ASSA: Agricultural Marketplace Application in the Distribution of Goods with GPS Tracking

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Abstract

Agriculture in North Aceh District, with the number of Millennial Farmers increasing every year, has become a major issue. The problem is that many farmers still lack access to markets, have long and inefficient distribution chains, and lack transparency in the distribution delivery chain. So with the ASSA application, the agricultural marketplace application with the GPS tracking feature can optimize the distribution channel by monitoring real-time movements of both product origin, delivery conditions, and estimated time of arrival. For this research to succeed use the R&D (Research and Development) method, which is a systematic approach in creating new applications and making improvements. From the results of the implementation of the ASSA application in all villages in North Aceh District 90% experienced satisfaction in using the ASSA application, and 5% there are still users who experience bugs or errors, so this application will be improved next.

Keysswords: *Marketplace; Agriculture; Tracking; GPS; Dist Paths*

INTRODUCTION

The agricultural sector plays a very important role in Indonesia's economy, as it is known to contribute significantly to the gross domestic product and create new jobs. North Aceh Regency is one of the areas that has a lot of potential in agriculture, with the number of millennial farmers always increasing, and it is known from BPS North Aceh that the number of millennial farmers in North Aceh Regency is 128,334 [1]. One of the challenges in agriculture is limited market access, an inefficient distribution channel, and a lack of transparency in the distribution chain. To ensure a sufficient food supply in a region, the agricultural sector must increase productivity and efficiency, with a system that can create tracking for the management of agricultural products, as well as monitoring the origin of products, so that it can face all the challenges that occur in the agricultural sector [2].

Farmers often face various challenges that can hinder their productivity and welfare. Limited market access can hamper farmers' low incomes. Farmers are often dependent on middlemen to sell their agricultural products. Distribution chains are often long, resulting in inefficiency, high transportation costs, significant post-harvest losses, and long delivery times. Another problem is the lack of transparency in the

distribution chain, which sometimes makes it difficult for consumers to know the origin of the agricultural products they buy, which can reduce consumer confidence and reduce the added value of agricultural products. Farmers are also often trapped in the dependency of middlemen who control their prices and access to markets, often resulting in unfair prices and lower incomes and turnover.

A technological innovation to overcome challenges in the agricultural sector is a promising solution with a marketplace system concept that will be equipped with GPS Tracking features. With the construction of an application, it will provide benefits and impacts for the community in general [3]. A GPS technology in obtaining precise location data, where the GPS receiver will get a signal that will be transmitted to other receivers by calculating the fixed position of a point, both latitude and longitude [4].

A marketplace application in agriculture allows farmers to sell their products directly without going through intermediaries, so as to increase the independence and progress and income of farmers in North Aceh Regency. An integration between the marketplace application and the GPS tracking feature enables real-time monitoring of product movement from farmers to consumers. The tracking feature on the GPS will make it easier for consumers to see the origin of the product, delivery conditions, and estimated delivery time. A marketplace application can have an effective and efficient impact on both promotion and marketing activities for agricultural products [5].

A use of GPS technology in marketplace applications can enable real-time monitoring of distribution channels, in this case it will help consumers track the position of goods from farmers, and can be used as decision-making in choosing the best route [6]. A geographic information system combined with GPS provides a platform to track various metrics and overlay information, thereby enabling farmers to maximize each piece of land and increase the productivity of their agricultural production [6].

The purpose of developing a marketplace application called ASSA is that this platform can enable farmers to sell agricultural products directly and reduce the dependence of farmers. With the GPS tracking feature, real-time product movement can be monitored and can reduce logistics costs because it can determine the route for efficiency in product delivery. This application will also be able to provide clear information on product origin, delivery conditions, and estimated time of arrival. Agricultural market apps with GPS monitoring are an innovative solution to address issues within the agricultural sector, particularly in terms of distribution and market access. Used correctly, the app can provide significant benefits to farmers, consumers, and distributors in addition to improving the efficiency and transparency of the agricultural supply chain.

RESEARCH METHOD

This research used a qualitative and quantitative approach. Where the implementation of qualitative approaches through interviews, and group discussions both to farmers, communities, and distributors of agricultural products. The steps in quantitative activities by carrying out surveys and analyzing data to measure the

effectiveness of the application and its effect on agriculture in North Aceh District. The sample used in the implementation of the agricultural marketplace application amounted to 100 samples from 1000 population. Sampling technique as a technique and procedure used from a predetermined population to be used as a data source or research subject [7].

