

# Sawit Kita WebApp Development: Artificial – Based E-Learning Intelligence and Community to Drive Actual Information Collaboration and Innovation of Palm Oil Farmers In Indonesia

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## ABSTRACT

Web App development within the scope of the company is very in necessary in today's technological era. Development increasingly advanced technology is proof that the level of technology is high in the field of computer science. Data management is very important for a company companies, especially palm oil companies. A company needs a tool or system for managing and monitoring data company to be more efficient, simple, fast and precise. There fore the author designing a system to make it easier for companies to manage data palm oil plantations using a very easy Web App used. This research aims to develop the Sawit Kita Web App, an Artificial Intelligence based e-learning platform and community forpalm oil farmers in Indonesia. The Sawit Kita Web App consists of three main features, namely GPT 4 chat, e-learning modules and community platform. Chat GPT 4 is an Artificial Intelligence-based virtual assistant that can answer questions, provide suggestions, and produce creative content about oil palm cultivation with customization of data input by developer. The e-learning module is a feature that provides interactive and easy-to-understand learning materials about cultivation sustainable palm oil. The community platform is a feature that facilitate communication and collaboration between oil palm farmers and researchers, extension workers, and other related parties in a discussion forum. Target This research is to improve access and quality of information, literacy and skills, participation and collaboration, as well as productivity and well-being palm oil farmers in Indonesia. The research method used is method research and development with stages of analysis, design, development, implementation, and evaluation. This research is expected to provide contribution to the development of the oil palm plantation sector in Indonesia.

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## 1. INTRODUCTION

Indonesia is the largest palm oil producer in the world, around 85% - 90% of the world's total palm oil production is produced by Indonesian and Malaysian palm oil farmers. The export value of Indonesian palm oil products increased 13.6% in 2020 despite the Covid19 pandemic [1]. CPO prices were also high in April 2021, around USD1,093.83 per ton [2]. This has a positive impact on the country's foreign exchange and the

welfare of oil palm planters. One of the scopes of plantation regulation regulated in Law Number 39 of 2014 concerning Plantations, is research and development [3]. Plantation research and development is intended to produce the science and technology needed to develop plantation businesses so that they provide added value, are highly competitive and are environmentally friendly. Palm oil as a strategic plantation commodity still really needs research and development especially those that have a direct impact on the development of the national palm oil industry. Research and development on oil palm is also needed to ensure the sustainable development of oil palm plantations.

Previous research entitled Building a Web-Based Palm Oil Recording Information System by Aidil Fitrawan in 2022 regarding the process of developing a one-by-one phase model, thereby minimizing errors that might occur. With the existence of a Web-Based Palm Oil Recording Information System in the Kasai Village Palm Oil Plantation, Berau Regency, it can handle the process of developing all-digital technology [4]. The next research is entitled Web-Based Palm Oil Plantation Management Information System at Pt. Teboplasma Intibelas Nisam Antara in 2023 regarding PT. Teboplasma Intibelas still uses manual methods to record data from the PT. In fact, this method is very inefficient for a business. An information system is needed to record incoming and outgoing data from a PT. By using this system, if the data is needed at any time, it will be easy to obtain, can be accessed anywhere and 880 TTS 4.0 at any time [5]. And the research entitled Designing a Data Processing System for Palm Oil Industry Companies in 2023 concerns the design process used to design this application using a database with the concept of data flow diagrams and using the PHP programming language and MySQL database. This system is divided into 3 accesses, namely access for the company, admin, and service heads. This system is expected to make it easier for employees, especially in the Plantation Industry Products Section, to manage data, store data and view reports from palm oil industry companies [6].

However, palm oil productivity in Indonesia still has the potential to be increased further. According to data from the Ministry of Agriculture, the average productivity of palm oil in Indonesia is only around 16 tonnes of fresh fruit bunches (FFB) per hectare per year, far below the genetic potential of 30-40 tonnes of FFB per hectare per year [2]. One of the factors that influences this low productivity is limited access to information regarding science and technology related to oil palm plants. The information received by oil palm farmers in Indonesia is still very minimal, inefficient and not current. This is due to the traditional way of disseminating information, namely through word of mouth and using guides from books.

