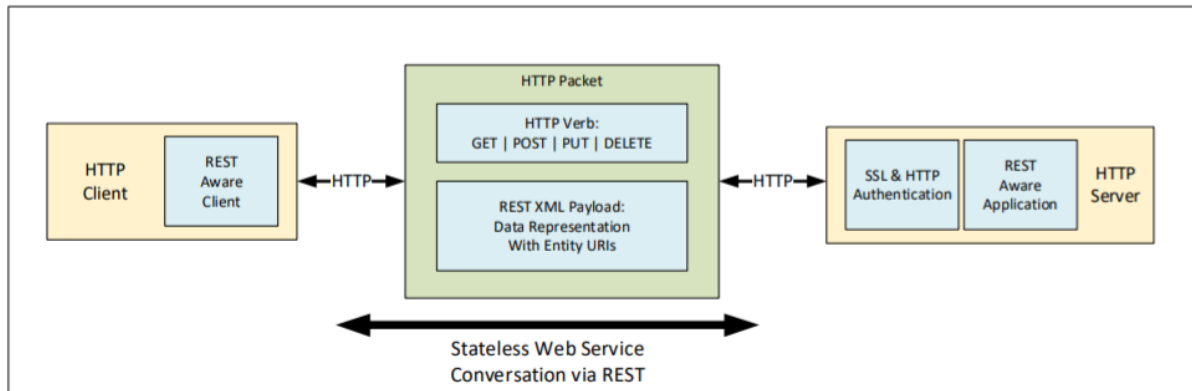


Figure 2. Representational State Transfer (REST) web services architecture.

## 2.10 Django Framework

Django is a web framework that uses the Python programming language to create dynamic, feature-rich, and secure applications. Django, which was developed by the Django Software Foundation, continues to get improvements, making the Django web framework widely used by developers in developing web applications [10].

## 3. Methodology

This research uses qualitative methods (observations, interviews, or document studies) to collect information and data then analyzed and validated, the results are mutually agreed upon to be used as data sources. The data sources themselves are obtained from primary and secondary data sources, primary data is data obtained directly from sources such as discussions, questionnaires, and interviews, while secondary data is indirect data sources, such as journals, websites, and so on. While the data sources in this study are:

- a. Study of literature  
Searching for data by collecting and studying literature such as books, articles, journals, and others.
- b. Field Study  
Looking for data by conducting interviews with related parties, this research interview was conducted by digging up relevant information.

The stages of completion of this research:

- a. Gathering needs
- b. Data analysis with business modeling and data modeling (use case diagrams and ERD diagrams using Microsoft Office Visio). Planning time for work to determining responsibility for system work will be carried out.
- c. Application Development
  - a. Android Design and Development using Android Studio and Flutter technology
  - b. Building a Database using PostgreSQL
  - c. Building REST Webservices using the Django Rest Framework in Python.
- d. Evaluation and testing of the application of each module, the system that has been tested has been completed to find out whether the system is running according to the planning that has been done.

## 4. Results and Discussion

In this study, system modeling was carried out to facilitate understanding of the flow and interaction between the stakeholders concerned. Use case diagram is to describe the interaction between actors in the Application Marketplace (JCom). The basic functions possessed by the system can be seen in the figure below (Figure 3). It could be explained that this application facilitates and connects between sellers and buyers, sellers can upload products and sell in the application, which then buyers will buy products by contacting the seller directly via message and telephone, so that

buying and selling transactions are carried out directly by the person concerned without going through the application. In this application there are also no payment transactions, because its function focuses on buying and selling containers that bring together sellers and buyers online.

Terms of use of this application by using an Android device with Mobile Device needs:

- ARMv5 1.5 dual core processor
- 2GB RAM
- 1920x1080 screen
- Android 5 Lollipop

