

Designing a Digital Logbook System to Improve Fishermen's Data Management

Mauli Kasmi¹, Akmal Abdullah², Andi Ridwan Makkulawu³, Andryanto Aman^{4*}, Mariam Mariam⁵

{ andryantoaman@unitama.ac.id }

^{1,2,5}Department of Fisheries Agribusiness, Pangkep State Agricultural Polytechnic, Pangkep, Indonesia

^{3,4}Agroindustry Study Program, Pangkep State Agricultural Polytechnic, Pangkep, Indonesia

Abstract. This research aims to develop a digital logbook system that can improve data management among fishermen who catch marine ornamental fish. The digital logbook system can assist fishermen in recording and managing data on marine ornamental fishing activities, including location, volume and type of catch, as well as educational data on marine ornamental fish species provided through this system. The research method uses the Agile Development approach and system testing using the UTAUT method questionnaire to evaluate various aspects such as usability, convenience, social influence, design, facilities, and behavioral intentions. The questionnaire was distributed to fishermen and government users with a total of 30 respondents. Based on the results of the respondents, the average score is 82%, which indicates that this system is feasible to implement and develop. The implementation of this digital logbook system is expected to improve the efficiency of fisher data management, allowing for more accurate analysis of fishing trends and supporting the conservation of marine ornamental fish. These findings indicate that the digital logbook system can be a tool that can improve fisher data management and help the government to monitor and evaluate the management of marine resource conservation in Indonesia, especially in South Sulawesi waters.

Keywords: Agile Development approach, Digital logbook system, Fishermen's data management, Marine ornamental fish catchers, UTAUT

1 Introduction

Marine ornamental fish fisheries have a role in the global fishing industry and provide economic benefits to many countries around the world [1], [2], [3]. The beauty and uniqueness of marine ornamental fish species can be a major attraction for hobbyists around the world. However, the fishing industry, especially marine ornamental fish, often faces challenges such as fishermen data management, monitoring and evaluation of fishermen's catches that are not monitored by the government, thus affecting the sustainability of marine resources [4].

Marine ornamental fish fisheries constitute a significant sector in the fishing industry and yield economic benefits to numerous nations worldwide [1], [2], [3]. Despite their potential, the sector frequently confronts substantial obstacles in fisher data management and the preservation of marine resources [4].

Fishermen who engage in marine ornamental fishing are confronted with complicated challenges when it comes to recording and tracking data related to their catch [5], [6], which includes details such as fish species, location of the catch, size, and more [7]. Certain fishermen still use manual record keeping methods that are susceptible to errors and make reporting to the authorities a challenge [5], [8].

The principal difficulties encountered in this industry are inadequate data management and insufficient transparency in reporting marine ornamental fish catchers [9], [10]. This may result in the unsustainable exploitation of natural resources and pose a threat to marine ecosystems.

Previous studies have attempted to tackle this problem by implementing improved manual record-keeping systems or web-based solutions to facilitate data recording by fishers [11], [12], [13]. However, the majority of these solutions have failed to offer an integrated approach to data management, reporting, and sustainability monitoring.

This study aims to establish a digital logbook system that is integrated with the government, and specifically developed for enhancing the data management of marine ornamental fishermen. The system is envisioned to simplify the process of accurate data recording, reporting, and sustainability monitoring, ultimately leading to an improvement in the management of marine resources, a reduction in unsustainable exploitation, and an enhancement of the welfare of fishers engaged in this sector.

2 Method

The research employed the Agile method as the system development approach. This method aligns with the Agile Manifesto philosophy, prioritising collaboration, adaptation, and co-development [14], [15]. Each development cycle of the Agile method ensures that the end result meets user expectations and needs [16], [17]. Given its iterative nature, the Agile method proves to be a highly fitting choice for fisherman logbook system development projects. In the Agile approach, the development team collaborates closely with the client or user to guarantee that the developed system fulfils their expectations and requirements. Users are involved in every stage of the development process to ensure that the final outcome meets their expectations and necessities.

The application of Agile methodology in building the Fisherman's Logbook System will ensure that the development team can respond to changing user needs during the development process. As such, it will result in a website that offers relevant features, meets user expectations, and adheres to high quality assurance standards.



