

# Design and building system analysis on the smart fisheries village (SFV) website at the banyuwangi fisheries training and counseling center

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## ABSTRACT

This research aims to analyze and design a smart fisheries village-based website system to facilitate back-end, front-end, and UI/UX designers in the application of website creation according to the needs desired by the agency and with an organized database so that the creation of data reports will be faster. The early stages of the research began with the identification of the specific needs of fishing villages and involved an in-depth analysis of the system needs that supported the vision of the Smart Fisheries Village. The design began with data collection consisting of observation methods and interviews, where researchers interviewed the authorities. In this method, the author gives 5 questions to the user, data analysis, and design of the Unified Modeling Language (UML). The design of this SFV web system uses a Unified Modeling Language (UML), which involves the use of diagrams and UML notation to describe various aspects of the system visually. The results of this study include UML diagrams, which encompass activity diagrams (for users and admins), flow diagrams (for users and admins), use case diagrams (for users and admins), and class diagrams that have undergone 4-5 iterations. The design of the Smart Fisheries Village website system is necessary to improve the welfare of the fishing village. Contributions of this research include the standardization of modeling, increased productivity, improved analysis and planning, and improved understanding. Previous research might have concentrated on a single type of system or domain. However, research should be expanded to various types of systems and industries.

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## 1. INTRODUCTION

This research is undertaken to analyze and design a web-based Smart Fisheries Village system that will make it easy for back-end, front-end, and UI/UX designers to use the website as required by the agency [1], [2]. The development of information technology, especially the Internet and data analysis, has opened up new opportunities to improve sustainability in this industry. This research tries to leverage these advances in the context of smart fishing villages. Everyday life requires information technology due to rapid advances in

science and technology [3]. Where the Internet can be used as a tool for communication and remote control [4]. With digital technology, such as the use of business management applications and online education platforms, it is expected to enhance productivity in the village of Bangsring. This will allow better time management and allow entrepreneurs and educators to focus on development and innovation, thus promoting economic growth and improving the quality of education in Bangsring village. Today's internet technology is becoming more and more user-friendly, which means it is easier for users to use it. The purpose of this software modeling is to describe the software development plan, enabling communication of this plan to the relevant parties, namely back-end, front-end, and UI/UX designer [5]. The study entitled "Design Build Geographic Information System Find Android-Based Veterinary Location" conducted by Nori Sahrun and Sularno (2023) revealed that the actors involved in creating the designed UML diagrams were also involved in the development of the application [6]. The UML design is used to determine the workflow of the system to be created so that the system runs according to the wishes of the author and does not intersect with its original purpose. Similarly, Jerio Madre's research entitled "Design of Website-Based Information Systems as One of the Promotional Media in Companies" [7] stated that he had described flowcharts, context diagrams, Data Flow Diagram (DFD), use case, and Class Diagrams. Furthermore, Hermanto's "Designing Building Website-based Information Systems" study has done design using UML before use cases, class diagrams, Sequence Diagrams, and activity diagrams [8]. In this study, the main focus is on the design stage of the system. The research method used in the design of the system starts with the library which is the initial stage before conducting research, then data collection techniques including observations, interviews, and questions to the authorities, which are two employees responsible for the course of the program [9]. Furthermore, a thorough data analysis will be performed to ensure that the resulting system can optimally meet the needs of the user, carry out the calculation process, and design the system using the Unified Modeling Language (UML). The picture of the UML results is divided into 4 parts, namely activity diagram, flow diagram, use case, and class diagram. The development of this information system also involves a deep understanding of the challenges facing the communities in Bangsring. The proposed solution must be able to overcome these barriers and provide tangible benefits to society. Although many previous studies have discussed the application of UML, several challenges remain. Not all teams use UML consistently, which can lead to difficulties in collaboration. Many projects only use UML formally without thoroughly documenting every aspect, reducing its benefits. According to previous research, there is still a gap; many studies focus more on the theory and basic principles of UML, while few explore its application in real projects with measurable results. There is a lack of studies that systematically evaluate the impact of UML usage on design quality and project success [10].

