**MULAWIN COCONUT FARMERS COOPERATIVE**

**MANAGEMENT SYSTEM**

A Research/Capstone Project

Presented to the Faculty of the

College of Computer Studies

**MINDORO STATE UNIVERSITY**

Calapan City Campus

Masipit, Calapan City, Oriental Mindoro

In Partial Fulfillment

Of the Requirements for the Course of

**BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

by

**Allan C. Capio**

**Criz Franchesca Marie R. Cruz**

**John Loyd B. Gutierrez**

December 2023

**CHAPTER I**

**INTRODUCTION**

**Project Context**

In the rich landscapes of Mulawin, where the vibrant coconut groves stretch as far as the eye can see, a dedicated community of coconut farmers has come together to accompany in a new era of efficiency, collaboration, and prosperity. The Mulawin Coconut Farmers Cooperative stands at the intersection of tradition and modernity, committed to preserving the rich agricultural heritage of the community while harnessing the power of cutting-edge technology.

Mulawin Coconut Farmers was founded on February 2009 and registered on April 2009. On December 2022, Mulawin Coconut Farmers became a cooperative and known as MUCOFACO.

In the pursuit of sustainable agricultural practices and enhanced socio-economic development, the cooperative recognizes the need for a strong and efficient management system. This project aims to revolutionize the way the Mulawin Coconut Farmers Cooperative operates, offering a comprehensive solution to address the complex challenges faced by the cooperative's management.

Our aim is to design and implement a sophisticated Cooperative Management System tailored specifically for the unique needs of the Mulawin coconut farmers. This system will integrate innovative technologies to efficient communication, optimize resource allocation, and facilitate informed decision-making processes. By leveraging the power of digital tools, data analytics, and user-friendly interfaces, the Mulawin Coconut Farmers Cooperative Management System aspires to empower farmers, enhance productivity, and contribute to the overall growth and sustainability of the coconut industry in the Mulawin community.

This project contains a commitment to community, sustainability, and technological advancement. As we embark on this transformative journey, we envision a future where the Mulawin Coconut Farmers Cooperative becomes a shining example of how tradition and technology can harmoniously coexist, fostering prosperity for generations to come.

**Objectives of the Study**

The general objective of this project is to design and implement an official website for Mulawin Coconut Farmers Cooperative to enhance virtually their operation. The specific objectives of the “Mulawin Coconut Farmers Cooperative Management System” project are as follows:

1. To develop a user-friendly digital platform that allows cooperative members to register their information easily and securely.
2. Implement a user-friendly interface that allows members to browse, inquire, and place orders seamlessly.
3. Develop a dynamic catalog that showcases the diverse range of coconut products and services offered by the cooperative.
4. Integrate an inventory management system to monitor the availability of products and services in real-time.
5. Develop a reporting module to generate comprehensive reports on key performance indicators (KPIs) such as member registration statistics, product and service sales, and inventory levels.
6. Conduct a thorough evaluation of the Mulawin Coconut Farmers Cooperative Management System in accordance with the ISO 25010 standard for software product quality.

**Scope and Limitations**

The scope of the Mulawin Coconut Farmers Cooperative Management System capstone project encompasses the comprehensive development and implementation of enhanced features within the cooperative's digital infrastructure. Specifically, the project will focus on the refinement of member registration processes and the optimization of products and services. The member registration scope includes the design and integration of a user-friendly interface for secure digital identification mechanisms, and a centralized, real-time member database.

While striving for comprehensive enhancements, it's imperative to acknowledge certain limitations inherent in the Mulawin Coconut Farmers Cooperative Management System. Firstly, external factors such as internet connectivity and technological infrastructure may impact the system's accessibility, particularly in remote agricultural community. Additionally, the successful implementation of secure digital identification relies on the cooperation and compliance of cooperative members, and challenges may arise in cases of resistance or reluctance to adopt new technologies.

**Significance of the Study**

The Mulawin Coconut Farmers Cooperative Management System holds paramount significance as it addresses critical challenges faced by the agricultural community in Barangay Mulawin.

**MUCOFACO**- the implementation of the Mulawin Coconut Farmers Cooperative Management System represents a transformative step towards efficient, transparent, and sustainable cooperative operations. This system offers MUCOFACO a powerful tool to streamline member registration, optimize product and service operations, and enhance overall decision-making processes.

**Farmers-** the Mulawin coconut farming community is profound. The Mulawin Coconut Farmers Cooperative Management System empowers individual farmers by simplifying the registration process, granting access to real-time market information, and facilitating fair trade practices.

**Researchers-** it contributes to the academic discourse on agricultural cooperative management systems, particularly within the context of coconut farming communities. The development and implementation of the Mulawin Coconut Farmers Cooperative Management System provide valuable insights into the integration of technology in agricultural practices, addressing a research gap specific to coconut cultivation.

**Future researchers-** serves as a foundational framework for future researchers interested in exploring digital solutions for agricultural cooperatives. This study opens avenues for further investigation into the scalability, adaptability, and long-term impacts of cooperative management systems in different agricultural settings.

