JITK (JURNAL ILMU PENGETAHUAN DAN TEKNOLOGI KOMPUTER)
VOL. 11. NO. 2 NOVEMBER 2025
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v11i2.7124

INTEGRATED SYSTEM-BASED SMART APPLICATION (SIPATIN) FOR STRENGTHENING FISHERIES GOVERNANCE IN LEBAK REGENCY, BANTEN

Dentik Karyaningsih[1*]; Farid Wajdi[2]; Muhammad Nurhaula Huddin[3]; Diki Susandi[1]; Akip Suhendar[1]; Anharudin[4] ; Shohifah Annur[5]

Informatics Engineering, Faculty of Information Technology[1]
Industrial Engineering, Faculty of Engineering[2]
Management, Faculty of Economics and Business[3]
Computer Systems, Faculty of Information Technology[4]
Chemical Engineering, Faculty of Engineering[5]
Universitas Serang Raya, Kota Serang, Indonesia[1,2,3,4,5]
https://unsera.ac.id[1,2,3,4,5]
karya.tiek@gmail.com*, faridwajdi@gmail.com, haulahuddin@gmail.com, unsera.diky@gmail.com, akip.suhendar@gmail.com, anhar.dean@gmail.com, shohifah.annur@gmail.com

(*) Corresponding Author
(Responsible for the Quality of Paper Content)

Abstract— *The Fisheries Office of Lebak Regency is responsible for the management of capture fisheries, aquaculture, resource monitoring, and the marketing of fishery products. However, geographical challenges, the difficulty of obtaining real-time data, and the use of conventional monitoring and reporting methods hinder effective and sustainable fisheries governance. In addition, limited market reach—primarily targeting only local areas—further restricts the region's economic potential. This study aims to address issues related to monitoring, reporting, and marketing through the development of an Integrated Fisheries Information System (SIPATIN), a smart mobile-based fisheries governance application integrated with a web-based monitoring platform. SIPATIN features include fishery area mapping, real-time reporting, an E-Commerce marketing platform, and a recommendation system that provides detailed information on products, seller locations, prices, reviews, estimated delivery times, and proximity-based suggestions for users. The system was developed using a prototyping method, consisting of needs analysis, design, development, testing, and evaluation based on user feedback. The application was evaluated using the System Usability Scale (SUS), which scored 74.26 (Good), and User Acceptance Testing (UAT), involving 246 respondents and resulting in a score of 79.13 (Acceptable). The results of this study show that SIPATIN effectively supports integrated fisheries governance, enhances service efficiency at the Lebak Regency Fisheries Office, and empowers fishery business actors including fishers, fish farmers, and small and medium enterprises (SMEs) in processed fish products. Furthermore, this research also produces a data-based fishery system for sustainable economic development.*

Keywords*: fisheries, e-commerce, integrated governance, smart application, system usability scale*

Intisari—*Dinas Perikanan Kabupaten Lebak bertanggung jawab atas pengelolaan perikanan tangkap, budidaya perikanan, pengawasan sumber daya, dan pemasaran hasil perikanan. Namun, kendala geografis, sulitnya mendapatkan data secara real time, serta metode pemantauan dan pelaporan yang konvensional menghambat tata kelola perikanan yang efektif dan berkelanjutan. Selain itu, jangkauan pasar yang terbatas karena hanya memasarkan di sekitar wilayah lokal semakin membatasi potensi ekonomi. Penelitian ini bertujuan untuk mengatasi permasalahan pengawasan, pelaporan serta pemasaran melalui pengembangan Sistem Informasi Perikanan Terintegrasi (SIPATIN), sebuah aplikasi cerdas tata kelola perikanan berbasis mobile yang terintegrasi dengan platform pengawasan berbasis web. Fitur-fitur SIPATIN meliputi pemetaan wilayah perikanan, pelaporan real time, media pemasaran E-Commerce, dan sistem rekomendasi yang menyediakan informasi detail produk, lokasi penjual, harga, ulasan, estimasi pengiriman, dan saran berbasis*

kedekatan kepada pengguna. Sistem ini dikembangkan menggunakan metode prototipe yang terdiri dari analisis kebutuhan, perancangan, pengembangan, pengujian, dan evaluasi berdasarkan umpan balik pengguna. Aplikasi ini dievaluasi melalui pengujian System Usability Scale (SUS) yang memperoleh skor 74,26 (Baik), dan User Acceptance Testing (UAT) yang melibatkan 246 responden dengan hasil skor 79,13 (Dapat Diterima). Hasil dari penelitian ini menunjukkan bahwa SIPATIN secara efektif mendukung tata kelola perikanan yang terintegrasi, meningkatkan efisiensi pelayanan pada Dinas Perikanan Kabupaten Lebak, serta memberdayakan para pelaku usaha perikanan diantaranya nelayan, pembudidaya ikan, dan UMKM produk olahan ikan. Selain itu juga penelitian ini menghasilkan sistem berbasis data perikanan untuk ekonomi berkelanjutan.

***Kata Kunci**: perikanan, e-commerce, tata kelola terintegrasi, aplikasi pintar, system usability scale*

INTRODUCTION

Fisheries management for a sustainable economy presents a significant challenge for many developing countries, including Indonesia [1], [2]. As a maritime nation with vast potential in marine resources, Indonesia faces high complexity in fisheries management involving governmental decentralization [3]. A primary issue is the prevalence of inaccurate data and the absence of real-time monitoring, which leads to ineffective decision-making. In many regions, such as Lebak Regency, reliance on inefficient manual observation is compounded by the lack of an integrated data system. This situation necessitates an inventory and mapping system for fisheries stakeholders that not only assists local government in program development but also opens market access for fish farmers and processors [4], [5] .