The framework in this study uses the R and D (Research and Development) method. The R and D method is a step process in developing a product and perfecting an existing product [8]. The R&D method is the dominant approach in the field of technology development and is very useful as a business investment, because this method aims to maximise user understanding of the product to be used [9]. In the R&D method, it will identify the problems faced, and the importance of technology in overcoming any existing problems. The purpose of using the R&D method in developing agricultural marketplace applications is to increase efficiency, as well as transparency with the GPS tracking feature so as to make farmers in North Aceh Regency independent and advanced.

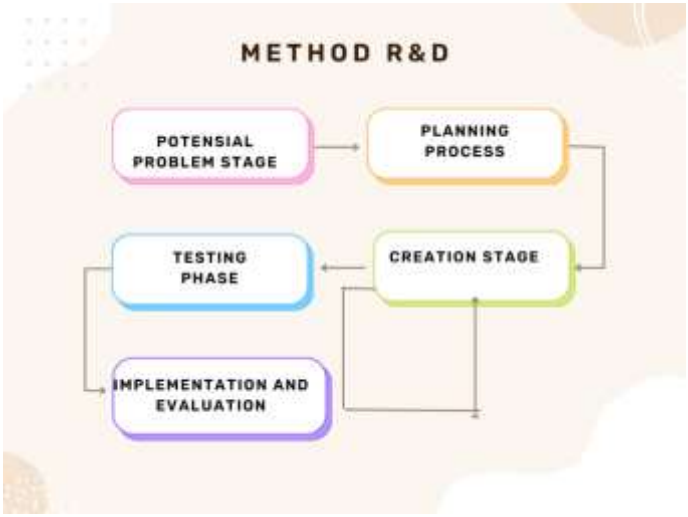


Fig 1. Research Framework for the Development and Implementation of Agricultural Martketplace Applications with GPS Features using the R&D Method

Potential Problem Stage

At this stage, activities in the form of collecting information both in the literature, interviews with farmers, the community, making direct observations. Where this activity aims as a needs analysis to understand the needs and problems faced by the object of this research. Literature study activities at this stage as a study of research to review previous studies that are relevant to the topic of this research.

Planning Process

The stage with the conceptual design is that the results of the needs analysis will determine the conceptual design of the application. Important features such as markets, GPS monitoring, stock management, and reporting are included in this design. Another stage of the planning process is the development plan creating a development plan that includes the process, time, resources, and methodology to be used.

Creation Stage

The activity of this stage is prototyping, which is creating an initial prototype of the application for trial users. This protocol must have basic features that allow users to manage stock, track shipments, and sell goods. then after that do iteration and feedback where based on feedback from users who test the prototype, do development iterations. This process is done repeatedly until the app has the desired capabilities.

Testing Phase

The testing phase consists of 3 stages, namely:

1. Functional Testing: Testing each feature of the application to ensure that everything operates according to specifications.
2. Ease of Use Testing: Testing the application with farmers, distributors, and consumers. The test results are used to change the user interface and user experience
3. Performance Testing: Testing the app to ensure that it can handle multiple users and data without any issues.

Implementation and Evaluation Phase

At the implementation stage, the application is released to the public and a wide range of users. At this stage, the application is ready for use. At this stage, there will also be socialization activities, workshops, and mentoring in the use of the application to farmers, district officials, sub-districts, villages, and communities.

The evaluation stage will measure the effectiveness of the application and analyze the impact of the application on farmers' welfare and consumer satisfaction. The results of this evaluation will assess the success of the project and determine steps in the sustainability of the program.

RESULTS AND DISCUSSION

Prototype Development and Functional Testing

For prototype development, we will design with Use Case. Use cases will describe the expected functionalities of a system, use cases will present the interaction between actors and the system [10]. Textual use cases explain the interactions that occur between actors and the system, use cases will also perform visualization to describe the context of the system to be developed [11]. Use case itself as a tool in system design that has interactions and shows the steps taken by actors to achieve a goal in a system usage.

