

**Web Integrated Research Platform for CNLRRS**

A Capstone Project Presented to the Faculty of the

College of Computing and Multimedia Studies

Camarines Norte State College

Daet, Camarines Norte

In Partial Fulfillment of the Requirements

For the Degree in Bachelor of Science

in Information System

by

Baile, John Khent A.

Dacillo, Roniel Mclain B.

Ibana, Mariellyn C.

Raynes, Mark Allen D.

## **Chapter I**

### **INTRODUCTION**

#### **Context of the Study**

Electronic library (E-library) is a form of computer mediated system that uses electronic media, such as Web/internet devices and distributes resources to improve on the quality of teaching and learning. Students' use of e-library for learning is essential and as such the government has invested hugely into its subscription for several university libraries in Ghana. However, most university students feel reluctant to use the e-library resources for their studies. The purpose of this paper is therefore to examine the factors that influence students' intention to use e-library resources for their studies (Kwakye and Nor, 2020). Accessing local research conducted here in Camarines Norte is very important for the industry of pineapple cultivation; it enhances informed decision-making, community development, and academic growth. The success of the marketing plan depends on its ability to apply marketing theories and frameworks to the specific problems faced by the organization



**Mariellyn Ibana**

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(Chernev, A. 2020). By cultivating new variants and pest proof pineapple crops it will increase the marketability of our local pineapples.

## **Research Objectives**

The main objective of this study is to design and develop a Web Integrated Research Platform for CNLRRS, specifically it aims to:

1. Determine the information requirements needed to develop the Web Integrated Research Platform of CNLRRS;
2. Determine the features of the Web Integrated Research Platform for CNLRRS;
3. Determine the level of effectiveness of the proposed study in terms of:
  - a.) Functionality;
  - b.) Reliability;
  - c.) Performance Efficiency;
  - d.) Usability;
  - e.) Security;
  - f.) Compatibility;
  - g.) Maintainability;
  - h.) Portability;

## **Research Question**

The following questions are aimed to be answered by the study:

1. What are the information requirements needed to develop the Web Integrated Research Platform for CNLRRS?
2. What specific system features of Web Integrated Research Platform for CNLRRS; and
3. What is the level of effectiveness of proposed study in terms of:
  - a.) Functionality;
  - b.) Reliability;
  - c.) Performance Efficiency;
  - d.) Usability;
  - e.) Security;
  - f.) Compatibility;
  - g.) Maintainability;
  - h.) Portability?

## **Scope and Limitation**

This study is designed to focus on the investigation, conceptualization, design and development of Web Integrated Research Platform for CNLRRS to assist the management of agricultural data of researches conducted in CNLRRS. One of the functions is an E-library, offering a digital repository for research materials, and publications focused on pineapple farming and agricultural innovations. One of the key features is this study has limitations, the system requires a stable internet connection, which may be difficult for users in remote areas with limited access to digital technologies. Additionally, the system does not provide real-time tracking of farm activities or visual mapping of farm sizes and geographic features, which may limit its usefulness and functionality. While the platform is beneficial for data management and research, it lacks integrated weather forecasting and climate impact analysis—key elements for effective production planning. Training and orientation may also be required for users to fully understand and utilize the system, which may affect satisfaction and ease of learning. Lastly, the absence of real-time market trend monitoring or pineapple pricing analytics may reduce the system's maintainability and practical use in economic decision-making.

## **Significance of the Study**

The result of the study will be beneficial for the following entities:

CNLRRS Management. The system will improve data management and efficient research processes so that CNLRRS can store, retrieve, and analyze information more effectively. It will promote enhanced cooperation between proponents and farmers by offering accessible agricultural knowledge and best practices. The E-Library component will act as a storage of quality research materials, where agricultural innovations and findings are thoroughly documented and readily accessible. With geo-tagging and farm profiling capabilities, proponents are able to track pineapple farming activities more efficiently, resulting in more targeted interventions and research advancements.

