

MOBILE APPLICATION DESIGN FOR DIGITAL MARKETING AND MANAGEMENT OF HORTICULTURAL CROPS

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Abstract

The agricultural sector is one of the influential sectors that contribute significantly to the economy of many Indonesians. Ironically, farmers, as the main actors in this sector, do not yet have good welfare. This condition also occurs in Garut Regency as the most significant contributor to the GDP of West Java Province due to the marketing and management system for horticultural crops has not been integrated. Therefore, mobile-based applications to improve crop management and as a digital marketing media is hoped to increase the competitiveness of superior horticultural products in the Garut district. This research was conducted through a field survey and interview of 30 farmers in the subdistricts of Cigedug and Bayongbong and representatives of employees at the Agriculture Office of Garut Regency. Secondary data in crop production reports, production maps, agricultural machinery, and others were used to support the primary data. Interview results indicate that agricultural production and marketing of horticultural products in Garut Regency are still carried out conventionally. It makes the farmers' access to various information and markets very limited. Therefore, this study aims to design a mobile-based Marketing Information System and assist plant maintenance and plant marketing in an integrated manner. In addition, a Prototype was used as the system development method. This study can help farmers market their agricultural commodities and determine the Agriculture Office of Garut Regency policies.

Keywords: Agriculture, Digital marketing, Horticultural, Management, Mobile application.

1. Introduction

Currently, information communication technology has been used massively in various fields. The development of information and communication technology ranging from the simplest media such as radio, television, phones to global computer network technology have contributed to the worldwide community as a marketing medium [1]. Internet networks as a media for promotion and transactions in marketing are known as digital marketing. Digital marketing in agriculture can be used as a marketing strategy to expand sales of agricultural products [2]. With digital marketing, farmers are expected to increase profits and open new markets [3]. In addition, digital marketing is expected to overcome problems that caused marketing inefficiency in agricultural products. The difficulties include weak infrastructure and market information, a small agricultural scale, lack of knowledge regarding grading and handling, high transaction costs, and unoptimized marketing policies.

Conventional crop management and marketing in local horticultural commodities in the Garut district is the main obstacle in the progress of this sector. Data from Statistics Indonesia (Badan Pusat Statistik or "BPS") shows that conventional maintenance and marketing of agricultural products in Garut regency, especially horticultural commodities, is the main obstacle to the progress of the agricultural sector, including improving the welfare of farmers. It is indicated by many smallholders, which is 79.23% of the total farmers in the Garut Regency. The economic structure, which is still dominated by the conventional agriculture sector, causes the overall slow economic growth in Garut Regency. Another main problem in the agriculture sector is that the farmers have no direct access to buyers, both small-scale buyers and big scale buyers in the industrial sector. For example, consumer food companies must need raw materials, such as fruits and vegetables from farmers. The farmers have no choice but to sell their agricultural products to middlemen at a lower price. Therefore, the welfare of farmers is still very low, and a system for digital marketing and crop management needs to be implemented in Garut Regency's proposed to solve this problem. Previous research has studied mobile application design for agriculture [4]. However, compared to the previous application, SICANTIK is designed to be more user friendly. SICANTIK guarantees data validation and security since the officer of the Agricultural Office of Garut regency is in charge as data validator and verificatory. Some research also creates applications in digital agriculture marketing. SICANTIK provides data of big-scale buyers such as companies validated by the Agricultural Office of Garut regency.

These problems hinder the increase in the market potential of agricultural commodities, especially horticulture in West Java. Market potential has a significant role in economic growth [5-9]. It is proven that 42 types of West Java horticultural commodities are exported to 12 countries [10]. However, research conducted by Awaliyyah et al. shows that despite having high market potential, labour in the agricultural sector still tends to be low compared to other industries. The agricultural sector workers will switch to the service sector due to the lack of welfare of farmers, especially farmworkers [11].

The role of the agricultural sector in supporting the economy in Garut Regency can be seen from the agricultural sector's contribution to the Gross Domestic Product (GDP) of an average of 39.4%. However, in practice, the availability of a support system to integrate data with field conditions is still minimal. It can show

by several strategic issues for the agricultural sector in Garut Regency in 2021. These strategic issues, namely: (1) Lack of professional Human Resources and Knowledge; (2) Unoptimized Agricultural Production and Productivity; and (3) Low added value and competitiveness of agricultural products. Therefore, this research must be carried out to provide accurate and real-time information through the "SICANTIK" mobile application to create a digital marketing system. This application is designed to assist farmers in analysing market potential, formulating marketing strategies and their execution, and helping the Agriculture Office determine the assistance based on market prices, potential, marketing opportunities, and agricultural entrepreneurship development.