## **2. METHOD**

### **Literature Study**

This study was conducted by reviewing journals of research report journals published between 2019 and 2023 using a specific set of keywords [11]. A total of 10 journal references were obtained, along with websites related to research problems and objectives. These references included 1 Sinta 3 journal, 7 Sinta 4 journals, 2 Sinta 5 journals and several international journals. The relationship between these reference journals and current research lies in the need to determine the initial steps for website design. Based on the information collected from the references, specific steps were adopted for the design process that will be carried out [12].

### **Data Gathering**

#### **Observation**

Direct observation of users and understanding in Bangsring, including the community where researchers find the main needs of the surrounding community, such as the need for online training activities, then the MSME actors, who need a promotional platform, and the tourist visitors who need a map of local tourist directions [13].

#### **Interview**

This method was used to collect data on the description of the research object, especially those related to the design of the Smart Fisheries Village website. Where will I conduct two-way communication to obtain data from respondents who can be trusted as input to complete this research, including 2 employees from the agency responsible for this SFV website [14].

#### **Questionnaire Method**

It is important to collect data about user needs and preferences as well as important elements in the management and development of a smart fishing village when building a smart fishing village information system. Here are some of the questions asked:

- 1) What is your level of satisfaction with this UML design?

- 2) Do you think some additional features might be needed?
- 3) Do you think the provided UML layout helps you better understand the structure and flow of SFV?
- 4) Is it easy for you to find the information needed in the UML design provided?
- 5) How well does this UML design describe the functionality and interactions of the system as a whole?
- 6) Do you think this UML design provides an adequate understanding of the entire system?
- 7) Is the UML design of this system sufficient?

Data collection in research or surveys involves the use of questionnaires or written questions filled in by respondents.

### Data Analysis

The analysis step is needed to find all the needs of the information system to be built. Field data and information obtained include observations (results of user observations), interviews (results of interviews with 2 agencies), and literature studies (results of searching for information from several journals). This analysis process identifies and explains user needs during the system design process that will become an information system [15]. Then do a questionnaire calculation and carry out a design that will later be evaluated. The aim is to assist in collecting data or information that is useful in the design process for creating an information system.

### Questionnaire Calculation Process

The questionnaire data obtained are then calculated using the formula above, then the results of the answers to the questions, total frequencies, and percentages are calculated using the formula sourced from Banyuwangi" by Yoga Apriatmo [16] as follows:

$$P = (F/N) * 100 \quad (1)$$

Explanation:

P	: Percentage (%)
F	: Frequency sought
N	: Number of respondents

### System Design

In designing this SFV system, was created using UML (Unified Modeling Language) diagrams, which consist of activity diagrams, flowcharts, use case diagrams, and class diagrams for designing this web system; here are some UML diagrams:

#### Activity Diagram

In activity diagrams, the activities are represented as elliptical or rectangular symbols, while the flow between these activities is represented as arrows. These diagrams help to visualize the logical flow of a process or system, allowing a better understanding of how a system functions and how processes interact with each other. Activity diagrams are a representation of workflows per activity stage (activities) and actions. It can be in the form of choices, repetitions, and joint activities. Can be used to represent all activities in the system [17].

#### Use Case

Use cases work by describing the typical interaction between users of a system and the system itself through stories of how the system is used [18]. The use case I designed consists of external actors and shows how users interact with the system [19]. The initial design of the user use case that will be estimated to experience 4-5 changes where users can access features on the landing page such as profile pages, fisheries education, education tourism, culinary, trip info, lodging, public facilities, events and news, sfv spots, galleries, and about us in smart fisheries village. The following image shows the initial design of the use case.