Pineapple Farmers / Agricultural Workers. Farmers will enjoy enhanced access to research-based agricultural methods and best practices that can improve productivity and sustainability. Geotagging capabilities will enable them to see their farm locations, sizes, and soil types, enabling them to make better farming decisions. The system will offer a structured database for monitoring trends in production, which can assist farmers in adapting their practices to maximize yields and profitability.

Department of Agriculture. The system will be an important tool for policymakers and agricultural officers as it will offer real-time and historical information on pineapple production trends. It will aid the mission of the department to advance the use of technology in agriculture, especially in maximizing the pineapple sector in Camarines Norte.

Through simplification of research and development procedures, the project will assist in facilitating better implementation of government programs about sustainable agriculture.

Local Traders and Agribusiness Investors. Traders and agribusiness investors will benefit from more accurate data on pineapple production, allowing them to plan better market strategies and supply chain operations. The system will enhance transparency and efficiency in the pricing and distribution of pineapples, ensuring fair trade practices. Investors will have access to data-driven insights, making it easier to identify potential business opportunities in the pineapple industry.

Future Researchers. The development of this system will serve as a learning experience for the proponents, allowing them to apply information systems concepts in a real-world agricultural setting. It will also serve as a valuable reference for future researchers and students interested in the integration of technology and agriculture.



## **Chapter II**

### **REVIEW OF RELATED LITERATURE AND STUDIES**

This section of the paper examined relevant information from diverse sources and viewpoints that either support or are pertinent to the current topic. It contained all significant writings, citations, assertions, and research by different experts on the study's topic.

#### **Information about Web Integrated Research Platform for CNLRRS**

Library outreach services involve providing and delivering information resources to library users outside the library building, specifically involving bringing library and information services to the doorstep of patrons who by whatever reason are unable to visit the library. There are several examples of Library outreach services in existence such as bookmobile, library on the go, Info bus, and library elderly outreach project. It is also envisaged that library outreach services can utilize present-day information technology to bridge the gap between distant unserved library users and library facilities for speedy and real-time information delivery and exchange (Johnson & Hill, 2022).

According to Benson et al. (2021) library and information service is an aspect of social service rendered to the society

at different degrees and levels to ensure that members of the society at any time have access to timely and accurate information relevant to their information needs.

The study revealed that e-library is very helpful in their studies and they are getting benefit from it. It came as a suggestion that library staff should focus on solving problems such as lack of computers and lack of access to e-resources outside the library (Humaira Iqbal et al., 2022).

The study concluded that while agricultural colleges in Northwest Nigeria possess diverse and relevant information resources, further efforts are needed to support and expand these collections. Recommendations for enhancing access and preservation of these resources are provided (Magaji et al., (2024).

There has been a substantial increase in research publications on various subjects, particularly in the past ten years. Factors determining the popularity of articles in the e-library sector include keywords searched in Scopus, the number of citations and the publisher's name. The insights gained from this study, along with the discussions on each issue, will guide researchers, academicians, journal editors and practitioners in directing their research efforts (Verma et al., 2025).

Electronic library (E-library) is a form of computer mediated system that uses electronic media, such as Web/internet devices and distributes resources to improve on the quality of teaching and learning. Students' use of e-library for learning is essential and as such the government has invested hugely into its subscription for several university libraries in Ghana (Okyere-Kwakye & Md Nor, 2022).

The main purpose for using e-library services is research and the benefits of using e-library services were accessing information 24/7, finding relevant information, and performing well in academic endeavours. The majority of postgraduate students were satisfied with the usefulness of e-library services while also perceiving their skills for accessing e-library services not satisfactory (Abdullah, H. L. 2022).

The growth of internet has emerged as the powerful tool and changed the methods of research, storage, retrieval and communication of scholarly information in higher education system. The use of different e-resources enabled the users to retrieve relevant information. The growing importance of e-resources in education and research, agricultural educational institutes are stepping ahead to keep pace with the latest advances in information technologies (Meenambigai & Keerthana, 2022).

