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DESIGN, DEVELOPMENT, AND IMPLEMENTATION OF CATCH ASSESSMENT AND TRACKING FOR COASTAL HARVEST ACTIVITIES (CATCHA) FOR THE BUREAU OF FISHERIES AND AQUATIC RESOURCES

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Abstract

The Catch Assessment and Tracking for Coastal Harvest Activities (CATCHA) is a web-based system that enables better fish catch tracking and recording in coastal communities. CATCHA provides centralized fisherfolk registration together with species-based and gear-type-based catch monitoring, which solves the data loss and delayed reporting problems that occur with traditional manual logs. The system creates automated reports, which the Municipal Agriculture Office (MAO) and the Bureau of Fisheries and Aquatic Resources (BFAR) use to achieve better data accuracy through the elimination of duplicate data. CATCHA supports local communities in modernizing their coastal harvesting methods by improving documentation and reporting processes, which lead to better decision-making and sustainable fisheries management.

Keywords: *sustainable fisheries management, coastal harvesting, data accuracy*

INTRODUCTION

The fishing industry serves as a main economic driver for the Philippines because it supplies food and revenue while enabling families to sustain themselves. The fishery sector in 2021 provided jobs to about 1.6 million workers which helped the sector produce 1.3% of the national GDP according to the Philippine Statistical Authority report from 2025. Fishing generates economic benefits for coastal communities by creating a strong social framework and historical background which preserves their local traditions. Aparri, a fishing municipality in Cagayan Province, is a clear example. The fishing grounds at Aparri which connects the Cagayan River and Babuyan Channel have existed since ancient times as a prime fishing location because they contain various ocean creatures (Bureau of Fisheries and Aquatic Resources, 2021). Fishing has existed as the main method for residents to obtain food and money during agricultural failure periods throughout their entire history.

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The fishing industry continues to face difficulties with data collection despite its various benefits. The majority of catch statistics continue to be documented through handwriting or verbal methods which result in data that shows both irregular patterns and unconfirmed information. The fishery sector encounters operational problems because of its inability to monitor fish activities in real-time which delays data collection processes required for official decision-making by fishers and regulatory authorities. Sustainable fisheries management efforts encounter obstacles because of incomplete information about catch volume and species distribution which creates data gaps. Fishermen and authorities have limited communication which results in scattered databases and ineffective enforcement of maritime regulations.

Statement of the Problems

1. Determine the current practices, policies, problems, and issues associated with the analysis of catches, and what implications they have.
2. Design, develop, and test a system solution to address the issues and implications of the analysis of catches.
3. Determine the IT experts' assessment of the developed systems' compliance with ISO 25010:2023 in terms of its:
    a. functionality suitability,
    b. performance stability,
    c. compatibility,
    d. usability,
    e. reliability,
    f. security,
    g. maintainability
    h. portability
4. Determine the end-users' assessment of the developed system using the Unified Theory of Acceptance and Use of Technology 2 in terms of its:
    a. Performance Expectancy
    b. Effort Expectancy
    c. Social Influences
    d. Facilitating Conditions
    e. Hedonic Motivation
    f. Habit
    g. Behavioral Intention
    h. Perceived Ease of Use
    i. Perceived Usefulness
    j. Self-Efficacy
    k. Response Efficacy
    l. Adoption Intentions

METHODOLOGY

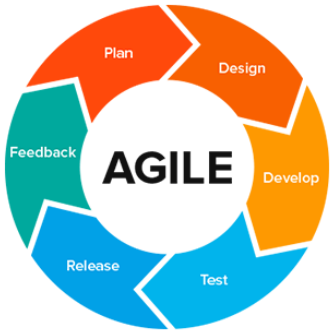
The following are the different methods and materials used in processing this paper.

Research Design

The research followed a descriptive-analytical research design which used a developmental research approach. The researcher used this design to study all current challenges and operational methods and difficulties which exist in fish catch monitoring for the municipality of Aparri located in Cagayan. The current fish catch logging process was presented through descriptive research while analytical research investigated the reasons and consequences of the identified issues.

The developers used a developmental research method to create and execute CATCHA: Catch Assessment and Tracking for Coastal Harvest Activities which operates as an online platform that enables fishermen and fish experts to record data and analyze information while tracking their activities and making decisions for environmentally friendly fishing methods. The system development process used the Agile Model.