In line with Indonesia's rapid digital transformation [6], the application of information technology offers promising solutions. Numerous studies have demonstrated that technology-based information systems can enhance efficiency, transparency, and data accuracy in fisheries management, as well as strengthen traceability in the global supply chain [7], [8]. The trend of using ICT for real-time fisheries data collection is growing and is key to modernizing the sector [9]. However, while the potential of technologies like Artificial Intelligence (AI) for smart fisheries has been widely discussed, a gap remains in implementing platforms that specifically integrate two vital local-level needs: the government's requirement for data-driven governance (inventory and mapping) and the stakeholders' need for direct digital marketing of their products [10], [11], [12], [13].

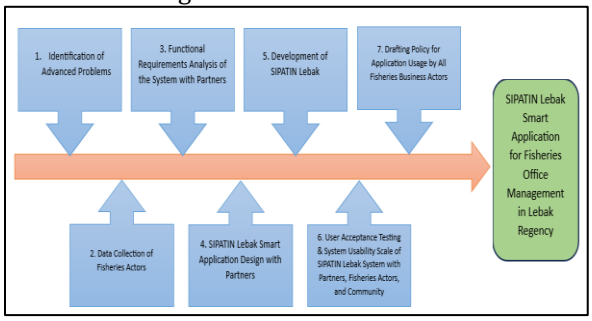
To bridge this gap, this research aims to develop SIPATIN (Sistem Informasi Perikanan Terintegrasi), an Integrated Fisheries Information System. SIPATIN is a smart mobile and web-based application designed to support fisheries resource monitoring, condition reporting, business area mapping, and the digital marketing of fishery products in Lebak Regency. This innovation integrates smart governance concepts with an adaptive information systems approach, developed using a participatory prototyping method [14], [15] . The findings of this study are expected to strengthen the capacity of the Fisheries Office to implement data-driven governance, empower local fisheries stakeholders, and expand the distribution of fishery products through a unified, integrated platform. The main contributions of this research are as follows:

1. The design and implementation of SIPATIN as a unified platform that combines governance support with digital market access for fisheries.
2. The application of a participatory prototyping approach to ensure system requirements reflect stakeholder needs.
3. The integration of data-driven monitoring and reporting tools to strengthen fisheries governance capacity.
4. The provision of digital marketing features to empower local fisheries stakeholders and expand product distribution.

The findings of this study are expected to strengthen the capacity of the Fisheries Office to implement data-driven governance, empower local fisheries stakeholders, and expand the distribution of fishery products through a unified, integrated platform.

MATERIALS AND METHODS

The research stages carried out in this study are shown in Figure 1**:**



Source : (Research Result, 2024)

Figure 1. Stages of the Research

Accredited Rank 2 (Sinta 2) based on the Decree of the Dirjen Penguatan RisBang Kemenristekdikti No.225/E/KPT/2022, December 07, 2022. Published by LPPM Universitas Nusa Mandiri

VOL. 11. NO. 2 NOVEMBER 2025
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v11i2.7124

The development of the SIPATIN Lebak Intelligent Application (Integrated Fisheries Business Actor Information System) was carried out through a structured and collaborative approach, involving the Fisheries Office of Lebak Regency, technical fisheries departments, and fisheries business actors [16]. The development process was conducted iteratively through seven main stages. The initial stage was an in-depth problem identification phase, aimed at identifying specific issues related to data management and service delivery in the fisheries sector of Lebak Regency. Through in-depth interviews and field observations, various systemic challenges were documented as the foundation for building a targeted and effective system.

Coordination meetings and alignment sessions with the Fisheries Office were conducted to ensure the system would align with their operational needs. These meetings, attended by the entire implementation team, were held at the Fisheries Office Hall. The coordination meetings resulted in a clear outline of the system requirements for fisheries governance, including UI/UX design plans, database components, and specific technical needs from the department.

A. Identification of Advanced Problems

In addition to coordination meetings for problem identification, a Focus Group Discussion (FGD) was also conducted with the theme "Fisheries Issues Identification: Products, Management, and Marketing." The participants included fisheries business actors, fisheries extension officers, and staff from various divisions within the Fisheries Office of Lebak Regency. The FGD was held at the R-B One Café Hall, Rangkasbitung, Lebak Regency, Banten, on March 27, 2024.

The outcome of this activity was a clear identification of the key issues faced by the Fisheries Office. Among the most prominent findings were the urgent need for digital-based governance in the fisheries sector—both in terms of data management and marketing—as well as the importance of adopting digital marketing strategies [17].

B. Data Collection

The next stage involved the systematic collection of data from fisheries business actors. Data were gathered through a mixed-method approach including surveys and direct field visits, which encompassed photo and video documentation, mapping of business locations, and operational monitoring. This process was carried out in collaboration with the Fisheries Office and the business actors themselves to ensure the validity and completeness of the field data. Data collection and observation were conducted across 28 sub-districts in Lebak Regency, spanning 11 distinct phases. The subsequent stage was the Functional Requirements Analysis of the system, conducted together with the Fisheries Office and relevant stakeholders to define system features, workflows, and user roles. A participatory approach was adopted to ensure that the system design accurately reflected the real conditions and needs in the field [18].

To provide a more detailed overview of the methodology and data captured, the key specifications are presented in the following tables.

