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## International Journal of Multidisciplinary Research in Science, Engineering and Technology (IJMRSET)

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# Development of Municipal Agriculture Management and Fisheries Resources Monitoring System

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**ABSTRACT:** Effective management of fishery data is vital for ecological sustainability and data-driven policymaking. In the Municipality of Cantilan, Surigao del Sur, fishery data collection remains a manual and fragmented process, leading to delayed reporting and inaccuracies. This study developed the Municipal Agriculture Management and Fishery Resource Monitoring System (MAMFRMS), an IT-based platform designed to collect, organize, and monitor real-time fishery data. Utilizing an Agile development methodology, the system allows fishers and officers to input daily catch records while providing the Municipal Agriculture Office with centralized data visualization. The system incorporates a Linear Regression algorithm to analyze historical trends and project future yields. Evaluation based on ISO/IEC 25010 standards showed high ratings in functionality, usability, and reliability, indicating the system's effectiveness in improving data accessibility and management for local government units.

**KEYWORDS:** Municipal agriculture management; Fisheries monitoring; Linear Regression; Agile methodology; ISO/IEC 25010

## I. INTRODUCTION

Coastal communities depend heavily on fishery resources for food security and economic growth. In the Philippines, the fishery sector is a primary income source for many households. However, many municipalities still rely on paper logbooks, which result in incomplete records and limited monitoring capabilities. In Cantilan, the lack of a centralized system hinders the ability of the Municipal Agriculture Office (MAO) to develop timely policies for marine conservation. This study addresses these gaps by developing a web-based monitoring system that provides role-based dashboards for real-time data tracking and predictive analytics to support sustainable fishery management.

## II. LITERATURE SURVEY

Recent advancements in digital agriculture and fishery monitoring highlight the shift toward electronic reporting systems. Globally, vessel monitoring systems and AI-driven remote sensing are used to combat illegal fishing and track biodiversity. Locally, studies emphasize that while the Philippines has robust fishery laws, the implementation at the municipal level suffers from a "digital divide" where small-scale fishers lack the tools to report data accurately. Existing research suggests that localized, web-based platforms using cloud databases can bridge this gap by providing user-friendly interfaces for non-technical users in rural coastal areas.

## III. DESIGN AND METHODOLOGY

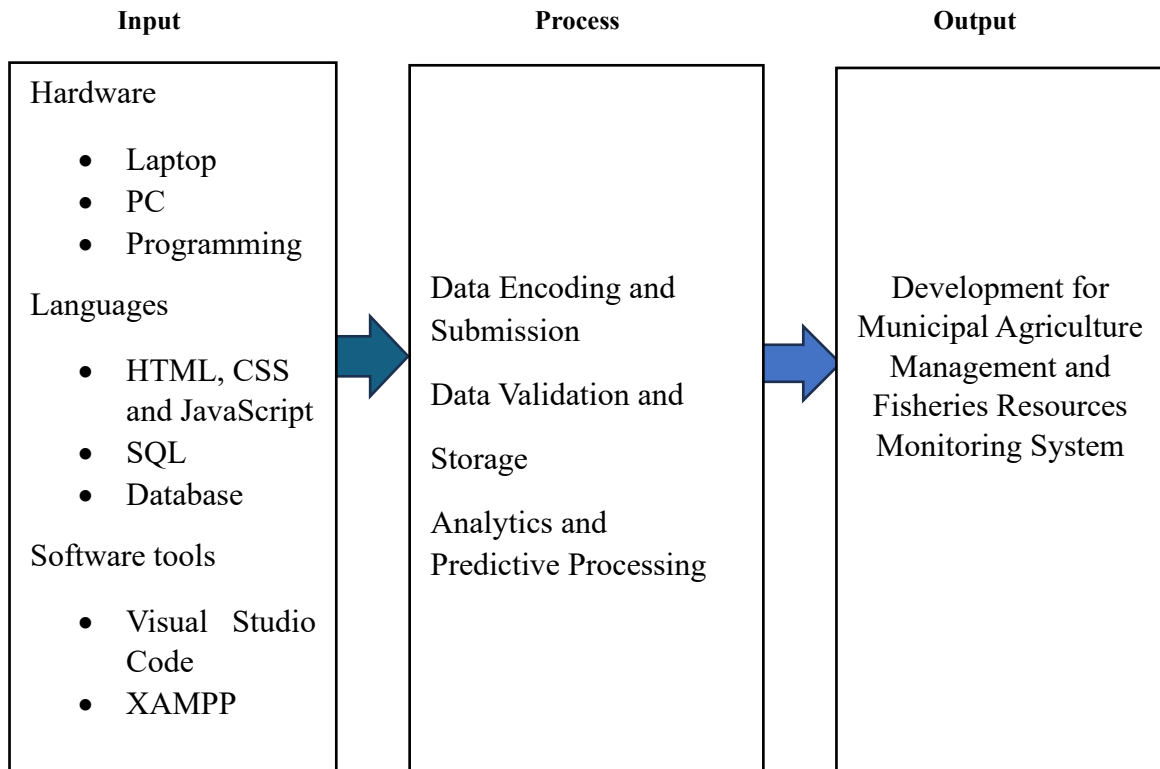
The researchers employed the Agile Software Development Life Cycle (SDLC), allowing for iterative improvements based on user feedback. The system was built using a technical stack consisting of PHP for server-side logic, MySQL for the database, and JavaScript for interactive front-end elements. A key technical feature is the integration of a Linear Regression algorithm, which processes historical catch data to identify seasonal patterns and forecast future resource