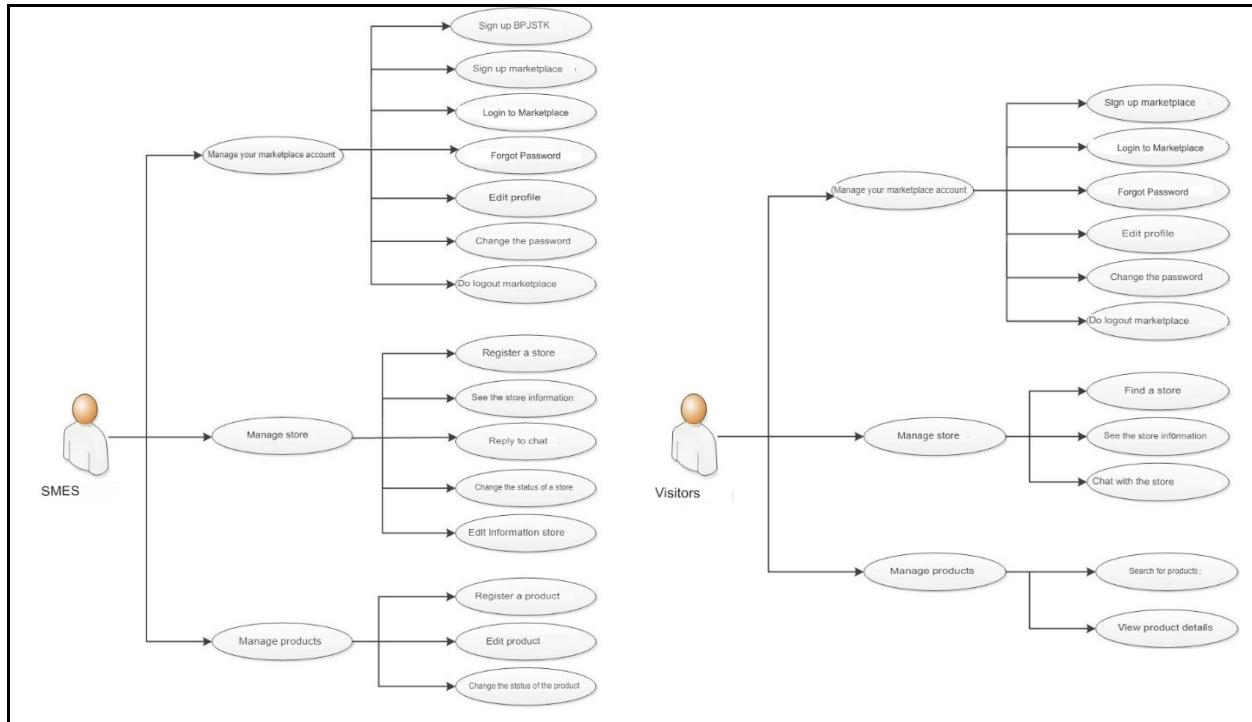


Figure 3. Use Case diagram JCom.

The system development for data modeling is described in Figure 4, consisting of several tables covering application requirements.