Therefore, we as a research team want to develop an innovation in the form of the Sawit Kita Web App, an e-learning platform based on Artificial Intelligence and a community that can be accessed via mobile or desktop which provides actual information, the latest methods, research, the latest, and other important information related to oil palm cultivation in Indonesia. The Sawit Kita Web App is designed online, so that it can be accessed by palm oil farmers throughout Indonesia via their smartphone or computer. Apart from that, with the support of artificial intelligence, Chat GPT 4, makes it easier for farmers to look for actual information and methods about oil palm cultivation in Indonesia [7][8]. Our Palm Oil Web App can also facilitate communication and collaboration between palm oil farmers and researchers, extension workers and other related parties in an interactive discussion forum. In this way, the Our Palm Oil Web App can increase the literacy and skills of palm oil farmers, as well as encourage innovation and creativity in developing their business.

### **1.1. Artificial Intelligence**

Artificial intelligence or AI is a simulation of human intelligence modeled on machines and programmed to think like humans. AI requires data as knowledge, which can be developed through a training process. AI has various branches, such as machine learning, computer vision, natural language processing, and others. Each branch has different goals and applications [9][10].

### **1.2. Waterfall Method**

One of the SDLC models, namely the Waterfall Model, is often used in system design. This model uses a systematic approach and sequentially. The stages in this model start from the planning stage up to the management stage (maintenance) and carried out in stages. Developers need to know more about how the process works system development if using the waterfall model and also characteristics of the waterfall model [11][12].

### **1.2. WebApp (Web Application)**

A web application is an application that is accessed using a web browser via a network such as the Internet or intranet, while a website is a site page that contains information and can be accessed by many people. The emergence of websites was based on the development of information and communication technology [13][14].

### 1.3. E-Learning

E-Learning is a learning process that uses media electronics, especially the internet, as a learning system. E-learning is the basis and consequence of the development of information technology and communication. The definition of e-learning is as learning that occurs when internet technology is used to facilitate, deliver, and allows the learning process at a distance [15][16][17][18].

### 1.4. State Action Reward State Action (SARSA) Algorithm

SARSA is a reinforcement learning technique that is widely used for the same training data with test data [19]. Sistem yang dirancang memanfaatkan metode SARSA, sebuah teknik dalam machine learning yang dapat diaplikasikan untuk memprediksi perilaku berulang di sebuah environment [20]. Each step has several actions will be done, then the agent will experienced a shift after taking action and get rewards according to the action which is conducted. These rewards help to decide the next action [21].

### 1.5. Urgency of Research

The urgency of the research is as follows: First, digitizing the provision of information regarding oil palm cultivation methods makes receiving information to farmers easier, more precise and current. Second, digitalization and the use of artificial intelligence to receive information can make it easier for farmers to access the latest information regarding oil palm cultivation anytime and anywhere. Third, creating a digital-based community can facilitate communication between farmers, thus triggering innovation in oil palm cultivation methods in Indonesia. Fourth, creating a digital-based application makes it easier for farmers to determine the right dosage regarding the use of products supporting oil palm cultivation in Indonesia so that it is hoped that it can have an efficiency impact and increase the amount of oil palm production in Indonesia.

The difference between this research and previous research is that this research develops our palm oil e-learning which can be used by oil palm farmers in the learning process. In this case, the researcher's e-learning is limited to just designing and providing material regarding how to plant oil palm, where this e-learning will be integrated with AI assistance and have a community of oil palm farmers that can be used as a medium of communication between oil palm farmers in Indonesia.

## 2. RESEARCH METHOD

Research methods are related to all activities used in creating a framework. The framework in research is used to create the stages that will be carried out in the research, so that these stages have an influence on each stage. In this research, the framework that will be designed is starting from problem identification, determining goals, studying literature, data collection, application development using the waterfall method, testing and evaluation, data analysis, finally reporting results. For more clarity, it can be seen in Figure 1.