**A screenshot of a computer program

Description automatically generatedConceptual Framework**

**Evaluation of Mulawin Coconut Farmers Cooperative Management System**

**Figure 1. Conceptual Framework**

Figure 1 illustrates the systematic flow of inputs, processes, and outputs within the Mulawin Coconut Farmers Cooperative Management System, demonstrating how the integration of technology and processes can contribute to the overall efficiency and success of cooperative management.

**Definition of Terms**

1. **Cooperative Management System (CMS):** The digital platform designed and implemented for the Mulawin Coconut Farmers Cooperative, facilitating efficient, transparent, and accessible management of cooperative operations, including member registration, product and service operations, and overall decision-making processes.
2. **Digital Identification:** The use of secure and unique digital credentials for cooperative members, including usernames, passwords, and multi-factor authentication methods, ensuring authenticated and authorized access to the CMS.
3. **Real-Time Member Database:** A centralized and continuously updated repository within the CMS containing accurate and current information about cooperative members, enabling quick and efficient retrieval of member details by cooperative administrators.
4. **Product and Service Catalog:** An interactive and user-friendly compilation of coconut products and services offered by the cooperative, accessible through the CMS, providing detailed information, pricing, and inventory status for members to explore and inquire.
5. **Inventory Management:** The systematic tracking, monitoring, and control of the cooperative's product and service inventory through the CMS, aiming to optimize stock levels, prevent overstock or stockouts, and ensure efficient operations.
6. **Pricing Transparency:** The practice of providing clear and easily understandable pricing information for coconut products and services within the CMS, promoting openness and fairness in transactions and contributing to informed decision-making by cooperative members.
7. **Fair Trade Practices:** Ethical and equitable principles governing the buying and selling of coconut products and services within the cooperative, encompassing transparent pricing, fair compensation for farmers, and adherence to ethical standards as facilitated by the CMS.
8. **Sustainability:** The integration of environmentally responsible and resource-efficient practices within cooperative operations, as supported by the CMS, ensuring the long-term viability of coconut farming in Barangay Mulawin.
9. **Resilience:** The capacity of the Mulawin Coconut Farmers Cooperative, supported by the CMS, to adapt and thrive in the face of challenges, uncertainties, and changes in the agricultural landscape, ensuring the sustained well-being of the farming community.

**CHAPTER II**

**REVIEW OF RELATED LITERATURE AND SYSTEM**

The Mulawin Coconut Farmers Cooperative Management System aims to enhance the efficiency and productivity of coconut farming operations in the Philippines through the integration of modern technologies. This review of related literature provides an overview of the key themes and concepts surrounding agricultural cooperative management systems.

**Local Study**

The effectiveness of a coconut development officer (CDO) is an important factor in a coconut farmer's productivity and profitability. This implies that CDOs are doing their responsibilities and farmers have experienced an improvement in coconut growing activities. Moreover, the ordered regression model revealed that being a young farmer, with low education attainment, and good economic income, a farmer who owned a coconut field, training and seminars, and membership in any agricultural organization are predictors of the effectiveness of CDO based on farmers' perspective. Conclusively, to further enhance the CDO's effectiveness in their responsibilities, they must undergo some rigorous training about the new technologies and techniques in coconut farming (CASINILLO, L. F., 2023). The coconut is deemed the tree of life for its versatility and multifarious uses. Nonetheless, the coconut industry is beset by low productivity and low value of its products owing to a variety of reasons. Massive replanting, intercropping, use of high yielding varieties and fertilization programs, among others, were launched and touted to address low productivity and incomes of the small farmers. This type of diversification will reduce the adverse effects of the vagaries of the market in traditional products which has a lot of substitutes and oligopsonist tendencies (Bello et. al., 2020).

Low agricultural productivity is an even bigger challenge. The cultivation frontier in the Philippines has long come to a close. This means that increasing agricultural production in the country can solely come from productivity improvement since no new area can be opened up for new cultivation. There is also limited connectivity between production areas, markets, and poor compliance with product standards resulting to low competitiveness of agriculture, forestry, and fisheries products (Brown et al., 2019). Technological surveillance can be defined as an organized, selective, and permanent process by which to capture information, whether external or internal, mainly on science and technology, in order to select that information, analyze it, disseminate it, and communicate it so that it can be converted into knowledge that might serve to make decisions that involve less risk and be able to anticipate changes (Padilla, J., Zartha, J., Alvarez, V., and Orozco, G., 2019).

This has come about largely owing to the paradigm shift regarding its genuine nutritional benefits. It is especially due to innovation that has been incorporated into agro-industrial processing and the development of new products, and the fruits of such labor can be seen in the growing demand by consumers around the world. Integrally making full use of coconut, it turns out, is extremely important for agribusiness (Grass Ramirez et al., 2023). The funds invested by the community members in implementing the CSA interventions are expected to be recovered within three years after 2020. Diversifying farm production should be encouraged and practiced by more households as it serves as a cushion to minimize loss of livelihood for the family, and could help households maintain a steady and reliable income even if one of the crops failed or incurred losses (Manilay et al., 2021).