Figure 1. Agile Model



Respondents

The research determined its participant group through the method of purposive sampling. The study participants were purposively selected, focusing on individuals who are knowledgeable, directly involved, and considered the primary users and beneficiaries of the proposed system. The study involved 87 fisherfolk from the Municipality of Aparri, 5 BFAR personnel/fisheries experts, 5 MAO Aparri personnel, and 10 IT experts from Cagayan State University Aparri Campus, which resulted in 107 participants. The selected respondents served as the most suitable respondents because their knowledge enabled them to deliver precise information which served vital functions in designing developing and evaluating the CATCHA system.

Research Instrument

The research used questionnaires which were developed according to ISO 25010:2023 and UTAUT2 to collect both quantitative and qualitative data from study participants. The assessment process utilized these instruments to identify current challenges in fish catch data collection while establishing system requirements and measuring how well fisherfolk BFAR personnel MAO personnel and IT experts accepted the CATCHA system. The research implemented these instruments to collect data which established empirical evidence that helped identify existing deficiencies in manual operations while supporting the creation and assessment process of a web-based system which aims to enhance fish catch monitoring and analysis and decision-making processes in the Municipality of Aparri.

Data Gathering Procedures

The researcher obtained ethics clearance from Cagayan State University Ethics Review Board with reference code: **CSU-IERB-2026-03-211**, before conducting the research which needed to

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follow ethical procedures and safeguard all participant rights and welfare and confidential information. The researchers obtained study permission from the Bureau of Fisheries and Aquatic Resources and the Municipal Agriculture Office of Aparri and other relevant agencies after they received ethics approval to study fisherfolk and BFAR and MAO personnel and IT specialists.

The process of collecting data occurred through multiple phases. The first phase required all participants to receive informed consent forms which informed them about the study objectives and their ability to choose whether to take part and their answers would remain private. The study included only participants who had given their consent to join. The second stage involved the administration of adopted questionnaires based on ISO 25010:2023 and UTAUT2, along with semi-structured interviews to gather relevant data regarding the current fish catch monitoring practices, existing issues, and system requirements for the proposed CATCHA: Fish Catch Analysis system.

The researchers collected all responses and interview data through a systematic process which depended on the participants' availability and their scheduled times. The researchers recorded all collected data which they organized and coded before they used it to conduct statistical and thematic analysis while maintaining accuracy and confidentiality and data integrity throughout the entire process.

Data Analysis Plan

The research used descriptive statistical methods to analyze the data that scientists gathered through ISO 25010:2023 software quality assessment and UTAUT2 questionnaire assessment. The research used weighted mean to summarize quantitative data because it offered an unbiased assessment of CATCHA system quality and user acceptability and usability among IT experts and end-users.

A five-point Likert scale was used to rate each property, with descriptive values interpreted as follows:

Table 1. Summary of the Level of Acceptability among experts utilizing the ISO 25010:2023

Numerical Value	Range Interval	Descriptive Value
5	4.21-5.00	Very high extent
4	3.41-4.2	High extent
3	2.61-3.4	Moderate extent
2	1.81-2.6	Low extent
1	1.00-1.8	Very low extent

RESULTS AND DISCUSSION

Below are the results and interpretations of all pertinent data relative to this article.

Current Practices, Policies, Problems, and Issues Associated with the Record Management System

The current fisheries data management system used in Aparri, Cagayan, depends on its existing manual recording system which staff members use to document their coastal harvest activities. Staff members from the Bureau of Fisheries and Aquatic Resources and the Municipal Agriculture Office of Aparri explained that all catch records which document caught species and quantities and fishing methods and harvest locations are manually entered into printed books or digital spreadsheet documents.

The manual operations create multiple problems that organizations need to manage. The process of retrieving specific records requires users to first browse through all pages and then search through all available documents which results in an inefficient and lengthy process that impacts both report creation and long-term study work. Physical damage and misplaced entries and illegible handwriting create obstacles to data retrieval which results in the system losing data and creating data errors. The system fails to provide real-time summary capabilities catch and effort tracking functions and fishing regulation compliance monitoring features which restrict its effectiveness in supporting decision-making and fisheries management processes.

The described deficiencies demonstrate that an automated tracking system should be implemented through CATCHA (Catch Assessment and Tracking for Coastal Harvest Activities). CATCHA provides a centralized platform that stores fisheries information as a digital database that users can search, thus improving data security and user access while maintaining data usability. The system enables users to track their compliance with regulations by providing real-time monitoring capabilities, trend analysis tools, and reporting functions, which help them make informed decisions about coastal fisheries management. CATCHA improves data management practices through its operational enhancements which help organizations track their data better while supporting sustainable coastal resource management practices.