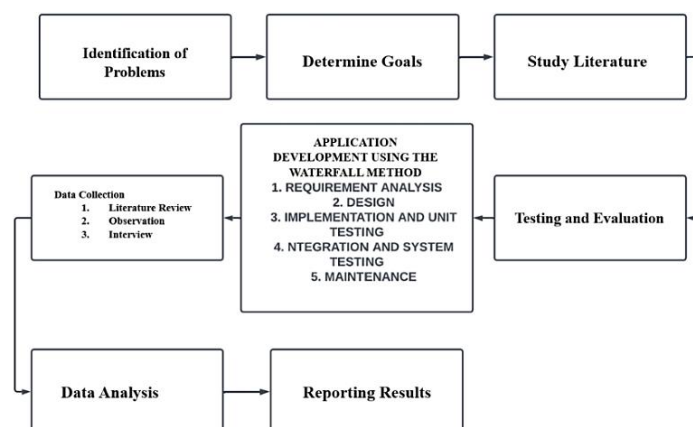


Figure 1. Framework Research

Based on the Framework Research in Figure 1 above, each stage of the framework Research can be described as follows:

#### 2.1. Identify the Problem

The research will identify the main problems to be solved through the development of the Sawit Kita Web App. In this stage, focus will be given to the challenges faced by oil palm farmers in accessing current information, collaborating and innovating in their communities.

## 2.2. Determine goals

These goals will include aspects such as increasing access to information, encouraging collaboration between palm oil farmers, and facilitating innovation in the palm oil farming sector.

## 2.3. Study Literature

This section will discuss the results of previous literature studies related to e-learning, community-based applications, and issues related to palm oil farming in Indonesia. The literature review will provide the theoretical basis and information that supports application development.

## 2.4. Data Collection

The next step is to describe the method that will be used to collect the data needed in developing this application, including; Library study is At this stage, an in-depth search and analysis of various items is carried out literature sources relevant to the application development focus. Observation, These observations allow us to identify the real challenges faced by farmers and the opportunities that can be bridged by the applications to be developed and Interview All the steps taken not only help us understand conditions on the ground, but also provide important direction in development planning "Palm Kita: Community Based E-learning" application.

## 2.5. Application Development

This section will explain the actual development stages of the Sawit Kita Web App, where at this development stage we will use the waterfall method. The waterfall method is a development concept that emphasizes systematic steps. Thus, the process of creating a system must be carried out sequentially, starting from the needs identification stage to the maintenance process.

### 1. Requirements Analysis

The first stage of the waterfall method is need analysis. Developer must conduct research to identify what user needs are system built.

### 2. Design

Apart from that, the design stage in this method also functions to identify hardware and system requirements required for the entire process development.

### 3. Implementation and Unit Testing

The third stage of the waterfall method is implementation which leads to the process coding. The system development process will go through stages in the form of modules small modules which in the next stage of the waterfall method will be combined.

### 4. Integration and System Testing

The fourth stage refers to the process of integrating each module that has been completed made. After this process is complete, the developer will carry out testing for check the functioning of the system as a whole. Apart from that, developers can also identify if there are failures or errors in the system.

### 5. Maintenance

This process usually includes improving the implementation of the system unit, fixing remaining or newly detected errors, and improving system performance tailored to user needs.

### 6. Testing and Evaluation

The application testing process will be described in this section, including functionality, security, and performance testing methods. In addition, user assessments will be carried out to measure the effectiveness of the application in achieving the set goals.

## 2.6. Data Analysis

The test and assessment results will be analyzed in depth in this section. The collected data will be interpreted to measure the extent to which the Our Palm Oil Web App is successful in encouraging actual information, collaboration and innovation among palm oil farmers.

## 2.7. Reporting Results

This framework, the research "Development of Our Palm Oil Web App" is expected to detail and guide each stage in the development of community-based e-learning applications to support palm oil farmers in Indonesia.