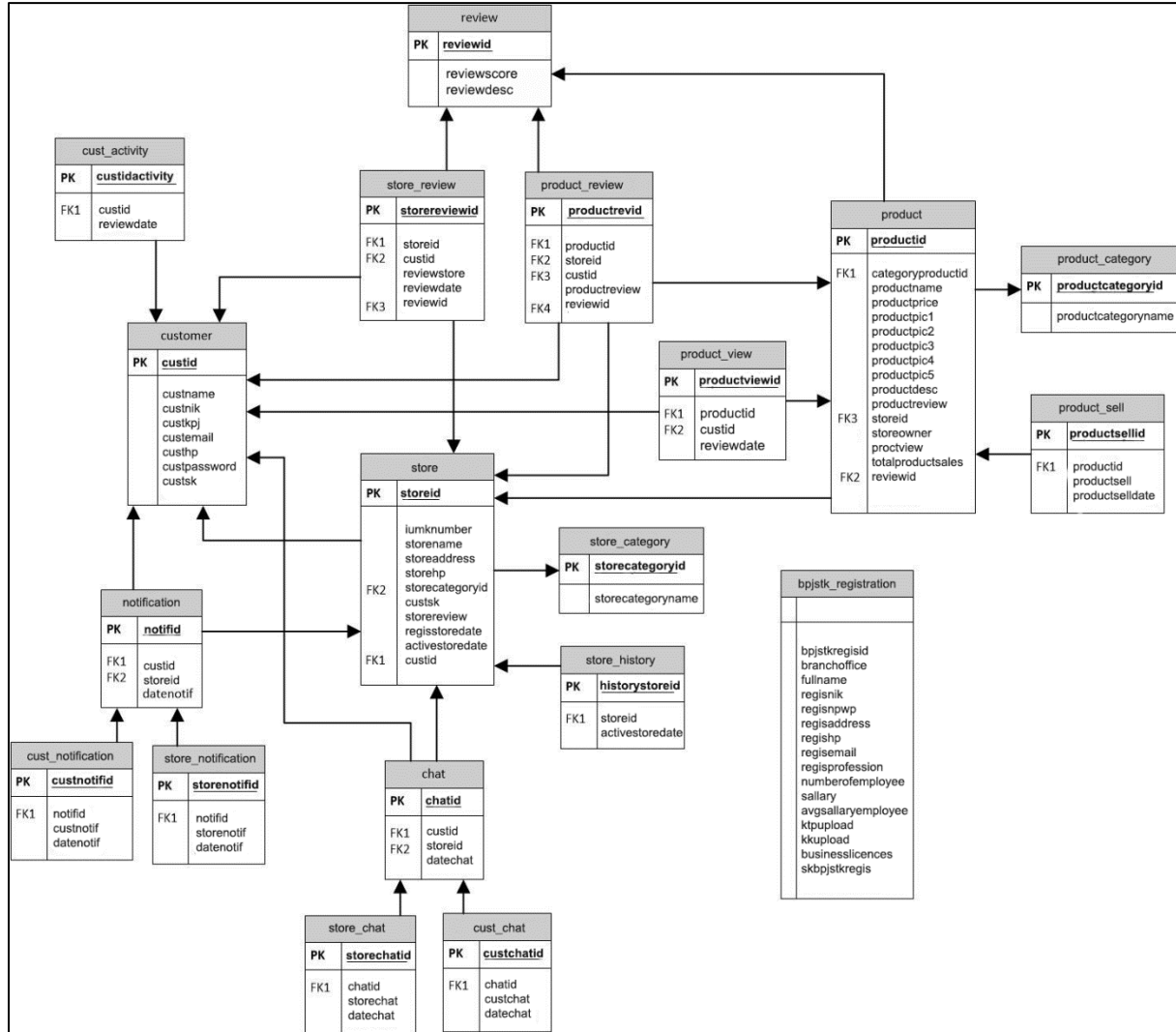


Figure 4. Database modeling.

The system architecture design for the Marketplace (JCom) application is shown in Figure 5 below:

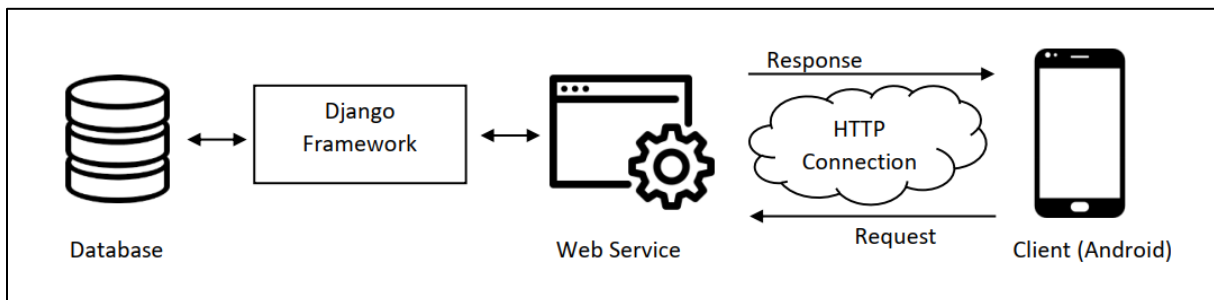


Figure 5. System architecture design.

Clients in the form of Android-based Marketplace (JCom) applications make requests to Web Services using HTTP Connection, Web Services created using the Django Framework process requests from Clients in the form of participant data.

The Flutter framework is used for the design and development of this Android-based Marketpalce (JCom) Application, Flutter is used because it suits the needs of application development, the UI is flexible and attractive, besides that there is a Hot Reload feature in Flutter that allows changing the code and viewing it on the spot without It takes a long time to compile, using Flutter it also doesn't need to install many libraries from third parties, because when the core of Flutter is updated, other internal modules are compatible with the update, unlike third-party packages that have to wait a few days or so. even months to adapt to the latest version.

Webservice design with Django framework can be seen in Figure 6 as follows:

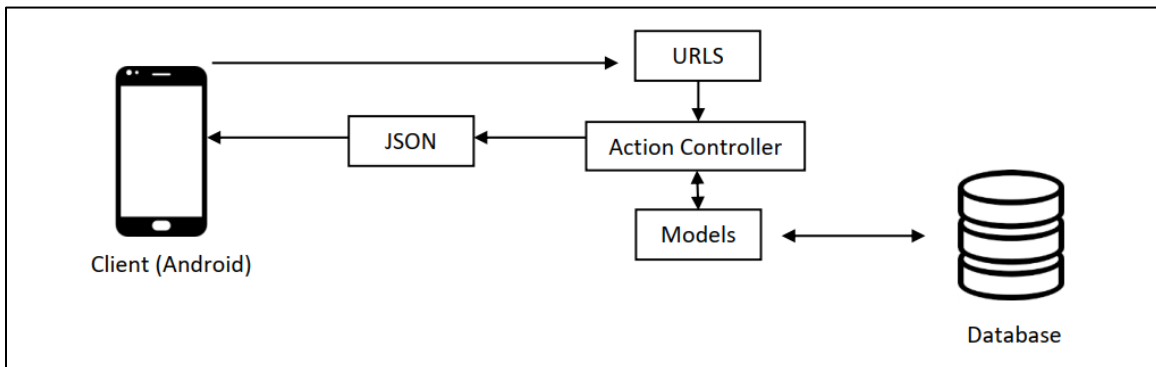


Figure 6. Webservice design.

Implementation of this application interface is as follows:

1. Splash Page

The start page of the application (splash screen), which contains the logo display and general information, this page is shown in Figure 7.

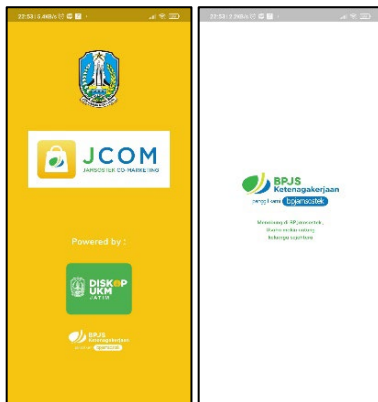


Figure 7. Splash page.

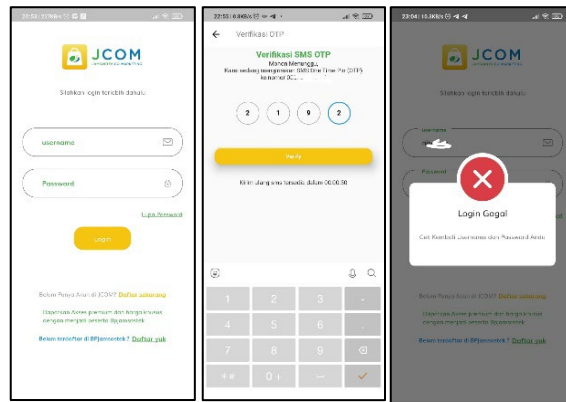


Figure 8. Login page.

2. Login Page

The Login page contains the form used for validation, namely username and password. These two fields cannot be empty, and the application would give a notification if the data entered is incorrect. The display of this page is shown in Figure 8.

3. Application Registration Page



Registration Form which contains the required data, so that users can enter the application. (Figure 9)

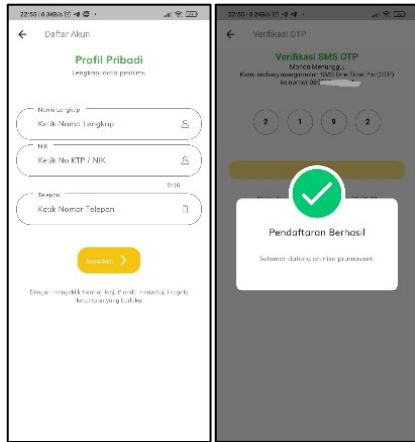


Figure 9. Application registration page.

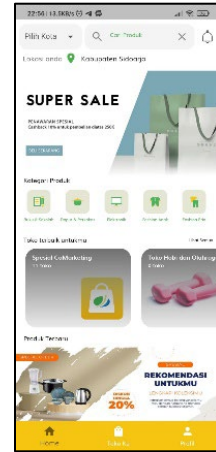


Figure 10. Main page.

#### 4. Main Page

The page that first appears after logging into the application, contains a list of products sold in the marketplace application from various regions, there is a search and location column to search for goods and location filters, on this page there are items from stores that have the highest sales. or as recommended by the app, this page is shown in Figure 10.

#### 5. Account Page

This page contains, among others, the user profile page which contains user data, the results of the data that has been entered at the time of registration for using the application, then notifications, about the application, help center and FAQ as well as the logout menu to exit the application, this page is shown in Figure 11.

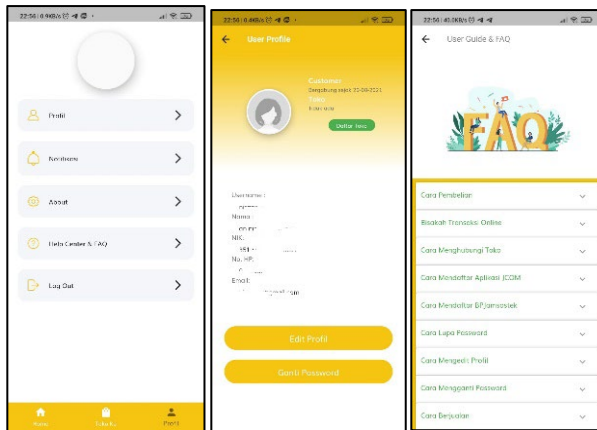


Figure 11. Account page.