E-library is a medium through which electronic materials and/or resources such as online journals, e-books, academic databases, web directory, etc. are assessed using internet-enabled devices (Chime & Ekwueme, 2023) consumed by students, teachers and other researchers. Chime and Ekwueme (2023) averred that these materials provided by the e-library are enhancers of research and academic work.

Libraries play a pivotal role in the provision of this information since they are credible sources of information. This article models e-library services for public policy and sustainable development in Kenya (Owiti & Kwanya, 2023).

According to Kehinde & Adeyeye (2023) this study investigated the influence of library user education on use of information resources by students of Federal Colleges of Agriculture Ibadan, Oyo State. It was recommended that Librarians have to adopt library orientation, on-line instruction and course-related instruction as form of library user education to promote massive use of their information resources.

The use of technology in the form of e-library applications, especially e-books, is an important element in increasing digital literacy among educators and students. This research aims to determine the use of e-books in e-library

applications in increasing digital literacy of users. Observation, interviews and documentation as data collection methods. The use of e-books in e-library applications also contributes to increasing ease of access to information and the level of digital literacy for users (Farika et al., 2024).

Electronic libraries or virtual libraries which are popularly known as E-library began to emerge in the 1970s. Recently, it has risen to internet stage, with it, the web development and web-based resources and access tools which include data bases. It was recommended that there should be a comprehensive education programme for users of the e-library in order to prepare them with the prerequisite knowledge and skills on information technology (ABDULLAHI et al., 2024).

Drafting of the manuals for the effective running of the library such as recommendations on the kind of infrastructure in terms of hardware, software, and networking required to establish the library systems, a user manual for a recommendation for additional training resources for the library, and user training manual for e-library systems (Phiri & Mwale, 2022).

Camacho et al. (2022) emphasize that centralized digital resources contribute significantly to agro-industrial innovation. In their study on pineapple biomass utilization in

Costa Rica, they demonstrated that accessible e-library data supported research into converting pineapple waste into biomedical materials. Their findings highlight how digital libraries not only preserve valuable agricultural knowledge but also open opportunities for interdisciplinary applications of pineapple-related research.

### **Features of Web Integrated Research Platforms for CNLRRS**

Electronic libraries are systems that combine the machinery of digital computing storage and communication, in which the content, and software needed to reproduce and emulate learning extend that of collecting, cataloguing, finding and disseminating information offered by traditional libraries (Li & Furht, 2014). Electronic libraries can also be described as a system providing a community of users with coherent access to a large, organised repository of information and knowledge (Akinselure & Idubor, 2021).

The findings reveal differences in research trends within various elements of electronic libraries. There has been a substantial increase in research publications on various subjects, particularly in the past ten years. Factors determining the popularity of articles in the e-library sector

include keywords searched in Scopus, the number of citations and the publisher's name (Verma et al., 2025).

Integrating digital library systems like SLiMS creates new pathways for literacy development by providing interactive platforms that combine traditional reading with digital information skills. Through the proliferation of e-books and online resources accessible via computers, smartphones, and tablets, users now benefit from enhanced portability, space efficiency, and environmental sustainability (Humaiddi et al., 2025).

In the present study, the researcher collected data through a well-structured questionnaire based on the demographic profile, library membership details, library resources, services and infrastructure facility, to identify the utilization of public library services in Madurai District. The recent developments in the field of e-library should be made known to the public and has become essentially imperative in this dynamic branch of library services (Thanuskodi, 2025).

In the digital age, e-libraries have emerged as valuable tools for enhancing national food security by providing access to a vast array of agricultural knowledge, research findings, and best practices. These digital repositories enable farmers, policymakers, researchers, and other stakeholders to access

real-time data on improved farming techniques, pest control, soil management, and climate adaptation strategies (Kamal et al., 2025).

The library is known as a knowledge resource centre in an academic institution, where its users gather information from various information sources based on their information needs. Library websites can offer far more services than a traditional physical library in the digital context (Kiran et al., 2021).