Table 1. Summary of Data Collection Methods

Criterion	Description
Geographical Scope	28 sub-districts in Lebak Regency
Data Collection Phases	11 phases
Sampling Technique	Simple random sampling
Total Sample	129 actors
Sample Distribution	- 73 Aquaculture - 25 Capture - 17 Processors - 14 Collectors
Inclusion Criteria	- Businesses actively registered with the Lebak Regency Fisheries Office - Businesses that are currently operational

Source : (Research Result, 2024)

Table 2. Data Dictionary

Variable Name	Data Type	Description
Business Profile	Text	Business name, owner's name, and contact information
Business Location	Text	Address and geographical coordinates (longitude/latitude)
Business Type	Text	The category of the business (e.g., Aquaculture, Capture, Processing, Collecting)
Production Volume	Number	Annual production output
Commodities	Text	The type of fisheries commodities produced or handled
Documentation	File (Photo/Video)	Visual documentation of the business site and its activities

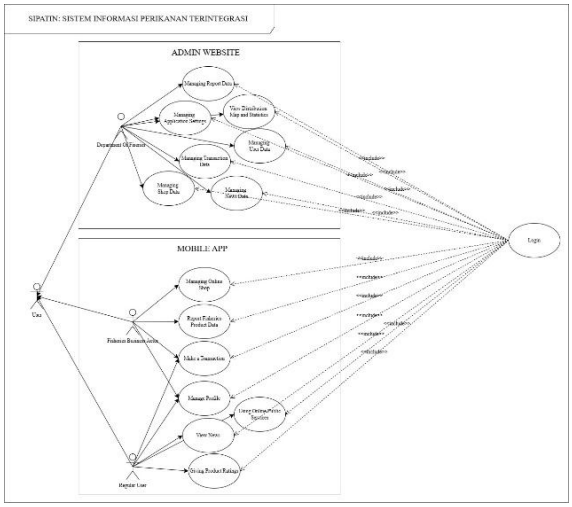
Source : (Research Result, 2024)

C. Functional Requirements Analysis

The Functional Requirements Analysis aimed to understand and document the functions that the system must perform [19]. This process began by identifying the needs and objectives, then determining the scope of the system to be analyzed.

The system's main functions were identified and broken down into more specific sub-functions.

To accurately represent the system's architecture and user interactions, a use-case diagram was created to model the system's behavior.



Source : (Research Result, 2024)

Figure 2. Use-Case Diagram of the System

This diagram serves as a foundational artifact for the system's design and will be included as a figure to provide a clear visualization of the user interactions. The analysis also examined interdependencies between functions to ensure that all interactions and dependencies were clearly identified. The process concluded with verification and validation to ensure that the analysis aligned with the actual system requirements.

D. System Design

The next step was the System and Prototype Design. This design phase was guided by a user-centered design approach [20], with the primary focus on creating a system that effectively meets user needs. Key artifacts from this stage included the development of a system architecture model and usage scenarios [21]. System analysis was also conducted using UML, including the creation of a use case diagram, class diagram, activity diagram, and sequence diagram. Additionally, UI/UX prototypes for both Android-based mobile and web-based platforms were created using Figma, along with mapping of the actors who would interact with the system [22].

E. Development

The next stage involved the development of the SIPATIN system, which entailed building both the mobile and web-based components of the application. The system was developed using the prototyping model[23], an iterative process that includes analysis, design, development, testing, and refinement based on continuous user feedback.

The development was carried out with a strong emphasis on security, scalability, and data processing efficiency, encompassing key functionalities such as database management, business logic, user authentication, and API integration.

The focus was on creating a robust system that effectively handles both server-side and client-side operations. The system was built on a client-server architecture, designed to support multi-platform access for both mobile and web users. The frontend and backend components were developed independently to ensure responsiveness and accessibility across various devices. The system is deployed on a cloud-based infrastructure, which provides flexibility and supports a wide range of operational demands.

The system's architecture was designed with scalability as a core principle, using a service-oriented approach to accommodate future growth in user base and data volume. The modular design allows for independent scaling of different components based on demand.

Security was a primary concern throughout the development lifecycle. Key controls were implemented to protect the system and its data:

Table 3. Application Security Control Details

Security Control	Description
Application Security	The system's security controls were implemented following the OWASP ASVS (Application Security Verification Standard) guidelines.
Rate Limiting	Mechanisms were put in place to limit the number of requests a user can make to protect against abusive behavior and denial-of-service (DoS) attacks.
Audit Logging	All critical user actions and system events are logged to maintain a verifiable audit trail for security monitoring.
PII Handling	Personally Identifiable Information (PII) is managed with strict protocols, including data encryption, to ensure compliance with privacy regulations.

Source : (Research Result, 2024)

F. Testing

The system's functionality and usability were evaluated through two primary methodologies: System Usability Scale (SUS) testing and User Acceptance Testing (UAT). These evaluations were conducted with key stakeholders, including technical personnel from the Fisheries Office and fisheries business actors, to ensure the system met their operational needs. This trial phase focused on user experience, functional effectiveness, and the system's suitability for day-to-day operational

Accredited Rank 2 (Sinta 2) based on the Decree of the Dirjen Penguatan RisBang Kemenristekdikti No.225/E/KPT/2022, December 07, 2022. Published by LPPM Universitas Nusa Mandiri

VOL. 11. NO. 2 NOVEMBER 2025
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v11i2.7124

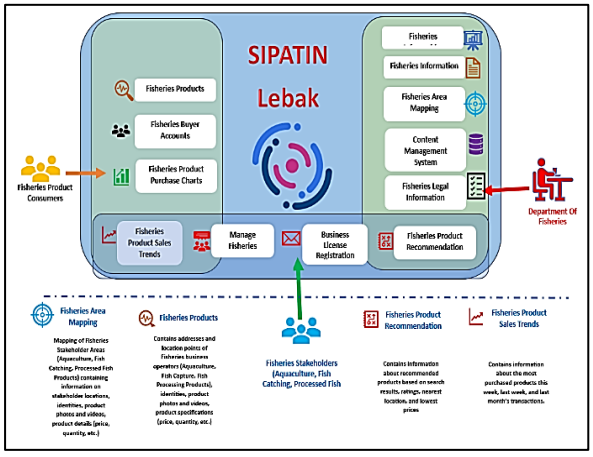
needs [24]. SUS testing involved 246 respondents from various backgrounds, including business actors, government staff, and general users. The goal was to measure how easy the system is to use. The results from this test were converted to a 0-100 scale to obtain a final score.