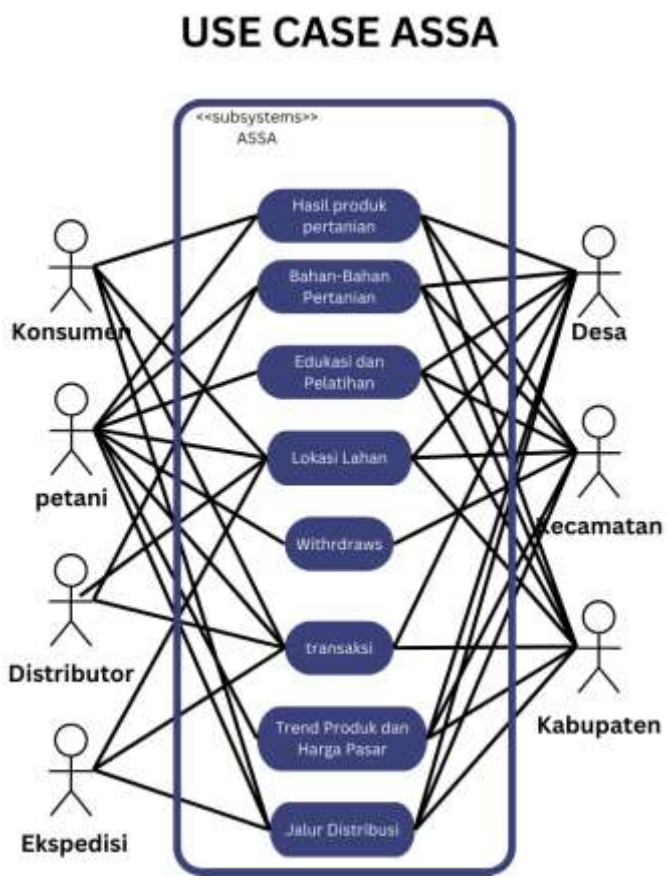


Fig 2. Use Case of ASSA Application Development, which is an Agricultural Marketplace Application that has a GPS Tracking feature.

With this use case, it is hoped that ASSA, an agricultural marketplace application with GPS tracking features, can provide an effective solution in managing agricultural distributors. It can be seen in Figure 2 that each actor has clear roles and responsibilities in the system so that it will facilitate system operations.

Implementation

The application will be used in all villages in North Aceh District, so there will be implementation and testing of the ASSA system. In this case, before implementation, a design for the ASSA business plan will be carried out. The business model in this marketplace system is a framework or structure for creating and capturing business value in order to operate to achieve strategic goals. Marketplaces are like shops or malls, there will be many products that will be offered with various price options [12]. Marketplaces in Indonesia as a driver of the national economy to face globalization [13].



Fig 3. Business Model ASSA Application, which is an Agricultural Marketplace application with a GPS tracking feature

As for the features of the Marketplace Application, it consists of 2 mobile-based and web-based concepts. For the web as a web server to perform data management. Mobile consists of 3 applications, namely consumer user applications, seller applications, and expedition applications.



Fig 4. Web-based Accoun Panel function in the ASSA application, namely the Marketplace application with the tracking feature