The coconut industry in the country Philippines plays a vital role in national economic development. In fact, this industry is one of the top ten exports as exhibited by the good export performance of both traditional and non-traditional coconut products in the country. The Philippines is the second-largest producer of coconuts globally, ranking directly behind Indonesia. Coconut provides a sustainable income source for many Filipinos by giving service through its many programs (Dargantes et al., 2022). The coconut industry is one of the most important sectors of the economy of the Philippines. Coconut goods are the Philippines' most significant agricultural export. However, the international exports and competitive advantage could be improved, according to the Coconut Farmers and Industry Roadmap (COCOFIRM) (Manilay et al., 2021).

**Foreign Study**

The value of coconut production in North Sulawesi reaches almost 10% of Indonesia’s total coconut production, and more than 95% is managed by farmers. The economic value of coconut is still very dependent on primary products, namely coconut seeds and copra. To increase farmers‘income, the solution that can be taken is to implement the value chain in integrated coconut farming by diversifying coconut products (Karipun et al., 2023). Demand for coconut derivatives has increased by 500% in the last decade, and both the value and volume of the market are expected to grow by 11.3 and 79.9%, respectively, in the coming years (Rethinam (2019), Alouw and Wulandri, 2020). This demand is principally due to the beneficial properties of coconut, elucidated by means of research conducted, in the main, by its biggest producers, including Indonesia, Philippines, India, and Brazil. While traditionally coconut meat and water have been consumed fresh, today some variety of products derived from coconut can be found, such as coconut water, coconut milk, grated coconut, coconut snacks, coconut cream, coconut fiber, coconut wood, coconut flour, coconut sugar, coconut powder, coconut chips, coconut oil, coconut plastic wood, coconut butter, and coconut shell charcoal, as well as copra, shell, or pulp. In that sense, while the marketing of conventional derivatives such as copra or oil exhibits some stability, high-value products such as coconut water, coconut milk, and dehydrated coconut have increased by 149, 33, and 29%, respectively (Chen et al., 2020).

Worldwide, in 2020, 61,938,690 tons of coconut were harvested, with the coastal areas of the Pacific Ocean being the main region of production. Indonesia topped the list with 16,824,848 tons, followed by India with 14,695,000 tons, the Philippines with 14,490,923 tons, and Brazil with 2,458,839 tons, Colombia currently ranks 23rd in production with 153,832 tons (Fao 2021). Coconut is the sixth most cultivated fruit in the world. It is found in 93 countries. Production covers an area of 12.3 million hectares, of which more than 70% is concentrated in just three countries—the Philippines with 29%, Indonesia with 25%, and India with 17%. The market is worth approximately 6,500 million dollars annually. At a commercial level, coconut can be found mainly in the form of dried coconut, copra, coconut oil, and coconut water, thus becoming a very important crop in the tropical and subtropical zones—the zones of highest production—due to its great contribution to local economies from the creation of employment and income generation (Sacchi, 2020).

Technologies and equipment also play an important role in the processing and commercialization of the coconut. One of the most widely used pieces of equipment is oil extractors since these are employed in obtaining this key derivative of coconut, useful not only in gastronomy but also as a component in preparing a variety of cosmetic products, such as soaps and body and facial creams (Perlaza et al., 2020). This extractor can be simple with only the application of mechanical force and with operations carried out by the operators (Machinery, 2021) or more modern with complete equipment to carry out almost the entire process of cutting and oil extraction (Gbasaour, 2019). In Colombia, given the increase in coconut production in recent years and expansion of product supply, the future of coconut might be well considered as having great potential, but multiple uncertainties arise due to various crossroads that have made difficult any advancement or development of the sector such as the low supply of coconut at the national level, which leads to increased prices and hinders agro-industrial transformation operations, and consequently the dependence on imports of fresh and processed coconut to achieve compliance with commercial sales quotas (Minagricultura, 2019), thus affecting the national coconut chain.

“Technological prospective studies have a great influence on innovation policies of countries, since they offer the possibility of identifying and taking advantage of future opportunities in which a certain sector must bet on science, technology, industry and society through a process participation of scientists, industrialists and government” (Suarez et al., 2021). A prospective study, thus, serves to give a focus to future research or trade since it offers the opportunity to be aware of “What is changing?,” “What might change?,” “What should change?,” “Who can make these changes?,” and “What are the implications of those changes?” Knowing this, it is easier to be able to identify which topic provides the highest possible profitability or which topic is of greatest interest to the public (Ucel, 2022).

**Related System**

Cooperatives are autonomous, duly registered association of persons, with common bond of interest, voluntarily joined together to achieve their social, economic and cultural needs and aspirations, making equitable contributions to the capital required, patronizing their own products and services and accepting fair share of the risks and benefits of the undertaking in accordance with the universally accepted cooperative principles (Hilario, 2022). The cooperative must adopt a series of good management and governance practices and a strategic positioning that guarantees a competitive position, putting it on an equal footing with private firms. The central management tools identified are separation between control and ownership, strategic management, strategic alliances and partnerships, management branding, restricted membership, social management, self-financing and risk management, with numerous other management options available (Wander et al., 2022).