During UAT, the system was tested by operators and staff from each division of the Fisheries Office, as well as fisheries extension officers (as admin users) and fisheries business actors. To ensure effective implementation of the system by all fisheries stakeholders, the final phase of this research was the drafting of an official policy document that regulates the use of the SIPATIN application by all fisheries business actors. This document serves as a governance guideline for the sustainable use of the system by the Fisheries Office of Lebak Regency.

RESULTS AND DISCUSSION

A. Identification of Advanced Problems

At this stage, the research produced both the data and the functional business process of the SIPATIN application. The SIPATIN system serves as an integrative platform connecting key stakeholders: the Fisheries Office, fisheries business actors (aquaculture, capture, and processing), and consumers. It provides core features such as product management, business legality registration, sales analytics, and a product recommendation system. Consumers can access product listings and track purchase trends, while business actors can manage their profiles and register their legality. The Fisheries Office uses the system for administrative and analytical purposes, including mapping business locations, managing content, and accessing data-driven infographics.



Source : (Research Result, 2024)

Figure 3. SIPATIN System Business Process

To illustrate the system's practical application, consider the following scenario involving various business actors:

1. An aquaculturist uses the mobile application to upload a new harvest report, including species type, total weight, and price.
2. A collector logs their procurement of goods from multiple small-scale fishers or cultivator (aquaculture farmers), documenting the volume and location to ensure a transparent supply chain.
3. A processor uses the platform to register their processed products and update their legality, ensuring all products are traceable and verifiable before listing them for sale.
4. A fisher uses the platform to upload a new catch report. They input details such as the type of fish, total weight, and price.
5. The report is submitted to the Fisheries Office for validation. The officer on duty reviews the data for accuracy and legality.
6. Once validated, the product is published on the marketplace, making it visible to consumers. The sales trend module then tracks its performance in real-time.

This streamlined process significantly impacts key performance indicators (KPIs):

1. Time to Report: The time it takes for any business actor to report their activities is reduced from a manual process to a matter of minutes, directly improving data timeliness and completeness.
2. Data Accuracy: The system's structured data input and validation from the Fisheries Office ensure higher data quality and integrity, leading to more reliable market analytics.
3. Market Listing Speed: The time from harvest or processing to market listing is drastically reduced, allowing business actors to respond faster to market demand and potentially increase revenue.
4. Traceability: The system creates a verifiable audit trail for products from the point of harvest or collection to the final processed product, enhancing consumer trust.

B. Data Collection

In the data collection stage, field observations and data gathering were conducted across 28 sub-districts in Lebak Regency. These efforts successfully documented the detailed composition of all fisheries business actors in the region. The collected data included mapped business locations, photos and videos of fishery products, and detailed business profiles. The distribution of fisheries business actors by type is presented in Table 4 below.

Table 4. Composition of Fisheries Business Actors Based on Business Type

Business Type	Number of Actors	Percentage (%)
Aquaculture	73	56.6%
Capture Fisheries	25	19.4%
Processors	17	13.2%
Collectors	14	10.8%
Total	129	100%

Source : (Research Result, 2024)

Furthermore, the geographical distribution of these business actors is visually illustrated in the following map. This map shows the density of businesses in each area, providing a clear overview of the characteristics of the fisheries business throughout Lebak Regency.

Source : (Research Result, 2024)

Figure 4. Geographical Distribution of Fisheries Business Actors

In the map, each marker represents a distinct category of fisheries-related activity. The red markers indicate locations of aquaculture operations, the purple markers represent sites of fish processing facilities, and the blue markers denote the presence of fishing communities or fishermen. This spatial visualization provides a clear overview of the distribution of fisheries activities, encompassing aquaculture, processing, and capture fisheries within the region.

C. Functional Requirements Analysis

This process begins by identifying the needs and objectives, followed by determining the scope of the system to be analyzed [25]. The main functions of the system are identified and then broken down into more specific sub-functions. Each function and sub-function is then described in detail, including the inputs, outputs, and the processes involved. The analysis of inter-function relationships ensures that all interactions and dependencies are clearly identified. This process concludes with verification and validation to ensure the analysis aligns with the system's actual requirements.

D. System Design

At this stage, system analysis is also conducted using UML diagrams, including the use case diagram, class diagram, activity diagram, and sequence diagram. Additionally, the UI/UX design, database design, and interface designs for both Android mobile applications and web-based platforms are developed using Figma. These designs are aligned with the needs of the actors/users who will interact with the system.

Table 5. Details of System Actor Roles and Assignments.