The e-library, on the other hand, offers access to a wide range of digital resources, which is increasingly important for accessing up-to-date information in agricultural practices (Ojo & Adekoya, 2022). The similar scores suggest that both in-person and digital engagements are valued by users (Olusanya et al., 2025).

Study suggests that certain interface characteristics, such as terminology, screen design, and navigation, indirectly affect perceived usefulness by influencing perceived ease of use in e-library systems. These findings underscore the significance of e-library system characteristics, particularly system quality. In addition to enhancing accessibility, a web-based e-library platform facilitates the centralization of digital resources, making it easier for librarians and administrators to manage and



maintain a vast collection of materials (Bareer & Mohammadi, 2023).

According to Mondal (2021) digital libraries give acceptable opportunities for learners, attributable to as well as up-to-date data. aggregation transmission resources created it doable to remote learning. Digital libraries by storing and possible retrieve of academic resources from laptop networks provided value aid to electronic and networked learning. while not existence of organized and maintained electronic resources by digital libraries, accessibility to up-to-date eLearning resources isn't full crammed.

In this digitalized world, e-resources have become the most functional tool for higher educational institutes. It is advantageous in improving search speed, provides more access points, the ability to access information that would otherwise be unavailable, and an increasing amount of information is electronic form. Whereas, the old library system consumes a lot of valuable time for the scholars (Prajapati et al., 2022).

Integrating electronic resources into library services can have a number of advantages, such as boosting efficiency and offering better user services, expanding access to resources and fostering new research, assisting in conservation and preservation and enhancing the value of the parent

organization's collection, supporting e-learning and online research, and supplanting traditional print resources with multiple digital formats. Compared to print publications, electronic information sources according to Bhardway and Shama (2022) are more adaptable. They offer superior searching capabilities by utilising full text or keyword indexing (Olanusi & Edward 2022).

In this digital age, library resources and services have experienced a shift from the traditional library concept which was mainly physical to comprise both physical and digital (Volkova & Shrayberg, 2020). The concept of a digital library allows users much-needed access to information with ease without time or geographical limits. That is, a library user can access the library remotely with or without any physical assistance for enhanced learning and research (Adebimpe et al., 2021).

Key features include open study areas without designated private study spaces, an e-library that ensures both on-site and remote access, conference rooms for group activities, and office spaces for administrative operations. Additional facilities include specialized sections for phone calls, relaxation, dining, and charging stations, making the library a multifunctional hub for academic and personal use (Akinola & Amadhe, 2025).

Everyone found the conventional method of reading study materials to be unpleasant and time-consuming, and the traditional library only contained a small number of copies of each subject that is the reason in the era of new advanced technology, traditional library is gradually moving towards e-library (Sonkar, 2014). E-resources are played a crucial role in so that enhancing education for the majority of colleges, institutions, and schools with a higher level of education (YADAV, R. 2023).

The aim of the e-Library is to disseminate information, share good practices, and promote current awareness to assist in underpinning written work, add value and depth to our students' study experience, and support the continuing professional development of all those working and aspiring to work in the built environment (Roper, L. 2025).

### **Effectiveness of Web Integrated Research Platform for CNLRRS**

According to Agnihotri et al. E-Library, from starting of twenty first century, we are witnessed with rapid information and Communication Technology development, so now days with physical settings of library, various online databases are available with large collection and are maintained by research institutions. Researcher can approach to the particular

e-library according to his need as per procedure laid down by the concerned library owner institution or organization.

The study investigated the availability and use of electronic databases by scientists in agricultural research institutes. Findings revealed that while electronic resources are available, their usage is hindered by limited awareness, inadequate training, and infrastructural challenges. The authors recommend capacity building, institutional support, and improved access policies to ensure maximum utilization of these e-resources (Magaji, 2024).

The study examined how undergraduate students of agriculture access library services for research. It highlighted the role of e-library tools such as TEEAL and online journals, recommending expanded access and improved training to strengthen academic research (Idiku et al., 2022).