Although the role of agricultural cooperatives in supporting farmers to improve their positioning in the value chain is recognized, in Romania only 1% are members in associative structures, the cooperative system being quite poorly developed. However, despite the sudden onset and magnitude of the pandemic shock, many agricultural cooperatives have managed to adapt and mitigate the effects on their members, as evidenced by the analysis by counties, regions and nationwide of the evolution of some indicators of their economic activity, for the last 3 years with submitted balance sheets (Dobay, 2022). Problems such as the reduction of the added value of agricultural products and the interruption of the supply of agricultural products caused by the unstable collaborative relationship have seriously hindered the high-quality development of the agricultural product supply chain. Promoting the stable collaboration in the agricultural product supply chain is an urgent problem. Considering the characteristic demand of consumers for agricultural products, this paper takes the supply chain mainly operating characteristic agricultural products and dominated by farmer cooperatives as the research object and constructs a tripartite evolutionary game model of farmer cooperatives, manufacturers, and retailers (Huo et al., 2022).

Due to the democratic nature of the cooperative form, it is assumed agricultural cooperatives empower their members and allow small farmers to have a stronger voice in the supply chain. However, much of the academic literature on agricultural cooperatives focuses on the economic analysis of their performance, while hardly any research has been done on analysing the impact that policy, long supply chains and the internationalisation of the food system have on members and labour dimensions (Ajates, 2020). The use of digital technologies has been recognized as one of the great challenges for businesses of the 21st century. This digitalization is characterized by the intensive use of information technologies in the different stages of the value chain of a sector. In this context, smart agriculture is transforming the agricultural sector in terms of economic, social, and environmental sustainability. In some countries, cooperatives, as the most common legal form of the incumbent companies, in this rather traditional low-intensive technology sector, are going to develop a relevant role in the process of adoption of these technologies (Ciruela-Lorenzo et al., 2022).

Literature contributions to agricultural cooperative (AC) entrepreneurship model are fragmented and show some significant limitations. The purpose of this paper is to identify the existing important barriers to this entrepreneurship model as well as to group them into respective themes (Pliakoura et al., 2022).

A collective marketing group for farmers and an equivalent non-marketing group that did not provide a marketing service, although other functions remained the same. Using the propensity score matching (PSM) procedure and stochastic production frontier (SPF) modelling, cooperatives’ key functions that potentially increase farmers’ TE can be identified (Qu et al., 2020).

Many international aid agencies have been trying to utilize cooperatives as a strategic means for poverty reduction and rural community development in developing countries due to their characteristics, operational efficiency, and effectiveness. However, it is difficult to find a successful case due to various factors. This study tries to propose strategies that the aid agencies and local residents should use for the success of cooperatives in developing countries (Moon et al., 2020). Agricultural cooperatives competitive context is being defined by sustainable development paradigm, which are forcing them to assess their performance considering sustainability requirements. There are few empirical studies that provide data to assess sustainable performance of agricultural cooperatives' operations (Marcis et al., 2019).

**Synthesis**

Cooperatives are vital in supporting farmers, offering a democratic, equitable, and ethical business model. However, they face challenges due to global changes and digital technologies. To remain relevant, they must adopt sustainable practices, ensure fair treatment, and contribute to local economic development. Barriers include inadequate infrastructure, limited financial resources, and weak public and private sector support. To overcome these, cooperatives need to invest in capacity building, strengthen management systems, and collaborate with stakeholders.

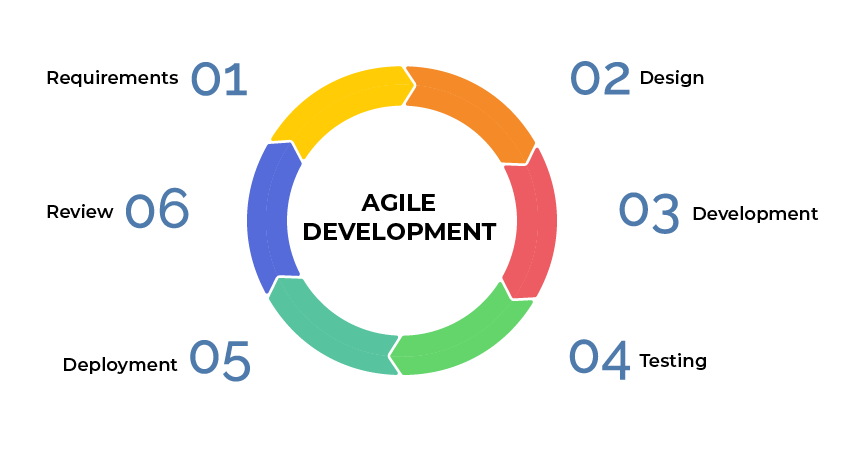
**CHAPTER III**

**METHODOLOGY**

This chapter presents the methods and strategies used in this study to develop an approach that matches its objectives. It was obtained using different processes, specifications, analysis, data gathering instruments, and evaluation that guide the researchers to manage and control the research.

**Development Method**

This study utilized quantitative as a research design, this design produces logical, statistical, and unbiased findings. Data was collected in an organized manner and on larger samples that were representative of the total population. Quantitative research collects information from existing and potential customers using sampling methods and sending out online surveys or questionnaires, the results of which can be depicted in the form of numerical. After careful understanding of these numbers to predict the future of a product or service and make changes accordingly.