No	Actor	Assigment of Actors
1	Department Of Fisheries (Admin)	a. Managing report data (CRUD) b. Managing application settings c. Managing shop/store data (CRUD) d. Managing transaction data (CRUD) e. Managing news/article data (CRUD) f. Viewing distribution map and statistics g. Managing user data
2	Fisheries Business Actors	a. Managing online shop (CRUD) b. Reporting fisheries production data c. Making transactions (as a seller) d. Managing profile e. Using online/public services f. Viewing news g. Giving product ratings
3	Regular User	a. Using online/public services b. Viewing news c. Giving product ratings d. Making transactions (as a buyer)

Source : (Research Result, 2024)

Table 5 outlines the specific tasks for each system actor. It details the functions for the Admin, Fisheries Business Actors, and Regular Users, based on the Use Case Diagram. This breakdown guided the design of the system's architecture and workflow.

E. Development

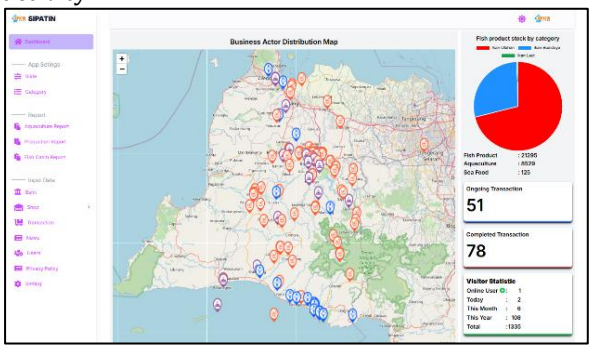
This system was built using a modern technology stack. The front-end, for both the mobile (built with React Native) and web applications, was developed to be responsive and intuitive for users. On the back-end, the system is powered by the Laravel (PHP) framework, which is responsible for managing business logic, a MySQL database, and API provisioning. Communication between the front-

Accredited Rank 2 (Sinta 2) based on the Decree of the Dirjen Penguatan RisBang Kemenristekdikti No.225/E/KPT/2022, December 07, 2022. Published by LPPM Universitas Nusa Mandiri

VOL. 11. NO. 2 NOVEMBER 2025
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v11i2.7124

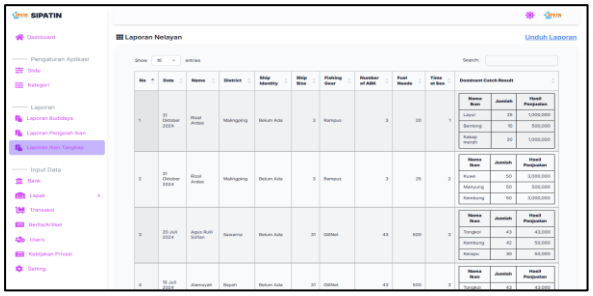
end and back-end is handled via a RESTful API architecture. Security was a priority, implemented through data encryption and user authentication using Bearer Tokens. Additionally, the system is integrated with third-party services, such as a payment gateway and the RajaOngkir API for shipping logistics. The final result is the SIPATIN application, available in both mobile and web versions.

Figure 5 shows the main dashboard of the SIPATIN application, which provides crucial data visualizations for the Lebak Fisheries Office. The interactive map displays the distribution of fisheries business actors by category, facilitating easier geographic monitoring. Meanwhile, a pie chart and real-time statistics offer a concise overview of fish product stock and transaction activity.



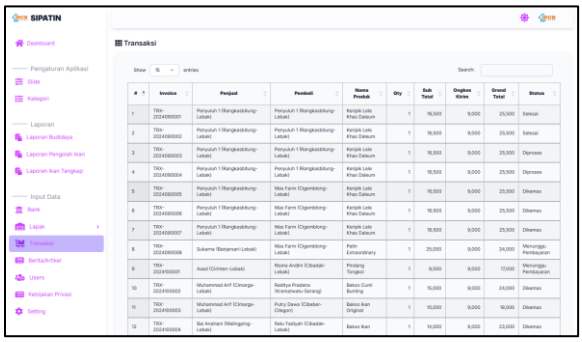
Source : (Research Result, 2024)
Figure 5. The Main Dashboard of the SIPATIN Web-based Platform

Figure 6 showcases the fisheries report page within the SIPATIN system, a detailed data management module. This page displays operational data directly inputted by fisheries business actors, including information such as the number of fingerlings, volume, and selling price, which can then be validated and managed by the Fisheries Office admin. Features like search and report downloading transform the reporting process from a manual one to a digital system designed to enhance efficiency and accuracy.



Source : (Research Result, 2024)
Figure 6. Data Management Module for Fisheries Reports

Figure 7 shows the transaction module, which records buying and selling activities within the SIPATIN platform. This page displays a list of recorded transactions, including details such as the invoice number, seller and buyer, product name, quantity, shipping costs, total price, and transaction status (e.g., Completed, Processing, Awaiting Payment). This interface allows the Fisheries Office to monitor the dynamics of fisheries product trading in real-time, identify market trends, and facilitate mediation if issues arise in transactions between users.

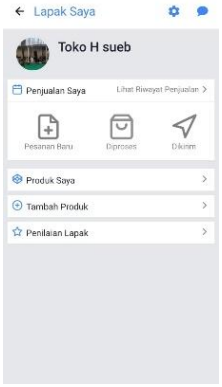


Source : (Research Result, 2024)
Figure 7. The Transaction History Monitoring Module

Figure 8 illustrates the user-facing mobile application of SIPATIN, designed for consumers to complete the digital ecosystem. Its main interface functions as a digital storefront, displaying fishery products across categories such as Processed Fish, Aquaculture, and Sea Fish. Users can search for products, view details including price and seller location, and conduct direct transactions. Furthermore, the information banner feature serves as a dissemination medium for the Fisheries Office, meaning the application not only facilitates economic activity but also strengthens the public service function.