This article highlighted how modern libraries can support agricultural scholarship by offering data management services, digital repositories, and open-access platforms. It concluded that libraries must expand beyond traditional roles to meet agricultural researchers' evolving needs (Van Camp & Hines, 2021).

Institutional adoption of e-libraries for agricultural education has shown positive results when integrated into teaching, learning, and extension activities. This study recommends aligning e-library services with curricula to maximize impact on research and farming practices (Rai & Pandey, 2022).

This article discussed how libraries can support AI-driven agriculture and food security in the Fourth Industrial Revolution. It emphasized the role of libraries in providing e-resources, managing datasets, and offering training for researchers and farmers. The authors call for capacity building and stronger partnerships to maximize digital opportunities (Adigun et al., 2024).

The modern innovative educational technologies projected in the twenty first century e-learning education, blended learning, distance learning, mobile learning(mlearning), virtual learning and e-library, provided opportunities for members of the academic communities such as professors, lecturers, instructors, teachers, researchers and students to acquire, develop and maintain core skills in essential digital knowledge without obstructions (Matthew et al., 2021).

The study findings indicated the primary motivations for utilizing e-resources were for assignments and research

purposes. Among the e-resources, e-journals, e-books, and e-magazines were most commonly accessed by the students. While the students held positive perceptions of the e-resources, the most significant challenge they faced was a lack of sufficient computers in the e-library. Based on the study's findings, it was recommended that efforts be made to encourage female students to utilize e-resources similar to their male counterparts (Mohammed et al., 2023, May).

E-library resources were the least subscribed support services among the students. In terms of social support services, interaction with tutors and interaction with fellow students came up as the main support services available to students while counselling services were absent for these students. It was recommended that the support services that were inadequate, least used, and absent should be provided to enable students to complete their programmes of study successfully (Amponsah et al., 2021).

Libraries should subscribe to online library tailored for individuals with reading disabilities like SugamyaPustakalaya. This e-library provides access to a vast collection of resources for member libraries and their users. Introduce AI tools in university libraries to enhance the quality of services provided to users with reading disabilities. These tools can assist in

personalized recommendations and improving accessibility features (ARUNKUMAR, 2025).

In this research focus is upon digital libraries and it's important for various sectors given. E-Library or egranthalaya is an example of it. With the help of these applications students can take advantage of this facility by registering online. Resources available in the libraries of colleges and universities can be uploaded on it so that other colleges and universities can take advantage of them (Gurav, 2023).

In today's digital age, libraries have adopted technological innovation and provided facilities like digital repository, e-library, data management service and research analysis tools, which are a revolutionary step towards innovation. Libraries foster a collaborative environment where exchange of ideas, dialogue and creative thinking are supported. Librarians act as catalysts of innovation, playing a vital role in directing users to appropriate resources and guiding them on the path of innovation (Prakashan, 2021).

Traditional library system is increasingly moving towards e-digital library system. Because of traditional library system is consuming a lot of valuable times and e-library saves the time of everyone. These e-resources are easily accessible at everywhere through ICT tools (Smart phone, Laptop, Tablet and

Desktop). In the 3 pandemic situation, due to Covid-19, e-resources played an important role as useful medium for communicating the important information to students who could not attend the regular classes and not reach the library (PRAJAPATI, 2021).

E-libraries offer a wide array of resources including e-books, academic journals, articles, multimedia content, and databases. This variety caters to diverse learning and research needs across different subjects and disciplines. Potentially reduce costs associated with maintaining physical collections and facilities. This can lead to more efficient use of resources and potentially lower costs for users in terms of access fees or subscription charges. By reducing the need for physical materials, e-libraries contribute to environmental sustainability by minimizing paper usage and transportation-related emissions (Vinayak, 2024).

University libraries now depend on both electronic and print media based on network and physical facilities. In this way, university libraries are able to offer their patrons remote services and access to the vast networked resources. The users of this type of libraries (e-library) require basic ICT and information searching skills unlike in the traditional libraries



where users are required to have only the ability to read (Unamma, 2020).