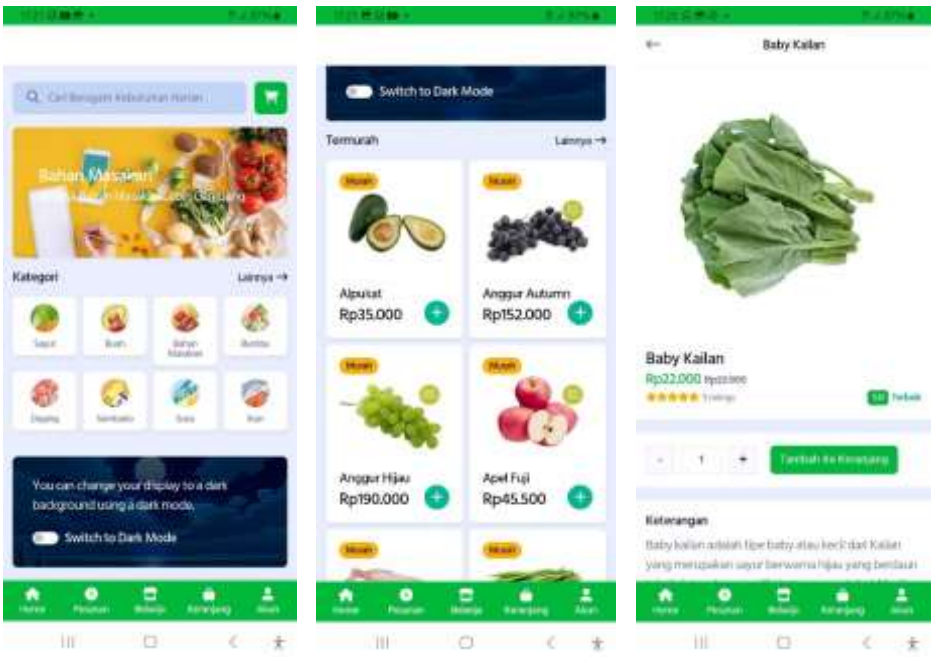


Fig 5. The initial Home Menu display on the ASSA Application, product selection and product specifications in the ASSA application storefront

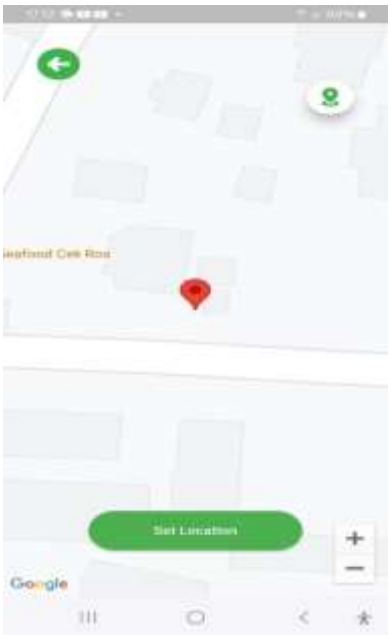


Fig 6. Determining the Location of Agricultural Land Before farmers Will Buy and Sell in the ASSA Application

Usability testing

The results of usability testing to assess ease of use and satisfaction in using the ASSA application, namely the marketplace application with the GPS tracking feature with the results of farmer participants totaling 50 farmers, 30 communities, and 20 distributors. By using questioner testing tools before the use of the ASSA application and after the use of the ASSA application, as well as conducting observations and interviews. The aspects measured in this usability are:

1. Ease of navigation

2. Clarity of information
3. Overall system satisfaction

Table 1. ASSA Testing Results

	Findings	Advice
Ease of navigation	80% of users stated that the navigation of the ASSA application is user friendly and 15% of users still experience difficulties.	Change the appearance to be more userfriendly and add menus to the icons, especially for navigation while tracking.
Clarity of information	85% of users feel the ASSA application is adequate in terms of information, 15% still feel less in the information provided by A	The use of simpler language, so that it is easily understood by the whole community. And the addition of precise, fast and straightforward information.
Overall system satisfaction	90% of users were satisfied, 5% of users gave neutral feedback, and 5% of users were still dissatisfied with the features and use of the ASS application.	Perform functionality enhancements and fix the er

Overall, the ASSA application is acceptable to all groups. Some areas need improvement such as the internet network

SIMPULAN

Usability testing of the agricultural market app with GPS tracking showed positive results. 90% of users were satisfied with their experience. Navigation and clarity of information were rated as good, but there were also suggestions to simplify menus and clarify terminology. To reduce the time required to complete tasks, it is necessary to optimize the checkout process. Some users experienced technical issues that need to be addressed. Recommendations include improving application stability, streamlining processes, and providing technical support. The implementation of these improvements is expected to enhance the user experience and increase the success of the app in the market.

ACKNOWLEDGEMENTS

Thanks to the research team consisting of 7 research members and 15 Information Systems Study Program students who have helped and participated in this research activity. This research is a grant research from the 2024 Kedaireka matching fund which is the result of collaboration between Malikussaleh University and the North Aceh Secretariat. So that this research has a major contribution to Mr Dr. A. Murtala, M.Si as the secretary of North Aceh, Mr. H. Anwar Sanusi, S.Pd.I, MSM as Chairman of Commission I of the North Aceh DPRK, and Abdisyah, SE as a team of padanana fund

grant partners. As well as thanking the LPPM Malikussaleh University who has helped and contributed to the success of this research.