Source : (Research Result, 2024)
Figure 8. The SIPATIN Mobile App's Main Page Interface

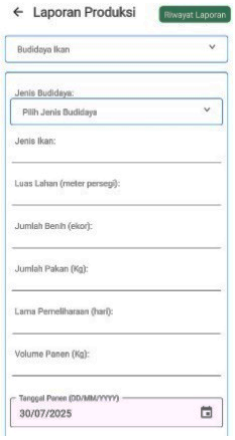
Figure 9 displays the "*Lapak Saya*" (My Stall) page, which serves as a personal dashboard for business actors to manage their digital stores on the SIPATIN application. This interface provides sellers with control over their business activities, from monitoring new, processing, and shipped orders. Business actors can also independently add new products and view ratings from buyers.



Source : (Research Result, 2024)

Figure 9. The Stall Management Page for Business Actors.

Figure 10 shows the "Production Report" form, which allows business actors to directly input their harvest data. This digital form replaces the manual reporting process, aiming to improve the accuracy and timeliness of data received by the Fisheries Office by integrating it directly from the field into the admin system.



Source : (Research Result, 2024)

Figure 10. The Production Data Input Interface

F. Testing

The system's functionality and usability were evaluated through a comprehensive testing phase, which included the System Usability Scale (SUS) and User Acceptance Testing (UAT). These tests involved key stakeholders, such as Fisheries Department staff and fisheries business actors, to ensure the system met their operational needs.

System usability was evaluated using the System Usability Scale (SUS), a standardized tool with 10 questions to assess user experience. The test was conducted with 246 respondents, comprising fisheries business actors, Fisheries Office staff, and general users.

The final SUS score was calculated by converting each respondent's Likert scale response into a standard 0-100 scale, as per the canonical SUS scoring methodology. The aggregated results are presented in Table 6. The mean SUS score of 74.26 is considered "good" based on industry benchmarks, indicating that the SIPATIN application is well-accepted by its users. The distribution of these scores, which shows the concentration of usability perceptions among users, is presented in Figure 11.

Table 6. Summary Statistics with Confidence Interval

Statistic	Value
Standar Deviasi	7,865302
Margin of Error	0,982888
Mean	74,26829
Lower CI	73,2854
Upper CI	75,25118

Source : (Research Result, 2024)

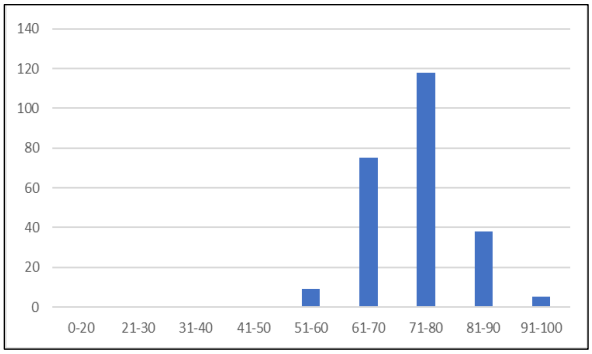


Figure 11. Distribution of usability perception scores among users

Source : (Research Result, 2024)

Following the usability evaluation, User Acceptance Testing (UAT) was conducted with 246 respondents to ensure the system's functionality met business and operational requirements. The testing involved key operational users from the Fisheries Office and business actors to validate the application's workflows in real-world scenarios. The UAT was conducted using a set of 10 questions and a Likert scale from 1 (Strongly Disagree) to 5 (Strongly Agree).

The UAT yielded an overall satisfaction score of 79.13%, indicating acceptable system performance. The results per question are shown in Table 7. The system scored well on feature functionality and compatibility.

Accredited Rank 2 (Sinta 2) based on the Decree of the Dirjen Penguatan RisBang Kemenristekdikti No.225/E/KPT/2022, December 07, 2022. Published by LPPM Universitas Nusa Mandiri

VOL. 11. NO. 2 NOVEMBER 2025
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v11i2.7124

Table 7. Results of the User Acceptance Test (UAT) by question

No	Question	Mean	Pct
1	Can users easily complete the main tasks in the system?	3.978	79.57
2	Are the layout and user interface design intuitive and easy to understand?	3.996	79.91
3	Do all buttons, links, and features function properly and remain accessible?	3.474	69.48
4	Can users access only the features and data appropriate to their permission levels?	3.353	67.07
5	Does the system work consistently across different devices and browsers?	4.034	80.69
6	Is the system accessible to users with specific accessibility requirements?	3.905	78.1
7	Are user guides and system documentation available and comprehensible?	3.953	79.05
8	Can users quickly find the information they need to operate the system?	3.996	79.91
9	Are there adequate help features or support when users encounter difficulties?	4.0	80.0
10	Does the system provide clear feedback and guidance throughout user interactions?	3.858	77.16

Source : (Research Result, 2024)

The testing highlighted three key areas needing improvement. Firstly, concerning User Access Control, the system's role-based access control requires refinement to prevent unauthorized access. A remediation plan will involve implementing a more granular permission system at both the database and application levels, followed by a thorough security audit to ensure integrity. Secondly, System Feedback and Guidance was noted as a weakness, as users reported a lack of clear feedback and contextual guidance, particularly during complex workflows. To address this, a remediation plan will focus on integrating in-app notifications, tooltips, and validation messages to provide real-time feedback and guide users through processes. Lastly, Accessibility was identified as an area for improvement, as the system currently has limited features for users with special needs, which could pose a barrier to adoption. The remediation plan will include conducting a formal accessibility audit (e.g., WCAG compliance) and integrating features like screen reader compatibility and improved keyboard navigation.