Library outreach services involve delivering information resources to users outside the traditional library building, ensuring that individuals who cannot physically visit the library still gain access to essential information. This includes initiatives such as bookmobiles, "library on the go," information buses, and elderly outreach projects. With the integration of modern information technology, these outreach services can bridge the gap between distant or underserved users and library facilities, enabling speedy and real-time information delivery and exchange. Such innovations highlight the transformative potential of library services in enhancing accessibility and inclusivity in the digital age (Johnson & Hill, 2022).

### **Synthesis of the Art**

The literature reviewed here proves that digital knowledge systems and e-libraries have been essential facilitators of agricultural research and innovation between 2021 and 2025. Examples of existing platforms like the CABI Digital Library, TEEAL, and the USDA's Ag Data Commons show how digital centralized repositories can enhance access to information, increase research productivity, and furnish decision-support

materials to researchers, farmers, and extension workers. Similarly, research in agricultural digitalization points to the growing incorporation of multimedia tools, data sets, and intelligent decision-support systems within digital repositories, going beyond the role of archives.

In spite of these strides, there are still gaps in localized accessibility, end-user training, sustainability, and data integration for production analysis at the institutional level. Although global and national platforms offer general resources, a majority of farming research offices—even in localized settings—continue to fall short of having tailored e-libraries that deal specifically with their individualized data management and production monitoring requirements. Trustworthiness, governance, and usability are also considered persistent challenges that need to be resolved in order to achieve long-term uptake and usefulness.

This cutting-edge approach emphasizes the potential for the current study to make a contribution by coming up with a design and implementation of a System. As opposed to generic platforms, this system will be a specialized e-library and knowledge center specific to the needs of CNLRRS, facilitating effective access to production data, optimized information management, and facilitation of research-driven decision-making. As such, the project pushes the art forward by filling in the gap between

international e-library prototypes and specific agricultural research needs in localized settings, so that digital knowledge systems become both inclusive and contextually appropriate and sustainable.

## **Chapter III**

### **Methodology**

The method for the study Web Integrated Data Management Information System for Production Analysis of CNLRRS are presented in this chapter. This contains the software development methodology, project scheduling, sources of data, population of the study, data collection method, data analysis, and ethical consideration.

#### **Software Development Methodology**

A system development methodology is an organized strategy for planning, managing, and regulating the software development process. This study will utilize the Agile methodology, specifically the Scrum framework, to develop the Research Repository System for CNLRRS. This approach was selected to ensure the final system is highly responsive to user needs through iterative development and continuous feedback from pineapple farmers and agricultural experts.

The Agile methodology is an iterative and incremental approach, organized into time-boxed development cycles known as sprints. Each sprint encompasses key activities including requirements refinement, design adaptation, development, continuous feedback, testing, and deployment, resulting in a

functional product increment that delivers value early and consistently.

The system's research and development were guided by the Agile methodology, which allowed for constant adaptation to growing agricultural needs. The team collaborated in iterative sprints to study cultivation requirements, enhance crop management tactics, and build personalized farming protocols. Regular feedback loops with stakeholders enabled quick adjustments during implementation, while continuous evaluation of yield performance influenced each successive development cycle. This method provided the prompt release of actionable, value-driven features for optimizing pineapple production.