2. Literature Review

2.1. Agriculture management

Agriculture management is an activity of maximizing plant cultivation. Agriculture management aims to increase the productivity and quality of plants which could directly influence agribusiness. The process is carried out by paying attention to the supply of water and nutrients, the physical and chemical properties of the soil, adequate irrigation and drainage systems, the behaviour of fruit maturity, environmental temperature, and plant stress levels [12, 13]. Internet of things can also be utilized in water supply management for horticultural crops for the functional design of irrigation flow using sensors based on water acidity (pH) and level [14].

2.2. Agriculture marketing

Agriculture marketing is the activity of distributing and marketing agricultural products by looking at market opportunities and conditions. During the pandemic, agriculture marketing used the concept of Less Contact Economy (LCE), which focused more on using digital communication equipment for economic activities [15]. Agriculture marketing analysis marketing activities in a complex manner by considering the nature of perishable products, production time, cost spectrum, advertising, and marketing methods.

2.3. Mobile application in agriculture

One of the effective methods is using mobile application since it can reach many people [16, 17]. The use of mobile applications for agriculture marketing activities was developed with the function of automatic geo-location services, selected goods delivery services, and information on various agricultural products [18]. The widespread use of mobile applications in agriculture was due to the limited direct Business-to-Consumer (B2C) relationship. Thus, mobile applications in marketing activities are expected to increase the interactions and opportunities B2C relationship from farmers to customers [18]. Besides being used for marketing activities, the mobile application can also be used for management activities such as providing information on seed varieties, types of fertilizers or pesticides, and various agricultural activities. In addition, the digitalization of the agricultural sector is increasing in the era of Industrial Revolution 4.0, and thus making the marketing of agricultural products through mobile applications is one of the breakthroughs that follow the trend [19, 20].

3. Method

The research method used in this study was carried out in several instances, namely at the Agriculture Office in Garut Regency, at the field, and the library. The types of data collected are primary and secondary data. Primary data collection was done by interviewing the staff of the Agriculture Office and thirty farmers in Bayongbong and Cigedug sub-districts. Secondary data collection was done through literature review, documentary review, and the results of previous studies.

The system development method used the Prototype method because the application design was made according to the needs of the farmers. The development starts by collecting data on user needs, then designing the system, developing the prototype, and evaluating the prototype based on the feedback of the demo version from the users. The several stages in the prototype development method are shown in Fig. 1.

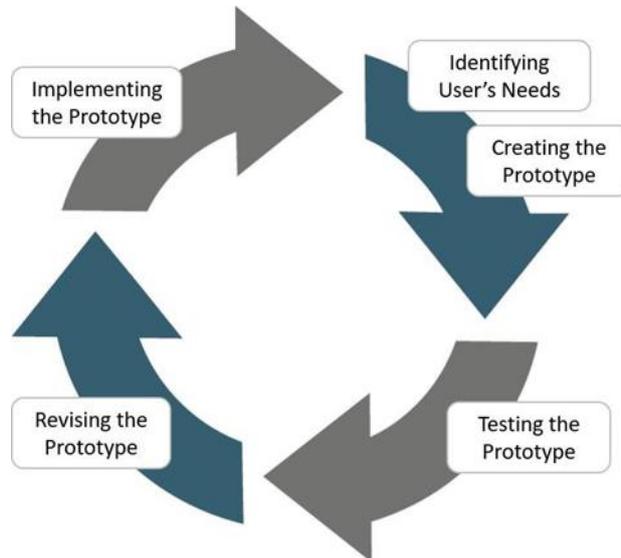


Fig. 1. Prototype development model.

4. Results and Discussion

4.1. System design

Before system development is carried out, the system is designed to ensure that the system analysis requirements are met as expected in the Unified Modelling Language (UML), which is defined as a tool for designing the proposed system. UML for use case diagrams and class diagrams for database usage. Use case diagrams to describe the relationship between actors in the system to describe interaction processes between one or more actors in the system's design. On the other hand, database design is a process that will determine the data settings and content needed to support the design of a system. There are two system designs in question; namely, the first level designs the system by analysing, and the second is a general design carried out to determine user needs.