Figure 1. Agile Methodology

The development process of the fisherman logbook system implemented several stages, such as Requirements, Design, Development, Testing, and Review. During the Requirements stage, the development team conducted field observations and interviews with users to determine specific needs for users. Based on these needs, the system developers created a Use case diagram as a system design in order to outline the roles and activities performed by each actor in the system. After the initial stage of system design, the development team proceeded to build the system. Next, the developers evaluated user validation through the use of the UTAUT method in order to find out the responses and feedback from users.

2.1 Requirements

The user requirements stage is bifurcated into two sections, i.e., fishermen and admin. The primary need of fishermen is to manage data related to their daily catch, with an ability to record daily catches through the system by inputting information such as ornamental fish species, number, size, catch area name, catch proof photos, and marking the coordinates of the catch. Another requirement of fishermen is to be able to identify the different types of ornamental fish. On the other hand, admin user needs include monitoring the catch of fishermen, managing data related to ornamental fish type, and user management operations.

2.2 Design

The Fisherman Logbook System's design phase utilizes a Use Case diagram to provide a clear visualization of how the system meets user needs and ensures the integration of all necessary features for optimal efficiency and effectiveness. Figure 2 illustrates this diagram.

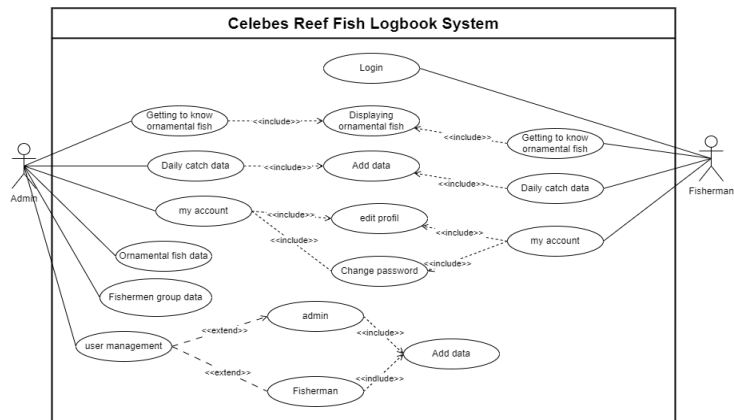


Figure 2. Use Case Diagram

3 Result

3.1 Development

The Laravel framework version 10 and PHP programming language were used to develop this system, accessible to users via the celebesreeffish.com website. Users, identified as fishermen, may access data on ornamental fish species and manage their catches. The interface is responsive and user-friendly on all platforms, enabling convenient access to and comprehension of the data. See Figure 3 for a preview of the interface.