**Figure 2. SDLC Agile Model**

**Requirements.** The researchers conducted an interview to gather more information related to MUCOFACO and documents by obtaining consent from the client. The information collected helped the researchers create better system functions and features that meet the client's expectations.

**Design.** The researchers focused on designing graphical user interface (GUI) of the system according to the needs of the client. The functions and features of the system were determined. Also, the researchers analyzed the design of the database schema and structure which will help by developing the system.

**Development.** The researchers began the development of the system. The researchers started writing a coding system associated with using visual studio. In addition, CodeIgniter framework is used to implement in the system for additional security and easier coding. The researchers also used PHP language, JavaScript, bootstrap template for interface and MYSQL as database platform.

**Testing.** This phase covered the system and is tested to ensure that it works properly according to its purpose. The researchers demonstrated how it works to all respondents to guarantee that the user's needs are met, and any errors are remedied. Negative testing, unit testing, and acceptance testing were all used by the researchers.

**Deployment.** The system had been deployed on the MUCOFACO. The Manager reviews and assesses the system during the deployment for additional improvement of the system. The researchers monitor and maintain the system during the deployment and regularly visit and consult the client to ensure that system remains in good working order and operates smoothly.

**Review.** In this phase, the system had been implemented in MUCOFACO, and the client had evaluated its performance. The researchers conducted a survey questionnaire through google forms and printed questionnaires that based on the ISO 25010 and distributed it to Members, Manager, Clients, and the IT experts. After the evaluation, the researchers tallied all the results from the questionnaires and got each overall mean and verbal interpretation.

**Gantt Chart**

The table below represents the schedule and plan of the development of the system. The Requirement Phase was scheduled for the month of October 2023 with the task will to be completed. The Implementation Phase was yet to be scheduled with the tasks to be completed. The development of our project started in November, the remaining months is for testing phase and deployment.

A grid of blue squares

Description automatically generated

**Table 1. Gantt Chart**

**Requirements Specifications**

The user must meet the required functions of the system to fully use the system. This includes the functional requirements, user interface, software interface, hardware interface, and security interface. Users must familiarize themselves with the processes and procedures of the system.

**Functional Requirements**

Functional requirements define how the system works and how it should be worked to function properly to avoid unnecessary events happening. This part will discuss the presentation of the system, this can be reviewing the process and how the data are operated to produce or create a functional output. It is important to discuss the functional specification of the proposed system for the benefit of the future researchers.

|  |  |
| --- | --- |
| **Features** | **Description** |
| **Ecommerce** | Facilitates online transactions for the cooperative's coconut products and services, providing members with a convenient platform to browse, order, and make secure payments. |
| **Point of Sale** | Integrates a user-friendly POS system to streamline in-person transactions, ensuring a smooth and efficient checkout process for cooperative members. |
| **Customer Feedback** | Incorporates a feedback mechanism, allowing members to share their experiences and suggestions, fostering a collaborative environment and continuous improvement. |
| **Chatbot** | Implements an intelligent chatbot to provide instant assistance and information, enhancing member engagement and addressing queries related to products, services, and cooperative operations. |
| **Registration** | The member registration process, offering a user-friendly interface for new members to join the cooperative digitally, capturing essential information efficiently. |
| **Generate Report** | Enables the generation of detailed reports on key performance indicators, member activities, and financial transactions, empowering cooperative administrators with valuable insights for strategic decision-making. |
| **Inventory Management** | Implements a robust inventory management system to track and optimize the cooperative's product and service stock levels, minimizing the risk of overstock or stockouts. |
| **MOD of Payment** | Offers diverse modes of payment to cater to the preferences of cooperative members, including online transfers, cash payments, and other secure transaction options. |
| **Push Notification** | Utilizes push notifications to keep cooperative members informed about important updates, promotions, and events, ensuring timely communication and engagement. |
| **Workshop** | Introduces a workshop feature that provides educational resources and training modules, equipping cooperative members with the knowledge and skills needed to enhance their coconut farming practices. |

**Table 2. Functional Requirements**

Table 2 shows that the Mulawin Coconut Farmers Cooperative Management System features consists of

**User Interface**

The user interface is also a significant part of the project because it facilitates interaction between the user and the program. The user interface for the created system is depicted in the tables below. Each discusses the description given and assisted the reader in visualizing the project.

A screenshot of a chat

Description automatically generated

**Figure 3. User Interface**

The researchers opted for a website design that would complement the MUCOFACO GUI, while also seeking input from the client on the website's GUI. The design features a minimalist style with a blue and plain white background, which some users may find too simple, but the majority find it visually appealing due to the well-chosen color combinations.

**Hardware Interface**

The hardware used in this project follows the required specifications in developing this system. The hardware interface included in this method defines the logical and physical characteristic of each interface between the software product and the hardware component of the system. The proponents used Ryzen 5 and 8GB Random Access Memory and hardware of 512 GB storage that would be sufficient for the storage of the OS, databases, files, and other important things to be used.