G. Policy Drafting for System Use

The final stage involved the drafting of an official policy document regulating the use of the SIPATIN application by all fisheries business actors. This document serves as a governance framework for the sustainable use of the system by the Department of Fisheries of Lebak Regency. The outcome of all these stages is the development of the SIPATIN Lebak Smart Application, a digital platform designed to improve governance in the fisheries sector with a transparent, efficient, and integrated approach.

The drafted policy document outlines the key governance principles to ensure the secure, transparent, and effective operation of the SIPATIN system. The main components of this policy are summarized below:

1. User Roles and Responsibilities: The policy clearly defines the roles and responsibilities of each stakeholder, including the Fisheries Office administrators, fisheries business actors, and consumers. This ensures clarity in system usage and data management.
2. Data Retention and Privacy: It establishes guidelines for the retention and deletion of data, ensuring that all data is handled in compliance with privacy regulations. Personally Identifiable Information (PII) is specifically addressed with protocols for encryption and secure storage.
3. Audit and Accountability: The policy mandates regular system audits to monitor user actions and data integrity. This creates a verifiable audit trail, enhancing accountability and transparency within the system.
4. Incident Response: A clear protocol for incident response is defined, outlining the steps to be taken in the event of a security breach, data corruption, or system failure. This ensures that the system can be restored and secured efficiently, minimizing disruption and data loss.
5. This application is utilized by the Fisheries Department to manage data on registered fisheries stakeholders. The collected data is subsequently employed as a decision-support resource, particularly in the distribution of assistance programs and the management of the fisheries sector in Lebak Regency.

The successful completion of this project, culminating in the SIPATIN Lebak Smart Application and its governing policy, marks a significant step towards modernizing the local fisheries sector and fostering a more transparent and sustainable economic environment.

CONCLUSION

This research successfully developed the SIPATIN (Integrated Fisheries Information System) smart application, a digital platform designed to enhance fisheries governance in Lebak Regency, Banten. The system, created through a structured prototyping approach in collaboration with the Fisheries Department and local business actors, effectively addresses critical challenges in data management, monitoring, and marketing of fishery products. The application's effectiveness was validated through rigorous testing, with System Usability Scale (SUS) results yielding a score of 74.26, indicating good usability, and User Acceptance Testing (UAT) showing a positive acceptance rate of 79.13%. These findings demonstrate that the system effectively meets user needs and expectations, holding significant potential to transform the local fisheries sector by enhancing transparency, efficiency, and integration.

The development of SIPATIN represents a successful model of collaboration between academic institutions, government agencies, and industry stakeholders. This research contributes to the growing body of knowledge on digital solutions for sustainable resource management and offers valuable insights for similar implementations in other regions. While this study provides a robust foundation, its scope is limited to a single regency, and the short pilot window may affect the generalizability and long-term analysis of the findings. The self-selection sampling method also introduces a potential bias. Future work should focus on addressing these limitations by performing comprehensive load testing to ensure scalability, integrating the system with national-level government platforms, and developing advanced analytics and traceability features. A long-term study is also recommended to evaluate the system's sustained impact on administrative efficiency and economic growth within the sector.

ACKNOWLEDGMENT

The authors would like to express their sincere gratitude to the Ministry of Education, Culture, Research, and Technology (KemendikbudRistek) of the Republic of Indonesia for funding this research through the Kedai Reka Matching Fund Program (PDP) Batch 1 of 2024, based on Decree Number: 1/E1/PPK/KS.03.00/2024 and the contract agreement between KemendikbudRistek and UNSERA (Number: 001/KR.PDP/UNSERA/III/2024 and Number: 36/E1/KS.00.00/2024) dated March 4, 2024. Gratitude is also extended to our partner, the Fisheries Agency of Lebak Regency, Banten Province, for their financial support. Furthermore, the authors thank Serang Raya University for providing the necessary funding and support for this research.

REFERENCE

[1] G. Macaulay, F. Warren-Myers, L. T. Barrett, F. Oppedal, M. Føre, and T. Dempster, "Tag Use To Monitor Fish Behaviour In Aquaculture: A Review Of Benefits, Problems And Solutions," *Rev Aquac*, vol. 13, no. 3, pp. 1565–1582, Jun. 2021, doi: 10.1111/raq.12534.

[2] S. Gebremedhin, S. Bruneel, A. Getahun, W. Anteneh, and P. Goethals, "Scientific Methods to Understand Fish Population Dynamics and Support Sustainable Fisheries Management," *Water (Basel)*, vol. 13, no. 4, p. 574, Feb. 2021, doi: 10.3390/w13040574.

[3] I. Jaya *et al.*, "Are The Working Principles Of Fisheries Management At Work In Indonesia?," *Mar Policy*, vol. 140, pp. 10–50, Jun. 2022, doi: 10.1016/j.marpol.2022.105047.

[4] F. Grati *et al.*, "Mapping small-scale fisheries through a coordinated participatory strategy," *Fish and Fisheries*, vol. 23, no. 4, pp. 773–785, Jul. 2022, doi: 10.1111/faf.12644.

[5] J. Solomonsz, J. Melbourne-Thomas, A. Constable, R. Trebilco, I. van Putten, and L. Goldsworthy, "Stakeholder Engagement in Decision Making and Pathways of Influence for Southern Ocean Ecosystem Services," *Front Mar Sci*, vol. 8, p. 623733, May 2021, doi: 10.3389/fmars.2021.623733.