Developed System to Address Reporting Challenges in Coastal Harvest Activities

The development process for CATCHA (Catch Assessment and Tracking for Coastal Harvest Activities) involved design testing which followed a systematic method to meet the requirements of Bureau of Fisheries and Aquatic Resources – Provincial Fisheries Office (BFAR-PFO) Aparri and Municipal Agriculture Office (MAO) for their documentation and monitoring and management needs of coastal harvest operations.

The design phase of the system implemented user-centered design elements which created workflows that matched the duties of fisheries personnel while maintaining system accessibility and user-friendliness and reliable data collection. The development team used contemporary web development solutions to build essential system features which included catch recording and fishing method documentation and species identification and quantity tracking and automated report generation.

The testing process included extensive unit testing and functional testing and user acceptance testing (UAT) which BFAR-PFO and MAO staff members and IT experts and selected fishers who work in coastal harvest operations conducted. The system improvements draw from evaluation feedback which helps achieve operational needs and CATCHA system performance and security and user-friendliness because it meets operational needs and helps produce dependable fisheries reports and compliance tracking.

IT experts' assessment of the developed software using the ISO 25010:2023 software quality standards

Table 2. Summary of the Level of Acceptability among experts utilizing the ISO 25010:2023

Summary Table	Category Mean	Descriptive Value

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Functional suitability	3.73	High extent
Performance stability	3.83	High extent
Compatibility	3.95	High extent
Usability	3.94	High extent
Reliability	4.00	High extent
Security	3.90	High extent
Maintainability	4.20	High extent
Portability	3.77	High extent
Overall Mean	**3.91**	**High extent**

Table 2 presents the summary of the level of acceptability among experts utilizing the ISO 25010:2023. The summary table shows an average score of 3.91, indicating a high level of agreement. This suggests that the participants generally believe the system meets quality standards in all eight categories. Users who rated maintainability as their highest score at 4.20 found the system to be easy to update because its structure enabled them to do so without creating problems. The functional suitability assessment received its lowest score because core features exist in the system, yet developers need to enhance performance through additional features and improved precision. The system achieves its best performance across all ISO/IEC 25010:2023 quality assessment areas because it requires only minor corrections to achieve optimum results.

Level of Acceptability among users utilizing the Unified Theory of Acceptance and Use of Technology 2

Table 3. Summary of the Level of Acceptability among users utilizing the Unified Theory of Acceptance and Use of Technology 2

Summary Table	**Category Mean**	**Descriptive Value**
Performance Expectancy	3.99	High extent
Effort Expectancy	3.94	High extent
Social Influence	3.82	High extent
Facilitating Condition	3.90	High extent
Hedonic Motivation	3.97	High extent
Habit	3.92	High extent
Behavioral Intention	4.02	High extent
Composite Mean	**3.93**	**High extent**
Perceived Ease of Use	4.02	High extent
Perceived Usefulness	4.06	High extent
Self-Efficacy	3.84	High extent
Response Efficacy	3.89	High extent
Adoption Intentions	3.94	High extent
Composite Mean	**3.95**	**High extent**
Overall Mean	**3.94**	**High extent**

Table 3 presents the summary of the level of acceptability among users utilizing the Unified Theory of Acceptance and Use of Technology 2. The average score of 3.94 shows that users approve the system and plan to continue using it. Users found the system to be most useful with their score of 4.06 which showed them its real-world benefits while social influence received the lowest rating of 3.82 because users based their system adoption on their own experiences instead of following their friends. The system has gained user acceptance which Tamilmani et al. (2020) identified as the main factors for UTAUT2 system acceptance these factors included perceived usefulness and ease of use and hedonic motivation which this study discovered.

CONCLUSION AND RECOMMENDATIONS

Conclusion

The design and testing of CATCHA: Catch Assessment and Tracking for Coastal Harvest Activities achieved its goal of solving problems that existed in the previous system, which required manual monitoring and reporting. The system achieved two benefits through its ability to track data in real-time and its simple interface, which users found easy to operate. The CATCHA system functioned as an efficient digital tool that allowed users to monitor and control their coastal harvest activities.

Recommendations

The study results lead to these recommendations, which will improve CATCHA: Catch Assessment and Tracking for Coastal Harvest Activities.

BFAR and MAO should use the system to monitor coastal harvests and ensure timely reporting.

LGU IT staff should be assigned for continuous system support and maintenance.

LGU should integrate the system into local coastal management plans and allocate funding for its sustainability.

Future developers should expand system features to include mobile access and also further improve the system interface to be more user-friendly, especially for non-technical users.

Declaration of no conflict of interest

The author hereby declares that this article is his original work and that there was no conflict of interest.

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