**Software Interface**

The software interface is one of the most important interfaces because it describes the difference between the system and other software components including database, operating system, tools, libraries, and integrated commercial components. The proponents used different applications such as Visual Studio for Php, MySql server for database management for the web application we used PHP scripting language, CSS, Bootstrap, HTML language.

**Security Requirements**

Before determining if the program is secured, the researchers first determined exactly what a security requirement is all about. The researchers ensured that the system is accessed only by authorized persons. Through username and password, the admin and users can have access to the system.

**Technical Background**

The technical background gives important information regarding technical aspects of the project which makes it easier to define what is required in easy-to-understand words for developers. The next sections go over hardware and software specifications.

**Hardware Specifications**

Hardware Specifications refers to the technical descriptions of the hardware items, its components, and capabilities. Table 3 below presents the different hardware components to be used for the completeness of this project.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Hardware** | **Function** | **Specifications** | | | **Unit** |
| **Minimum** | **Recommended** | |
| **RAM** | Efficient development and testing | At least 8GB | | 16GB or higher | 1 |
| **Processor** | Handling demands of web development | Multi-core processor (e.g., Intel Core i3 or higher) | | Quad-core or higher | 2 |
| **Internet Connection** | Efficient access to cloud storage, version control, and web development tools | Reliable internet connection | | High-speed and reliable connection | 3 |

**Table 3. Hardware Specification**

**Software Specifications**

Software Specifications refers to the representation of the software used by the system. The researchers recommend installed Excel File, medium to fast internet connection and any form of search engine to search for the website. Table 4 below also presents the other software specifications to be used by the project.

|  |  |  |
| --- | --- | --- |
| **Component** | **Minimum Specifications** | **Recommended Specifications** |
| Operating System | Windows 10 (64-bit) | Windows 11 Pro (64-bit) |
| Visual Studio Code | Version 1.60.0 | Latest stable version |
| Database (phpMyAdmin) | 1 Database | 2-3 Available Databases |
| MySQL | Version 5.7 | Latest stable version (e.g., MySQL 8.x) |
| CodeIgniter | Version 4.1 | Latest stable version |
| Hostinger | Shared hosting plan | Premium or Business hosting plan for enhanced performance and features. |
| Laragon | Version 4.0 | Latest stable version |
| Web Browser | Google Chrome | Google Chrome or Any Web Browser |

**Table 4. Software Specification**

As shown on the Table 4, the proponents used a variety of applications, including PHP for a programming language and CodeIgniter for the framework used by the researchers, Visual Studio for the text editors, Laragon for the database, and google chrome for browser. The researchers also employed a 64-bit operating system that could handle the researcher's system project.

**System Analysis and Design**

System analysis and design are concerned with the planning and development of information systems by understanding and specifying in detail what a system should perform as well as how the system's components should be implemented and work together.

**System Architecture**

A system architecture shows the representation and structure of the system.

A black and white image of a gear

Description automatically generated

**Figure 4. System Architecture**

Figure 4 shows that the admin has control and maintenance responsibilities over the system and manages various aspects related to members, payments, a chatbot, and orders or services. The system, in turn, interacts with or provides services to the member. The overall layout indicates a workflow or organizational structure.

**Use Case Diagram**

A diagram of a person with text

Description automatically generatedA representation of a user interaction with the system and depicting the specifications of a use case. A use case diagram can portray the different types of users of a system and the various ways that they interact with the system.

Member

Admin

**Figure 5. Use Case Diagram**

In this diagram, there are two main actors represented by stick figures: "Admin" and "Member." The "Admin" actor is associated with multiple use cases, including Login/Register, Add Members and Products, Print Service Agreement, Update Customer, Add Stock, Update Stock, Generate Reports, and Manage Members. On the other hand, the "Member" actor is associated with use cases such as Ask Chatbot, make feedback, Browse services, and Browse products.

**Activity Diagram**

A diagram of a diagram

Description automatically generated with medium confidenceThis part of the document presents the flow of the project using an object-oriented flowchart. Its purpose is to capture the dynamic behavior of the system. It focuses on the execution and flow of the behavior of a system instead of implementation.

**Figure 6. Activity Diagram**

Figure 6 represents a system or process involving multiple steps and decision points for members, a system interface, and admin roles.

**Data Flow Diagram (DFD)**

The data flow diagram is like a map that shows the flow of information for any processes of the system. From here, the context diagram and diagram 0 are discussed.

**Context Diagram**

This presents the basic overview of the whole system or process being analyzed.

A close up of a white background

Description automatically generated

**Figure 7. Context Diagram**

Figure 7 shows the development of how the proposed system will work and function in respective areas that they are designed to work on.

**Diagram 0**

The Diagram 0 of Mulawin Coconut Farmers Cooperative Management System shows the flow of information to visualize the processes of the project.