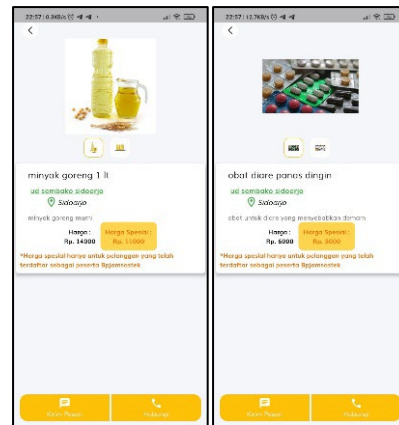


Figure 12. Product page.

#### 6. Product Page

A page containing product details and chat and telephone buttons to communicate directly with the seller, this page is shown in Figure 12.

## 7. Shop Page

A page that contains details of stores that sell goods, own stores if you are a seller and shops of other SMEs that sell goods. On this page, it is also facilitated to upload products that you want to sell, this page is shown in Figure 13.



Figure 13. Shop page.

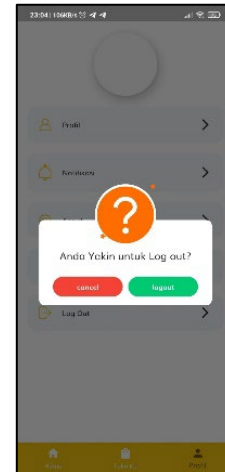


Figure 14. Logout page.

## 8. Logout Page

Logout page is a menu to exit the application. In this menu the user will be reconfirmed whether he really wants to exit the application or not, this page is shown in Figure 14.

The Marketplace (JCom) application has been tested and has gone through the improvement stage, all processes are maximized and functionally the application can run smoothly and ready to be used by the community.

## 3. Conclusion

The Marketplace (JCom) application in its development has been going well because it continues to be tested and improved, so it can be concluded that the existing application can run in accordance with the initial purpose of this application, which is to help SMEs to buy and sell online to help economic growth during the pandemic by using Flutter technology which provides various benefits that can generally be seen, namely beautiful UI and user friendly making it easier for users, the existing features are also quite complete, added with the use of web services to increase security in the application.

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## Biographies

**Tarimantan Sanberto Saragih**, joined BPJS Ketenagakerjaan in 2005 as Information Technology staff and now he is serving as assistant deputy for information technology area. Apart from working at BPJS Ketenagakerjaan, he is also a lecturer in information technology at a private university in Jakarta since 2009 until now. He really likes to learn new things as evidenced by the many certifications he has participated in so far so that while serving as assistant deputy for the information technology area, he has contributed a lot and achieved achievements, he has also formed a great team and created many great people through the work he does.

**Tota Pirdo Kasih** is Head of Professional Engineer Program in Bina Nusantara University, Indonesia. He earned B.S. in Gas and Petrochemical Engineering from Universitas Indonesia. Master and his Ph.D in Material Science from Engineering Department Gunma University, Japan. He has published more than 25 journal and conference papers. His teaching courses and research areas of expertise include manufacturing processes, mechanics of materials, sustainable design and manufacture, system engineering and analysis, surface engineering and non-thermal plasma and its applications.

**Erwin Wibowo** joined BPJS Ketenagakerjaan in 2015 as an information technology staff at a branch office and now he serves as an information technology staff at the regional office. He joined the East Java regional office in 2020 as a small team to accelerate follow-up on issues related to information technology in the East Java regional office. He is a specialist in mobile-based programming (android and ios), as last year he won the national innovation competition held by BPJS Ketenagakerjaan every year.

**An Nisa Pramasanti**, joined BPJS Ketenagakerjaan in 2018 as an information technology staff at the regional office until now. She is an analyst on the regional office's information technology team. He also won last year's national innovation competition organized by BPJS Ketenagakerjaan which can be useful for the East Java regional offices and the BPJS Employment head office.

**M Andika Putra** joined BPJS Ketenagakerjaan in 2019 as an information technology staff at the branch office and now he has served as an information technology staff at the regional office since 2021, he really likes web programming, web services, databases, and so on as evidenced by the many auxiliary tools made to facilitate the performance and operations of branch offices in the East Java region.