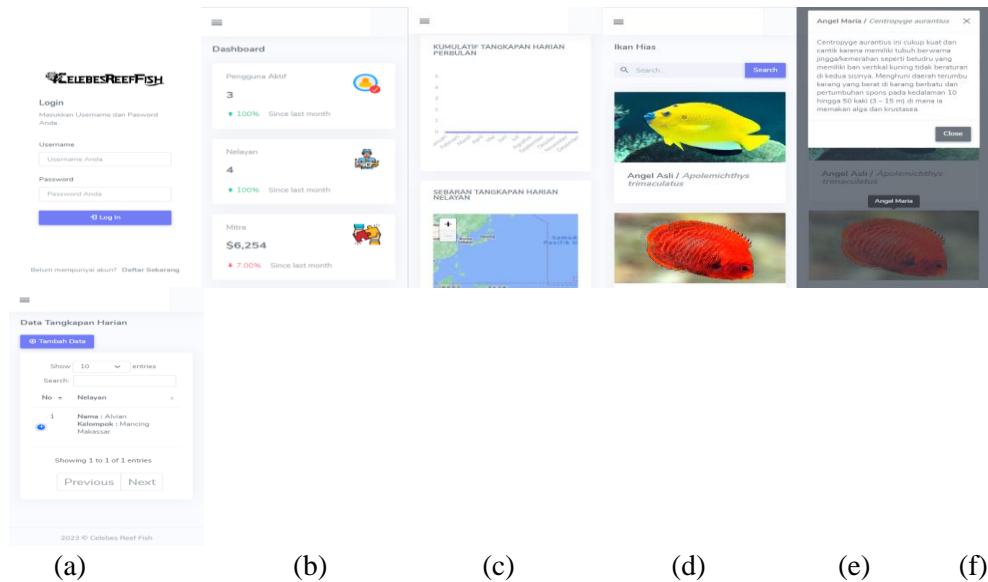


Figure 3. Fisherman's User Interface

Figure 3 illustrates various user interfaces for fishermen. Part (a) depicts the user login page, while part (b) presents the website dashboard that shows the number of active users and fishermen. Section (c) displays the cumulative monthly catch and maps the distribution of fishermen's daily catch. Section (d) exhibits images of marine ornamental fish, whereas section (e) provides their description. Lastly, under section (f), fishers may input their daily catch statistics.

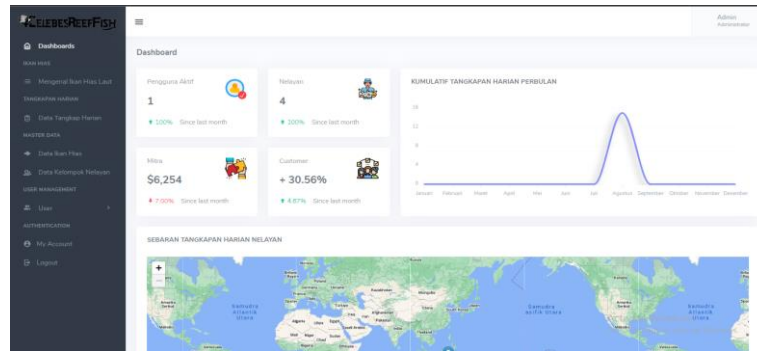


Figure 4. Admin User Interface

Figure 4 illustrates the admin dashboard, which displays data on active users, the quantity of fishermen, monthly aggregate catch, and maps outlining the catch distribution by fishermen daily. Furthermore, the admin can manage data on ornamental fish species, users and fishermen's catches via separate functionalities.

3.2 Testing

This study employed the Unified Theory of Acceptance and Use of Technology (UTAUT) to assess the usability, convenience, social influence, interface design, facilities and behavioural intentions of a system. A questionnaire was distributed to both fishermen and government users with a total of 30 respondents. Figure 5 illustrates the percentage values of the aforementioned aspects.



Figure 5. Respondent Assessment

Figure 5 displays the percentage of various aspect assessments, such as usability at 72%, convenience at 86%, social influence at 89%, interface design at 81%, facilities at 81%, and behavioral intention at 78%. On average, the aspect assessment is 82%. This study's feasibility assessment measurement employs a 5-point Likert scale model that comprises strongly agree = score 5, agree = score 4, neutral = score 3, disagree = score 2, and strongly disagree = score 1, respectively. Based on the feasibility assessment, it can be deduced that implementation of the fishermen's logbook system is highly feasible.

4 Conclusion

Based on the findings of a UTAUT method-based questionnaire completed by 30 respondents comprised of government officials and fishermen, a range of assessments were gathered on multiple aspects. These include usefulness at 72%, ease of use at 86%, social influence at 89%, interface design at 81%, facility at 81%, and behavioural intention at 78%. Overall, the mean evaluation across all aspects was 82%. Based on the feasibility assessments, it can be inferred that the logbook system for fishermen is a highly suitable implementation. It can enhance the catch data management, notably for those catching marine ornamental fish, and assist the government in raising awareness about diverse marine ornamental fish species. Moreover, the crafted system could aid the government in monitoring and assessing catch outcomes at any time and place, provided that it is linked to the internet. A comprehensive system can be developed by establishing an integrated approach involving fishermen, the government, academics, and stakeholders in the marine ornamental fish industry. This system ensures that the requirements of all parties involved in marine ornamental fish management are met while promoting the sustainability of biogeographic factors pertaining to marine ornamental fish, particularly the Emperor Angelfish (*Pomacanthus* sp.).

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