DAFTAR PUSTAKA

[1] "Badan Pusat Statistik Kabupaten Aceh Utara." Accessed: Apr. 09, 2023. [Online]. Available: https://acehutarakab.bps.go.id/indicator/6/88/1/jumlah-penduduk-kabupaten-aceh-utara-menurut-kecamatan.html

[2] A. F. Ulva, D. Abdullah, N. A. Haq, and B. U. Haq, "AROS (AgRO-Smart) : Smart City Pertanian dengan Track and Trace GPS berbasis Mobile," vol. 5, no. 4, pp. 78–91, 2023, doi: 10.60083/jidt.v5i1.418.

[3] A. F. Ulva and M. A. Saptari, "Pencarian Pemesanan Rumah Sewa Berbasis Mobile," *J. Tika*, vol. 7, no. 1, pp. 19–31, 2022.

[4] A. F. Ulva, Kurniawati, and D. Yulisda, "Development of GPS Track and Trace System in Dewantara Smart City Application to Realise Mobile-based Good Governance and Clean Government," *SAGA J. Technol. Inf. Syst.*, vol. 1, no. 3, pp. 97–103, 2023, doi: https://doi.org/10.58905/saga.v1i3.179.

[5] A. F. Ulva *et al.*, "Pedampingan Petani Dengan Aplikasi BS (Buying and Selling) Farmer Untuk Meningkatkan Promosi dan Pemasaran di Gampong Ulee Pulo Kecamatan Dewantara Aceh Utara," *J. SOLMA*, vol. 12, no. 3, pp. 1611–1619, 2023, doi: 10.22236/solma.v12i3.12969.

[6] C. Palaniswami, P. Gopalasundaram, and A. Bhaskaran, "Application of GPS and GIS in Sugarcane Agriculture," *Sugar Tech*, vol. 13, no. 4, pp. 360–365, Dec. 2011, doi: 10.1007/s12355-011-0098-9.

[7] D. Firmansyah and Dede, "Teknik Pengambilan Sampel Umum dalam Metodologi Penelitian: Literature Review," *J. Ilm. Pendidik. Holistik*, vol. 1, no. 2, pp. 85–114, 2022, doi: 10.55927/jiph.v1i2.937.

[8] Okpatrioka, "Research And Development (R & D) Penelitian yang Inovatif dalam Pendidikan," *J. Pendidikan, Bhs. dan Budaya*, vol. 1, no. 1, pp. 86–100, 2023.

[9] D. S. Ruhansih, "EFEKTIVITAS STRATEGI BIMBINGAN TEISTIK UNTUK PENGEMBANGAN RELIGIUSITAS REMAJA (Penelitian Kuasi Eksperimen Terhadap Peserta Didik Kelas X SMA Nugraha Bandung Tahun Ajaran 2014/2015)," *QUANTA J. Kaji. Bimbing. dan Konseling dalam Pendidik.*, vol. 1, no. 1, pp. 1–10, 2017, doi: 10.22460/q.v1i1p1-10.497.

[10] M. Rahmatuloh and M. R. Revanda, "Rancang Bangun Sistem Informasi Jasa Pengiriman Barang Pada PT. Haluan Indah Transporindo Berbasis Web," *J. Tek. Inform.*, vol. 14, no. 1, pp. 54–59, 2022.

[11] T. A. Kurniawan, "Pemodelan Use Case (UML): Evaluasi Terhadap beberapa Kesalahan dalam Praktik," *J. Teknol. Inf. dan Ilmu Komput.*, vol. 5, no. 1, pp. 77–86, 2018, doi: 10.25126/jtiik.201851610.

[12] A. D. Cahya, F. A. Aqdella, A. Z. Jannah, and H. Setyawati, "Memanfaatkan Marketplace Sebagai Media Promosi Untuk Meningkatkan Penjualan Di Tengah Pandemi Covid-19," *Sci. J. Reflect. Econ. Accounting, Manag. Bus.*, vol. 4, no. 3, pp. 503–510, 2021, doi: 10.37481/sjr.v4i3.329.

[13] A. F. Ulva, R. P. Fhonna, H. A. K. Aidilof, M. Nur, and M. Zikri, "Inovasi 3D Virtual Reality Exhibition dalam Konsep e-Marketplace untuk UMKM Binaan MUI Menggunakan Metode Occlusion Based Berbasis Web dan Mobile," *G-Tech J. Teknol. Terap.*, vol. 6, no. 2, pp. 174–182, 2022, doi:

https://doi.org/10.33379/gtech.v6i2.1660.