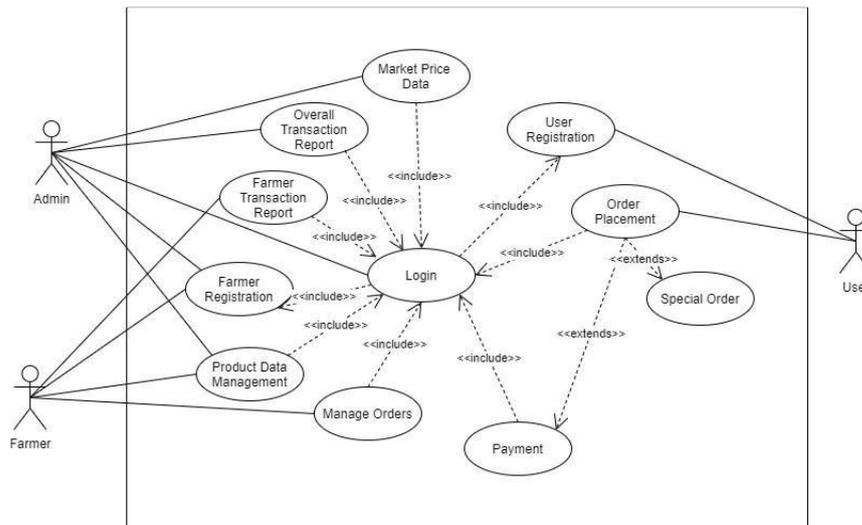


Fig. 2. Use case diagram of the SICANTIK application.

The design of the marketing system was made with a marketplace scheme and focused on the agricultural commodities in Garut Regency. In this system, there are three main actors, namely: 1) the Admin, who are the staffs of the Garut Regency government; 2) the User, who can access the application to view and purchase the agricultural products; and 3) the Farmer, who can sell agricultural products to the User. The general public can access this application, who typically have small-scale purchases and merchants who want large-scale purchases. It aims to access the market directly while still getting a stable price and disadvantaged by the complex distribution channels. There are eleven use cases from the use case diagram: Market Price Data, Overall Transaction Data, Farmer Transaction Data, Farmer Registration, Product Data Management, Order Placement, Payment, User Registration, and Product Browsing, Special Order, and Login. The definition of each use case is shown in Table 1.

Table 1. Use case description.

No.	Use Case	Description
1	Market Price Data	A process for admins to provide data on standard agricultural prices per kilograms.
2	Overall Transaction Data	Transaction reports in the marketplace from all Farmers and Users.
3	Farmer Transaction Data	Transaction reports for Farmers at their respective stores. The Farmer can only access this report.
4	Farmer Registration	Account registration for the farmers who wanted to sell their products on this marketplace. There is validation by the Admin to ensure that those who register are not middlemen.
5	Product Data Management	Product management for the Farmers to add, change, or delete the displayed products. However, it requires admin validation to maintain the quality of the marketplace.

6	Order Management	Order management for the Farmers to better accommodate user's orders.
7	Payment	A payment process for users to complete the order.
8	User Registration	A registration process for buyers who want to order products in this system.
9	Order Placement	The process for Users to select the products available on the application and submit the order to the farmer's store. The standard unit of measurement is metric Kilogram (kg)
10	Special Order	A process for users to order products on a large scale. The unit can be in quintal units or tons.
11	Login	The process for all actors to access the application

4.2. Interface design

Based on the explanation of the system concept, SICANTIK aims to be a liaison marketplace application for farmers to sell their agricultural products to the general public. In addition, the application also allows users to purchase products on a large scale. This application starts with an initial page that displays the SICANTIK logo before entering the Register or Login page (see Fig. 3). Fig. 3(a) is the start page of SICANTIK, which displays the logo and the account registration page as in Fig. 3(b). To register, entering the phone number is enough, which then the user gets an OTP (One Time Password) notification to be input as proof of validation to have an account. After that is successful, the user is directed to fill in personal data and the account password to log in to SICANTIK. If the user already has an account, they can go directly to the Login page by clicking "login." In addition to the phone number, users can also use their Google or Facebook accounts. A similar process is conducted for farmers who want to sell their products. The difference is that the admins have to validate the account to ensure the sellers' credibility in the application. After the user or farmer successfully registers and has an account, the user only needs to access the Login page. The Login page after the user has registered their account and the Home Page for users are shown in Fig. 4.