## 3. RESULTS AND ANALYSIS

The research mechanism in this field refers to the method or process used to investigate, develop, or solve a problem. The following is the research mechanism in the development of our palm oil elearning:

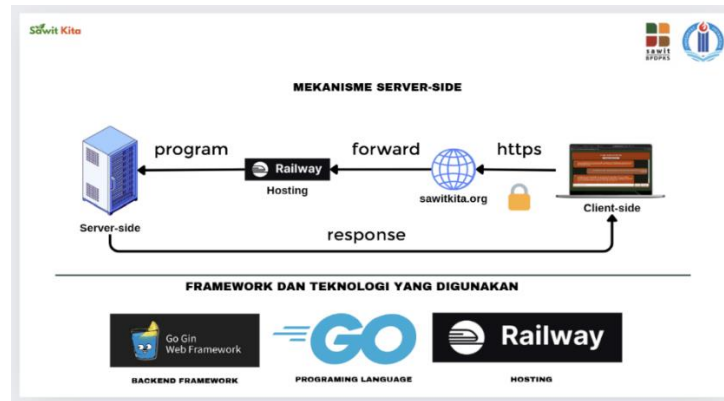


Figure 2. Research Mechanism

Sawit Kita Web App, an Artificial Intelligence-based e-learning platform and community for palm oil farmers in Indonesia. The Sawit Kita Web App consists of three main features, namely Chat GPT 4, e-learning module, and community platform. The progress for the output in the form of the Sawit Kita WebApp e-learning product is that our Palm Oil WebApp e-learning can now be accessed online with the domain <https://sawitkita.org/>. Several features of e-learning can now be accessed, such as:



Figure 3. Landing Page

This landing page will appear when researchers access our palm oil e-learning domain. The landing page can be accessed by users and non-users, but there are several features that cannot be accessed by non-users.

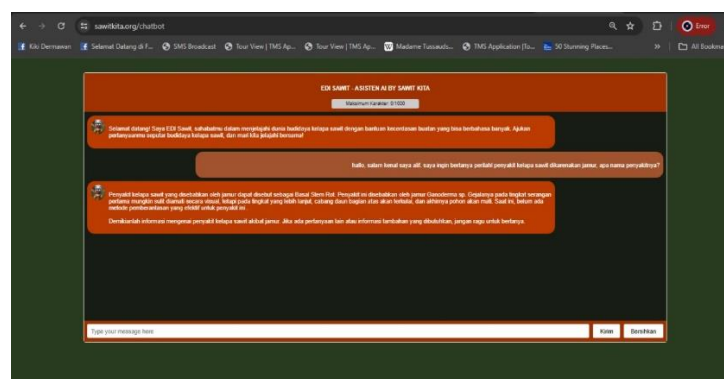
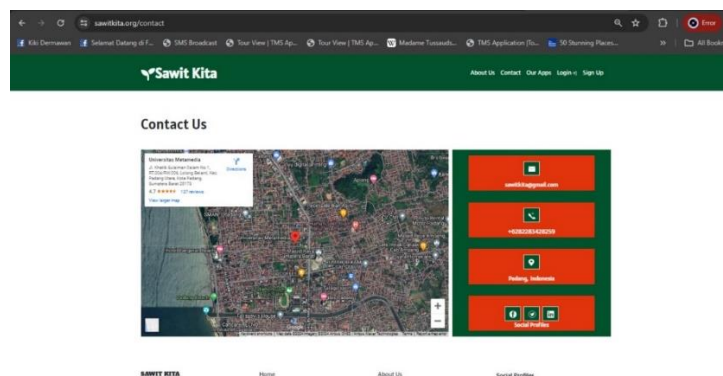


Figure 4. Assistance Artificial Intelligence

The AI Assistance page display will be visible when researchers access our palm oil e-learning domain. Assistant Ai can be used for consultation and this feature can be accessed when the user has registered and can take part in the training provided.



**Figure 5.** Page Contact Us

The Contact Us page will appear when researchers access our palm e-learning domain. This contact us is used as a helpdesk which can be used as a means of asking questions if you don't understand the use of features in elearning.

#### 4. CONCLUSION

From the results of research into the development of the "Our Palm Oil Web App" with the GPT 4 Chat feature, e-learning module, and community platform, it can be concluded that this platform aims to increase access to information, literacy, skills, participation, collaboration, productivity and welfare of oil palm farmers in Indonesia. By integrating artificial intelligence technology and e-learning modules, this platform is expected to provide significant benefits to the palm oil plantation sector. The strength in developing this elearning is that it has integrated AI Assistant which can be used as a means of consulting and asking questions about the community and how to plant oil palm directly.

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