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availability. System quality was evaluated using the ISO/IEC 25010 framework, focusing on functional suitability, performance efficiency, and security.



**Figure 1.0 IPO Diagram**

The Input-Process-Output (IPO) model for the Municipal Fisheries Resource Management and Development Program utilizes hardware (laptops and desktops) and a technical stack including HTML, CSS, JavaScript, and MySQL, supported by Visual Studio Code and XAMPP. The process involves encoding and validating fish catch data submitted by fishers and barangay officers, which is then analyzed using predictive analytics to identify trends. The resulting output is a centralized electronic platform that provides the Municipal Office of Agriculture and local stakeholders with real-time data access and automated reporting to modernize fishery management and decision-making.

### System Design

The Software Development Life Cycle (SDLC) was selected as a framework for this research study. In particular, the Agile software development methodology was utilized as a roadmap for the development of the MAMFRMS to support stakeholders in Cantilan, Surigao del Sur. The following phases of development occurred in a sequential manner: requirements gathering; planning; system design; system development; testing; deployment; and system review. Careful attention was paid to all phases of development to ensure that the final product met all end user requirements and would operate in an actual production environment.



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**Figure 3.0 Agile Method**

Figure 3.0 shows the Agile Methodology was chosen because continuous involvement of users for feedback from local administrators - from the Barangay Fisheries Officers (BFOs), and is critical for this project to produce a satisfactorily developed system, iteratively refine the system during development through regular enhancements based on local administrator's (BFO) suggestions and to be continuously improved during the lifetime of the system's development. In summary, the Agile Methodology provides a means for ensuring that the continuously evolving system will continue to be consistent with stakeholder needs over the entire lifetime of the system's development.

#### IV. RESULTS AND DISCUSSION

##### Overall Feedback Result

The developed MAMFRMS provides distinct modules for Fishers, Barangay Officers, and the MAO. Interface testing confirmed that the dashboard successfully visualizes catch trends by species and location. Evaluation results from stakeholders yielded high satisfaction scores across all ISO/IEC 25010 characteristics. Specifically, the "Functional Suitability" and "Usability" categories received the highest marks, as users found the automated report generation significantly faster than manual compilation. The Linear Regression component was verified using historical datasets, demonstrating reliable predictive accuracy for seasonal fish migrations in the Cantilan waters

Table 4.8 Over all Result

OVERALL RESULT		
Criteria	Total Weighted Mean	Verbal Interpretation
Functionality	4.00	Agree
Performance Efficiency	4.385	Strongly Agree
Maintainability	4.37	Strongly Agree
Compatibility	4.36	Strongly Agree
Usability	4.333	Strongly Agree
Reliability	4.165	Agree
Security	4.37	Strongly Agree



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Portability	4.47	Strongly Agree
TOTAL	4.306625	Agree

### Data Analytics

The data for this study was collected through the completion of a hard copy questionnaire by a group of volunteers who were selected from the Municipal Agricultural Office (MAO), local Fisheries Officers and licensed fishers in Cantilan, Philippines. As soon as the information was collected, it was manually entered into a well-structured numerical data file for further analysis. The questionnaire was structured using a five-point Likert scale, so it was necessary to convert the qualitative data into quantitative numeric values for proper statistical processing; thus, a numeric value was applied to each of the options in the answer to the questions, assigning them numeric values according to the following weights: Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, and Strongly Disagree = 1. The process of converting non-numerical (e.g., qualitative) answers into numerical answers for purposes of processing them using statistical techniques was called data encoding, as it is known in the field of computer science.

5	Strongly Agree
4	Agree
3	Neutral
2	Disagree

### Predictive Modeling

The objective of this study was to assess the fisheries data using linear regression analysis and develop predictive patterns. Using the following equation:

- $Y = mx + b$

## V. CONCLUSION

The Municipal Agriculture Management and Fisheries Resources Monitoring System successfully transitions Cantilan from a manual to a digital data environment. By providing real-time access to catch data and predictive trends, the system empowers local officials to make informed decisions regarding fishing seasons and resource distribution. It is recommended that the Local Government Unit (LGU) officially adopt the platform and provide training for all local fishers. Future iterations could include a mobile application with offline capabilities to further assist fishers in areas with poor internet connectivity.

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