A diagram of a user account

Description automatically generated



ADD TO CART

![A white background with black and white clouds

Description automatically generated](data:image/png;base64,iVBORw0KGgoAAAANSUhEUgAAAGYAAABOCAYAAADSIGM5AAAAAXNSR0IArs4c6QAAAARnQU1BAACxjwv8YQUAAAAJcEhZcwAAEnQAABJ0Ad5mH3gAAADNSURBVHhe7dExAQAgDMCwgX/PwIGIHM1TAV3nmXD2bzCNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY1CNQTUG1RhUY0gzFw+tBJidZNL3AAAAAElFTkSuQmCC)

APPROVE ORDER

ORDER INFORMATION

**Figure 8. Diagram 0**

This figure is diagram 0 of the system and it shows the whole data system of the project and emphasizes the way it interacts with the external entities.

**Database Schema**

System design was an important stage in the study's development. This phase displayed the properties of the entities in the system. This allows the user to view the attributes of existing entities. It describes the data from the study.

A screenshot of a computer

Description automatically generated

**Figure 9. Database schema**

The diagram illustrates the overall structure and interrelationships of various tables within the database. It depicts how the tables are interconnected using primary keys and foreign keys, which creates a relationship between them. The primary key serves as a unique identifier for each record in the table, while the foreign key creates a link between tables by referencing the primary key of another table. The diagram provides a visual representation of the database schema and the relationships between tables, which allows for efficient data manipulation and maintenance while ensuring data consistency and accuracy.

**Testing and Evaluation**

This is the type of task that must be completed for all components of the system to be thoroughly tested and the system to be effectively implemented. The system has undergone various revisions to maximize the number of services that it can provide. We also make certain that the system is usable.

**Participants of the study**

The respondents to the study were composed of the manager of the MUCOFACO, members, and IT Experts.

|  |  |
| --- | --- |
| **Respondents** | **Number of Respondents** |
| Manager | 1 |
| Members | 35 |
| IT Experts | 7 |
| **Total** | **43** |

**Table 5. Respondents of the study**

Table 5 shows the respondents of the study, including the number of each category of respondents.

**Data Gathering Instrument**

For the study, the researchers provided questionnaires which were answered by the respondents of the study. The acquired data of the respondent would validate to formulate the needed information for the website. The researchers used the rating scale questionnaire as instrument where it used Likert scale to get information from the respondents.

|  |  |  |
| --- | --- | --- |
| Scale | Range | Verbal Interpretation |
| 5 | 4.51 – 5.00 | Strongly Agree |
| 4 | 3.51 – 4.50 | Agree |
| 3 | 2.51 – 3.50 | Moderately Agree |
| 2 | 1.51 – 2.50 | Disagree |
| 1 | 1.00 – 1.00 | Strongly Agree |

**Table 6. Likert Scale-type**

**Implementation Plan**

If the proposed system is adopted by certain people, the researchers have devised an implementation strategy. If this is the case, the system as well as its documentation will be turned over. It will be used as a guide for the client who will oversee system updates and maintenance. There should be a letter of agreement stating that the system is freely given to the user and that the researchers will not be responsible for the project's updating and maintenance. If the initiative is approved, the researchers are planning to conduct several strategies.

|  |  |  |
| --- | --- | --- |
| Activities | Date | Progress Notes |
| Meeting with Client | October 23, 2023 | Agreed in the project proposal |
| Deployment Approval |  |  |
| System Development and Monitoring Period |  |  |
| System Evaluation |  |  |