[6] S. Aminah and H. Saksono, "Digital transformation of the government: A case study in Indonesia," *Jurnal Komunikasi: Malaysian Journal of Communication*, vol. 37, no. 2, pp. 272–288, 2021.

[7] Z. Konstantopoulou and P. Mikalef, "Enhancing Traceability in the Norwegian Fish Supply Chain: Blockchain Adoption," *Disruptive Innovation in a Digitally Connected Healthy World*, pp. 383–393, 2024, doi: 10.1007/978-3-031-72234-9_32.

[8] S. Orofino, G. McDonald, J. Mayorga, C. Costello, and D. Bradley, "Opportunities and challenges for improving fisheries management through greater transparency in vessel tracking," *ICES Journal of Marine Science*, vol. 80, no. 4, pp. 675–689, May 2023, doi: 10.1093/icesjms/fsad008.

VOL. 11. NO. 2 NOVEMBER 2025
P-ISSN: 2685-8223 | E-ISSN: 2527-4864
DOI: 10.33480/jitk.v11i2.7124

[9] N. J. Rowan, "The role of digital technologies in supporting and improving fishery and aquaculture across the supply chain–Quo Vadis?," *Aquac Fish*, vol. 8, no. 4, pp. 365–374, 2023.

[10] M. Liao, J. Zhang, R. Wang, and L. Qi, "Simulation research on online marketing strategies of branded agricultural products based on the difference in opinion leader attitudes," *Information Processing in Agriculture*, vol. 8, no. 4, pp. 528–536, 2021.

[11] J. Xiao, W. Wang, and S.-B. Tsai, "Coupling of agricultural product marketing and agricultural economic development based on big data analysis and 'Internet+,'" *Mobile Information Systems*, vol. 2021, no. 1, p. 3702064, 2021.

[12] J. Guo, H. Hao, M. Wang, and Z. Liu, "An empirical study on consumers' willingness to buy agricultural products online and its influencing factors," *J Clean Prod*, vol. 336, p. 130403, 2022.

[13] C. Kelly *et al.*, "Capturing Big Fisheries Data: Integrating Fishers' Knowledge In A Web-Based Decision Support Tool," *Front Mar Sci*, vol. 9, p. 1051879, Dec. 2022, doi: 10.3389/fmars.2022.1051879.

[14] D. Albadra *et al.*, "Participatory design in refugee camps: comparison of different methods and visualization tools," *Building Research & Information*, vol. 49, no. 2, pp. 248–264, 2021.

[15] J. Steinke, B. Ortiz-Crespo, J. van Etten, and A. Müller, "Participatory design of digital innovation in agricultural research-for-development: insights from practice," *Agric Syst*, vol. 195, Jan. 2022, doi: 10.1016/j.agsy.2021.103313.

[16] G. E. Mushi, P.-Y. Burgi, and G. Di Marzo Serugendo, "State of Agricultural E-Government Services to Farmers in Tanzania: Toward the Participatory Design of a Farmers Digital Information System (FDIS)," *Agriculture*, vol. 14, no. 3, p. 475, Mar. 2024, doi: 10.3390/agriculture14030475.

[17] C. G. Devi, A. C. Deepa, M. J. S. Kumar, B. K. Chauhan, R. K. Agarwal, and S. C. Sekhar, "Marketing and Distribution Channels for Fisheries and Aqua Products in India," *J Surv Fish Sci*, vol. 10, no. 3S, pp. 3095–3105, 2023.

[18] A. Muktamar, C. S. Lumingkewas, and A. Rofi, "The Implementation of User Centered Design Method in Developing UI/UX," *JISTE (Journal of Information System*, vol. 1, no. 2, pp. 26–31. 2023.

[19] N. Balasubramaniam, M. Kauppinen, A. Rannisto, K. Hiekkanen, and S. Kujala, "Transparency and explainability of AI systems: From ethical guidelines to requirements," *Inf Softw Technol*, vol. 159, p. 107197, 2023, doi: https://doi.org/10.1016/j.infsof.2023.107197.

[20] C. Y. M. Cheng, C. C. Y. Lee, C. K. Chen, and V. W. Q. Lou, "Multidisciplinary collaboration on exoskeleton development adopting user-centered design: a systematic integrative review," *Disabil Rehabil Assist Technol*, vol. 19, no. 3, pp. 909–937, Apr. 2024, doi: 10.1080/17483107.2022.2134470.

[21] M. Anshor, S. Basuni, H. Arief, and T. Sunarminto, "Stakeholders and network analyses in Tambora National Park, Sumbawa Island, Indonesia," *Biodiversitas*, vol. 24, no. 10, pp. 5446–5463, 2023, doi: 10.13057/biodiv/d241027.

[22] F. Staiano, *Designing and Prototyping Interfaces with Figma: Learn essential UX/UI design principles by creating interactive prototypes for mobile, tablet, and desktop*. Packt Publishing Ltd, 2022.

[23] Z. Chenari, M. Rezaeizadeh, and B. Bandali, "Designing a prototype of coaching software and measuring its usability," *Technology of Education Journal (TEJ)*, vol. 17, no. 1, pp. 1–22, 2022, doi: https://doi.org/10.22061/tej.2022.5800.2281.

[24] R. T. Y. Tong, Y. K. Yuan, N. W. Dong, and R. K. Ramasamy, *A Review: Methods of Acceptance Testing*, vol. 228. Cyberjaya, Malaysia: ICTIM, 2022.

[25] D. Gobov, "Practical Study on Software Requirements Specification and Modelling Techniques," *International Journal of Computing*, vol. 22, no. 1, pp. 78–86, Mar. 2023, doi: 10.47839/ijc.22.1.2882.