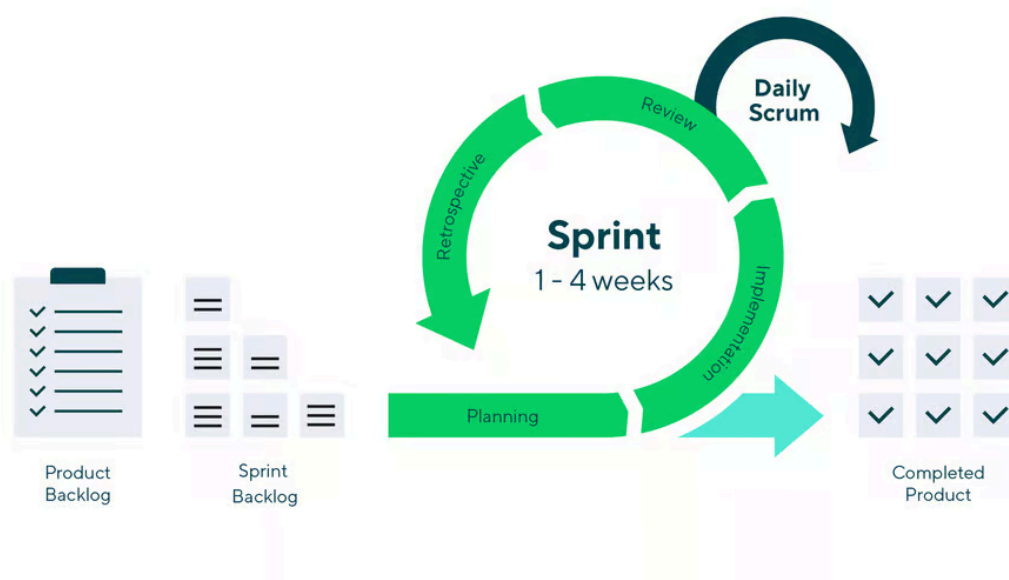


Figure 1: Hybrid Methodology Model

Product Backlog, The Product Backlog is a prioritized list of all potential features, research projects, and enhancements for the Pineapple Production Research Repository. It is a constantly evolving blueprint based on feedback from researchers, farmers, and stakeholders.

During the first requirements gathering phase, our team conducted structured interviews and surveys with key stakeholders, including Daet-based pineapple producers and agricultural organizations such as the Provincial Agriculture Office (PAO). The insights gained from this interaction were utilized to create and prioritize the initial Product Backlog, ensuring that the repository's development plan is built around the most crucial user needs and relevant features.

Sprint Backlog, is a specific, time-bound group of work chosen from the Product Backlog for a single development sprint (usually 1-2 weeks). It demonstrates the team's genuine commitment to delivering a specific, functional increment of the repository.

In this phase, a focused set of actionable tasks, including designing the user authentication module, implementing the sophisticated search filter for "cultivated" or "soil type," or creating the secure file upload interface. The Sprint Backlog is the team's thorough plan for achieving the Sprint Goal, which is

to transform priority research requirements into feasible, accessible software that will help the CNLRRS repository achieve its goal of optimizing pineapple production.

Planning, It's the phase where you define what you will do, why you will do it, how you will do it, and when you will do it. This roadmap keeps you organized, on track, and ensures your project is achievable.

During this phase, Sprint Planning is a meeting where the team picks a chunk of work from the master list (Product Backlog) and plans how to get it done in the next 1-4 weeks. This creates their focused to-do list for the sprint (Sprint Backlog).

Implementation, It's where you actively follow the plan you created and put your ideas into action.

During the implementation, The Implementation phase is dedicated to developing and building the sprint backlog's features for the CNLRRS Research Repository, such as cultivation-focused search filters and secure user authentication. The team overcomes obstacles and stays on track by working together every day. By the end of the sprint, they have delivered a tested and working product update that makes pineapple production research more accessible.

Deployment of product, this is the phase where actual creation of the purpose and objective of the system based on the design phase is developed.

During this phase, researchers created and integrated the Data Management Information System flow and created a mock-up. Based on the data collected from the client, and estimated the time required for system development.

Getting the final outcome, This final phase delivers the Data Management Information System while assessing completion towards all project objectives.

The phase combines evaluation with stakeholder acceptance to guarantee the solution fits both farmers and clients' needs. Our team created and Integrated the Data Management Information System flow and created a mock-up. Based on the data collected from the client, Our team deployed the entire Data Management System

### **Schedule of Activities**

The activities involved in the development of Web Integrated Data Management Information System for Production Analysis of Camarines Norte LowLand Rainfed Research Station are



presented in the figure below. Figure 2 shows the Gantt Chart showing the duration of activities researchers must complete to accomplish the capstone project. They used the Gantt Chart as shown in Figure 2 to show the dates of the schedule of activities which included the start and end of the activities, as well as the project activities summary. This visual representation helped to clearly outline the timeline.