**Table 7. Implementation Plan**

**References**

1. CASINILLO, L. F. (2023). MODELING THE EFFECTIVENESS OF THE COCONUT DEVELOPMENT OFFICER (CDO) IN THE PARTICIPATORY COCONUT PLANTING PROJECT (PCPP). Scientific Papers Series Management, Economic Engineering in Agriculture & Rural Development, 23(3).
2. Bello, R. T., Pantoja, B. R., Tan, M. F. O., Banalo, R. A., Alvarez, J. V., & Rañeses, F. P. (2020). A study on skills for trade and economic diversification (STED) in the non-traditional coconut export sectors of The Philippines (No. 995072489702676). International Labour Organization.
3. Brown, E. O., Decena, F. L. C., Ebora, R. V., & Director, A. E. (2019) The Current State, Challenges and Plans for Philippine Agriculture The Current State, Challenges and Plans for Philippine Agriculture.
4. Padilla, J., Zartha, J., Alvarez, V., and Orozco, G. (2019). Technological Surveillance for the Identification of Innovations in Leather tanning byproducts. Inf. Tecnol. 29, 127–142.
5. Grass Ramírez, J. F., Muñoz, R. C., & Zartha Sossa, J. W. (2023). Innovations and trends in the coconut agroindustry supply chain: A technological surveillance and foresight analysis. Frontiers in Sustainable Food Systems, 7, 1048450.
6. Manilay A, Cabriole MA, Itliong K, Jordan R, Rosimo M, Monville-Oro E, Barbon WJ, Gonsalves J. (2021). Coconut-based Systems in the Philippines: Intensification and Diversification with Climate-Smart Agriculture. CCAFS Working Paper no. 367. Wageningen, the Netherlands: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).
7. DARGANTES JR, V. C., BALES, M. C., & CASINILLO, L. F. (2022). MODELING FARMERS'INVOLVEMENT IN THE PARTICIPATORY COCONUT PLANTING PROJECT OF THE PHILIPPINE COCONUT AUTHORITY. Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development, 22(3).
8. Manilay, A. A., Cabriole, M. A., Itliong, K., Jordan, R., Rosimo, M. M., Monville-Oro, E., ... & Gonsalves, J. F. (2021). Coconut-based Systems in the Philippines: Intensification and Diversification with Climate-Smart Agriculture. CCAFS Working Paper.
9. Kairupan, A. N., Kindangen, J. G., Joseph, G. H., Hutapea, R. T., Malia, I. E., Paat, P. C., ... & Barlina, R. (2023). Value Chain Implementation in Rural-Scale Integrated Coconut Farming System in North Sulawesi Province, Indonesia.
10. Rethinam, P. (2019). “International scenario of coconut sector.” in The Coconut Palm (Cocos Nucifera L.)-Research and Development Perspectives (Singapore: Springer), 21–56.
11. Alouw, J. C., and Wulandari, S. (2020). “Present status and outlook of coconut development in indonesia,” in IOP Conference Series: Earth and Environmental Science, Institute of Physics Publishing, 12035.
12. Chen, H., Wang, Y., Sun, X., Peng, Y., and Xiao, L. (2020). Mixing effect of polylactic acid microplastic and straw residue on soil property and ecological function. Chemosphere 243, 125271. doi: 10.1016/j.chemosphere.2019.125271
13. Perlaza, D., and Carrillo, F. (2020). Estudio de factibilidad para el procesamiento de aceite y leche de coco, en la parroquia borbón- esmeraldas. riobamba: universidad nacional de chimborazo.
14. FAO (2021). Organizacion de las Naciones Unidas para la Alimentacion y la Agricultura.
15. Sacchi, G. (2020). Sector del coco: análisis de mercado y aspectos socioeconómicos, Marco general sobre el sector del coco en Jamaica. Ghana: Tropicsafe.
16. Machinery (2021). Small Scale Coconut Oil Extraction Machine.
17. Gbasouzor, A., and Nwanekezie, M. (2019). development of Improved Motorized Nmanu Akuoyibo (coconut oil) Extractor Designed for Employment Generation in Nigeria. Iaeng Transactions on Engineering Sciences.
18. Minagricultura (2019). Cadena de coco, Dirección de Cadenas Agrícolas y Forestales. Bogota: Ministerio de agricultura.
19. Suarez, L., Agudelo, A., Zartha, J., and Orozco, G. (2021). La cadena productiva de mora en el Departamento Risaralda en el marco de un estudio de prospectiva a 2032. Ciencia y Tecnica 26, 83. doi: 10.22517/23447214.23921
20. Ucel, C. (2022). Rethinking Modern Agriculture: Essays on Farmers, Productivity and the Environment (Doctoral dissertation, University of Pennsylvania).
21. Hilario, V. (2022). Socio-Economic Impact of Cooperatives Among Members: An Input to Customized Program Development Framework for Cooperatives. Psychology and Education: A Multidisciplinary Journal, 4(6), 636-651.
22. de Paula de Oliveira Junior, O., & Elenor Wander, A. (2022). AGRICULTURAL COOPERATIVE SYSTEM: MANAGEMENT CHALLENGES AND FEASIBLE SOLUTIONS. Brazilian Journal of Management/Revista de Administração da UFSM, 15(3).
23. Dobay, K. M. (2022). The resilience of agricultural cooperatives in the COVID-19 pandemic time. evidence from Romania. Agricultural Economics and Rural Development, 19(1), 13-30.
24. Huo, Y., Wang, J., Guo, X., & Xu, Y. (2022). The collaboration mechanism of agricultural Product supply chain dominated by farmer cooperatives. Sustainability, 14(10), 5824.
25. Ajates, R. (2020). Agricultural cooperatives remaining competitive in a globalised food system: At what cost to members, the cooperative movement and food sustainability?. Organization, 27(2), 337-355.
26. Ciruela-Lorenzo, A. M., Del-Aguila-Obra, A. R., Padilla-Meléndez, A., & Plaza-Angulo, J. J. (2020). Digitalization of agri-cooperatives in the smart agriculture context. proposal of a digital diagnosis tool. Sustainability, 12(4), 1325.
27. Pliakoura, A. P., Beligiannis, G., & Kontogeorgos, A. (2022). Significant barriers to the adoption of the agricultural cooperative model of entrepreneurship: a literature review. International Journal of Social Economics, 49(1), 1-20.
28. Qu, R., Wu, Y., Chen, J., Jones, G. D., Li, W., Jin, S., ... & Frewer, L. J. (2020). Effects of agricultural cooperative society on farmers’ technical efficiency: Evidence from stochastic frontier analysis. Sustainability, 12(19), 8194.
29. Moon, S., & Lee, S. H. (2020). A strategy for sustainable development of cooperatives in developing countries: The success and failure case of agricultural cooperatives in musambira sector, Rwanda. Sustainability, 12(20), 8632.
30. Marcis, J., de Lima, E. P., & da Costa, S. E. G. (2019). Model for assessing sustainability performance of agricultural cooperatives’. Journal of Cleaner Production, 234, 933-948.