On the login page (Fig. 4(a)), the user only needs to fill in the phone number and password that were previously entered. If the previous registration was done using a Google or Facebook account, the user clicks the icon below to enter through one of these accounts. After successful login, the home page containing a selection of agricultural products ranging from fruits to vegetables appears (Fig. 4(b)). This application has five main menus: Home, Market Info, Orders, Favorites, and Accounts. First, the Home menu is the main page that contains products sold on the SICANTIK marketplace. Second, the Market Info menu is the standard price information displayed by the Garut district government as a reference for sellers in marketing their products so that they are not too high from that price. Third, the Order menu will display the history of previous successful orders. Fourth, the Favorites menu shows the products bookmarked as "Favourite" by the user if they sometimes want to order them again. Finally, the Account menu displays the current account profile and can also change the password or log out. When the user selects a product, a product description appears, as shown in Fig. 5.

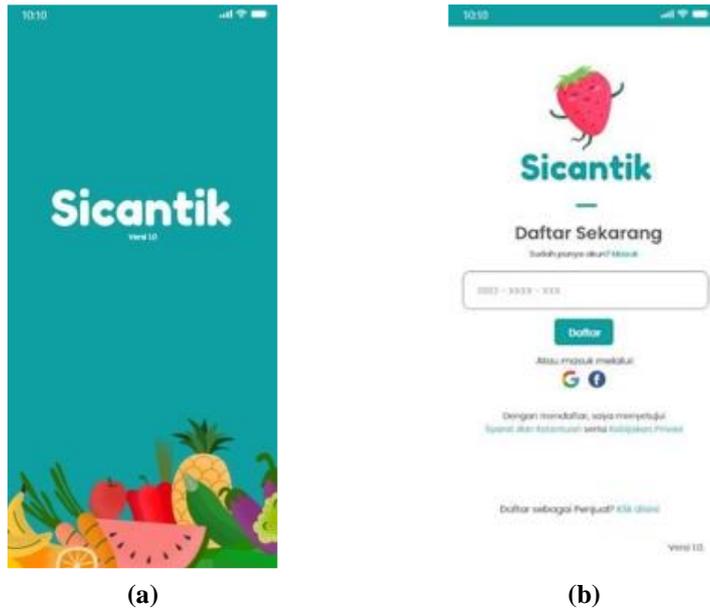


Fig. 3. Initial page of SICANTIK application.

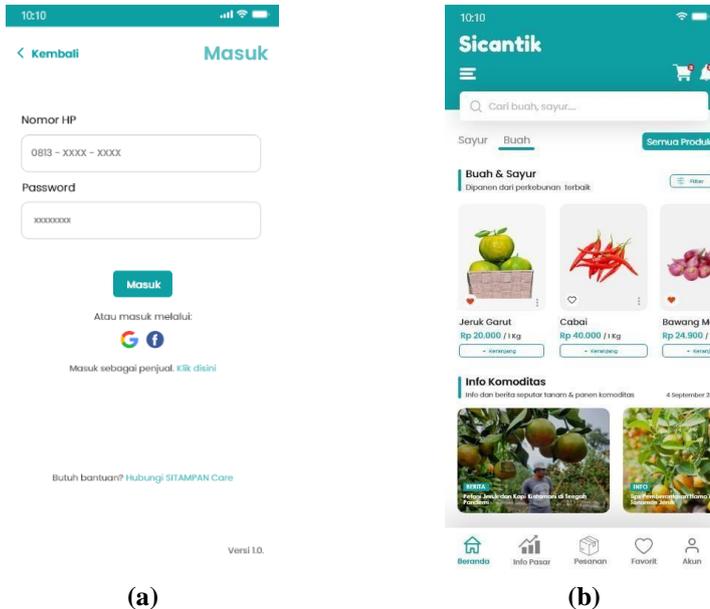


Fig. 4. Login page and home page.

The Description page displays information about the product, such as the image, seller, location, and rating (Fig. 5(a)). Users can also contact the seller through the chat feature to ask for more details about the product. The user then can add the product to their 'basket' to add other products or go to payment directly (Fig. 5(b)). There is a Special Order feature to order in large quantities. The user needs to fill

in their order details, starting from product quantity (tons or quintals) and whether the user is from an individual or a company. Attach a request letter to the Special Order form (Fig. 6(a)). Then, the user needs to complete the address data, type of delivery, and payment method (Fig. 6(b)).