***Figure 2: Gantt Chart.***

**Sources of Data**

In this study, the researchers collected data from both primary and secondary sources. The primary data sources were responses from pineapple farmers, CNLRRS staff, and farm stakeholders engaged in crop production and marketing. They were gathered via structured interviews, focus group discussion, and questionnaires to gain information on their current practices, problems, and system requirements.

The secondary data sources were in the form of existing research, related literature, and articles from the internet. These sources offered background information on farm data management systems, crop marketing processes, and adoption of technology among rural farm communities.

**Population of the Study**

The sample population of the study are thirty (30) workers from the CNLRRS, ten (10) of which are production department staff, five (5) system administrators, and fifteen (15) users of the existing process. In choosing the respondents, purposive sampling was employed by the researchers, wherein the participants were chosen intentionally in accordance with relevance to the study's purposes, that is, those having experience in data management, use of the system, or production analysis in CNLRRS.

#### **Data Collection Method**

In order to determine the main requirements and features, interviews were held with employees from various departments such as production, system administration, and end-users of the existing manual process. The researchers also studied relevant literature and existing research on similar systems to gain further insight into best practices and design considerations.

Researchers also conducted a survey based on the evaluation of USE tools to identify the usability of the existing process. The purpose of this survey was to determine the feedback provided by employees to the functionality, and overall usefulness of the current data management tools. The result of the survey was used to solve research problem 3 that

investigates the extent of usability of the existing system and how the usability can be enhanced.

To evaluate the efficiency of the new system in improving production analysis, qualitative and quantitative assessment approaches were applied. These were pre- and post-implementation surveys to measure improvement in system efficiency and production performance. The researchers also reviewed system logs and performance metrics to evaluate the effect on productivity.

Lastly, the researchers reviewed relevant research studies, industry reports, and documentation to validate the knowledge and ensure that the new system would be suitable for the unique needs of CNLRRS.

### **Data Analysis**

The study employed a comprehensive data analysis approach, encompassing qualitative and quantitative analysis. The researchers blend qualitative and quantitative analysis for this study. Qualitative analysis was used to investigate and understand CNLRRS personnel and pineapple farmers' experiences, problems, and expectations regarding their existing system. The method was highly appropriate in answering research questions 1 and 2. Quantitative analysis was used, however, to measure the

efficacy of the system against research question 3. This allowed the researchers to translate subjective user comments into quantifiable data that could be subjected to statistical testing of the system's usability and effectiveness.

The Likert scale, presented in Table 1, was critical in measuring the degree of acceptance and satisfaction with the system by its users. As a psychometric instrument, it enabled the researchers to examine patterns of user perceptions and to ascertain the effectiveness of the system in actual agricultural environments. The information obtained using this technique was statistically processed to determine trends, compute mean ratings, and assess the efficacy of the system in terms of user feedback from CNLRRS stakeholders.

### **Statistical Treatment of Data**

The data acquired, which measures the weighted mean or the average scores for each aspect of the system's effectiveness, will be analyzed and interpreted by the researchers using descriptive statistics.

The weight mean formula is shown below:

where:

$\bar{x}$  = weighted mean

$\Sigma$  = symbol of summation

w = weight

x = marks

N = total number of respondents

### **Ethical Consideration**

In addressing ethical issues and concerns in this study, the researchers always maintained the recognized ethical standards so as to make the research process safe and genuine, as well as protect every participant involved confidentiality, security, and privacy of every respondent. The information and personal data gathered remained confidential and was utilized only in pursuit of this research. Any acknowledgment of the work of other writers is properly credited and referenced in APA format. Voluntary participation in the research was mandatory, and all the respondents provided their informed consent before data were gathered. The researchers also pledged not to do any data manipulation or distortion. All the findings from primary and secondary data were objectively and accurately presented without any distortion or prejudice to maintain the credibility of the study and ensure transparency of reporting.



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