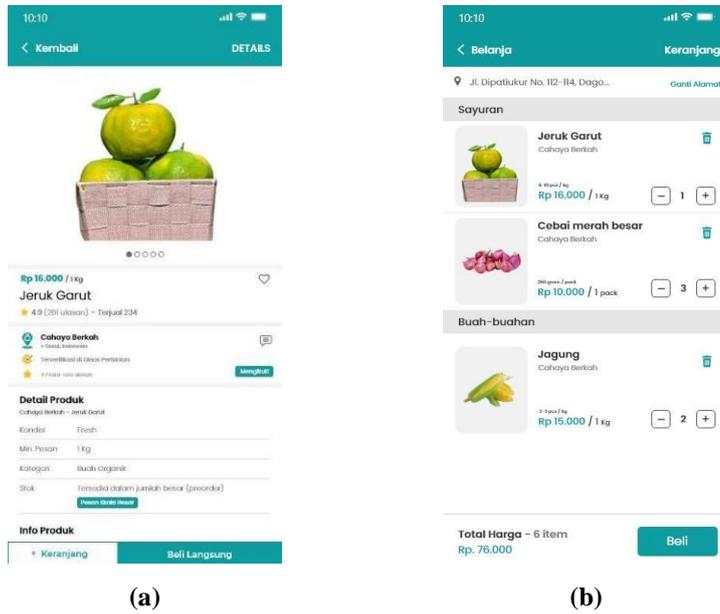


Fig. 5. Details and chart pages.

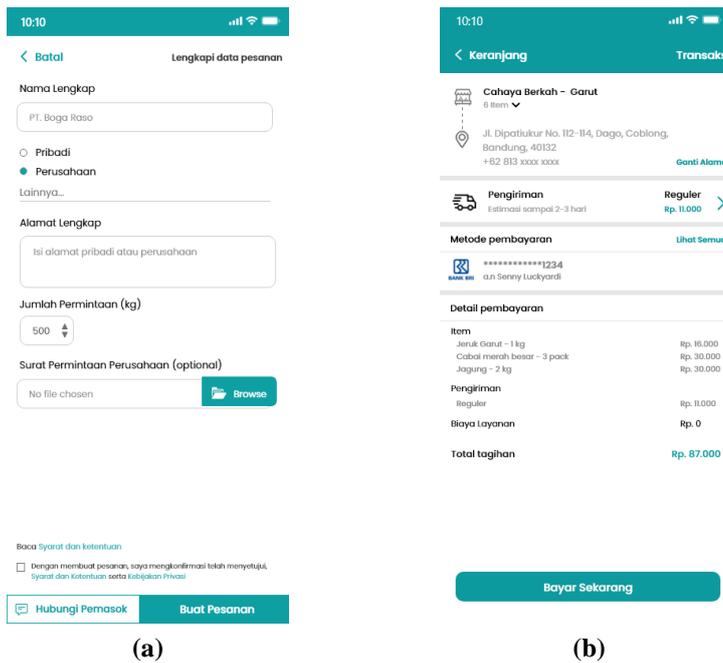


Fig. 6. Transaction page.

5. Conclusion

This research concludes that SICANTIK can assist the maintenance and marketing of horticultural products by providing market information tools, ordering, vegetable and fruit product information, providing payment and delivery services. This application is also expected to improve the welfare of farmers, especially in Garut Regency, by facilitating horticultural sales transactions using the B2C method.

SICANTIK will help implement B2C so that farmers can reach a broader range of consumers, helping to serve consumers and potential customers directly. In addition, the SICANTIK application can be a tool to find out market conditions related to supply and demand horticultural products, assist in managing marketing strategies or product strategies.

It is also hoped that it can help the government formulate policies related to improving marketing strategies in overcoming strategic agricultural issues in Garut Regency. The limitation of the research is the application was made based on the need of the farmers and people of Garut Regency. Coverage commodities are only superior local commodities of Garut regency. The “identifying user needs” stage in prototype development is conducted based on the interview result with the farmers in Garut regency since SICANTIK was aimed to be applied in Garut Regency.

The future research agenda of the research is the application of SICANTIK must cover more superior commodities on the national scale, considering the users are from many areas.

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