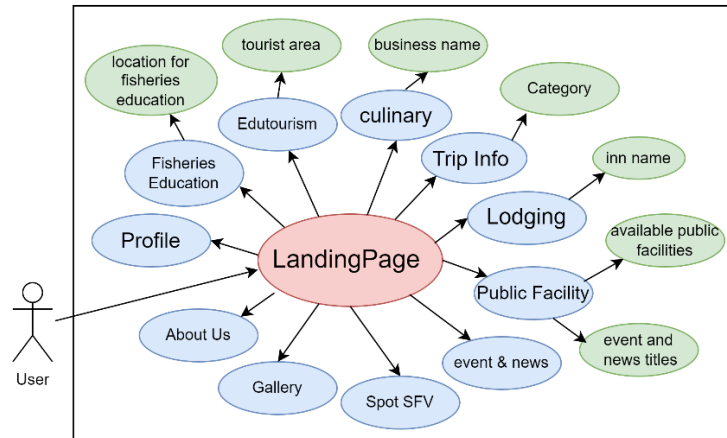


Figure 1. Preliminary use case design

**Flowchart**

Flow charts show the sequence of interactions between objects in a scenario or process and are useful to understand the logic of process execution [20]. The initial design of making this user flowchart will be estimated to experience 4-5 changes where after the user opens the page, they will enter the home page and can access features such as profiles, and for tourist attractions consisting of the name of the tourist spot, a brief description of eduwisata, the contents of eduwisata, and likewise for culinary, users can see the title of education which consists of the name, title, and content of fisheries education, dikman eduwisata users get recommendations for tourist attractions consisting of the name of the tourist spot, a brief description of eduwisata, the contents of eduwisata, and likewise culinary, users can access tourist attractions consisting of business names, descriptions, and contents of culinary, then info trip which will have several categories. Then the inn, which will consist of the name of the inn, the title of a brief description, and the contents. And finally, there are public facilities, and in the database, there are types of facilities available and the coordinates of the destination facility. The following image shows the initial design of the flowchart.

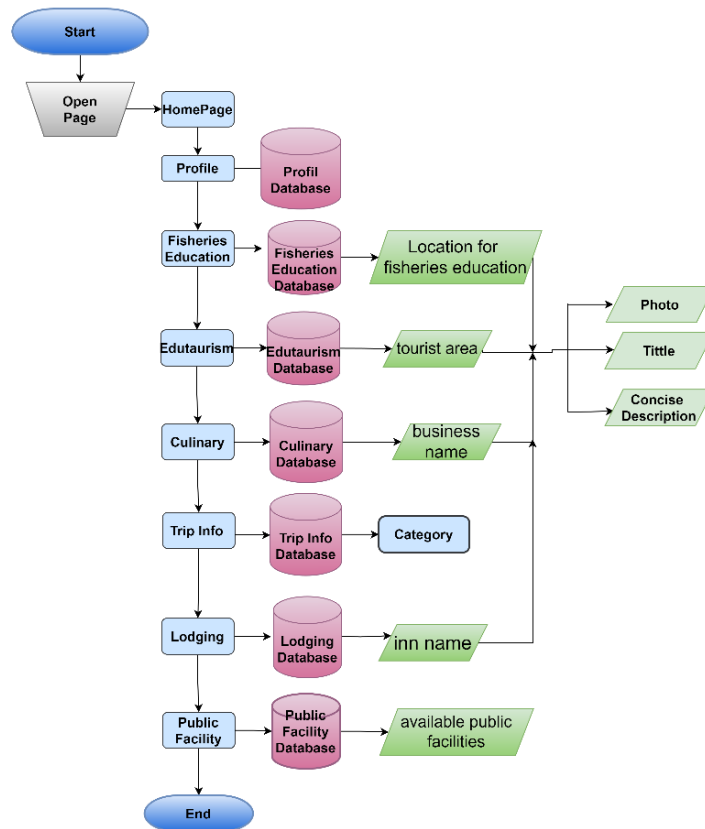


Figure 2. Preliminary flowchart design

**Class Diagram**

Class diagrams are used to describe the static structure of a software system. The Class Diagram explains the layout of the database design class diagram that will be made [21]. This diagram shows the classes that exist in the system, the relationship between these classes, and the attributes and methods owned by each class. In the initial design of this class diagram, there are five classes: the first is the fisheries education class related to biota, then the culinary consists of culinary locations related to the stall class, and the stall class is related to the product class, which is related to the culinary type class.

From this class diagram, it can be explained that the relationship from the location table to the stall table is one-to-many because one location can have several stalls, for the stall table to the product table also has a one-to-many relationship because one stall can have many products, as well as the culinary type table to the product table also has a one to many relationship because one type of culinary can be for several products. For the fisheries education table itself, it also has a one-to-many relationship to the biota table because one education can cover several marine biotas. The following image shows the initial design of the class diagram.

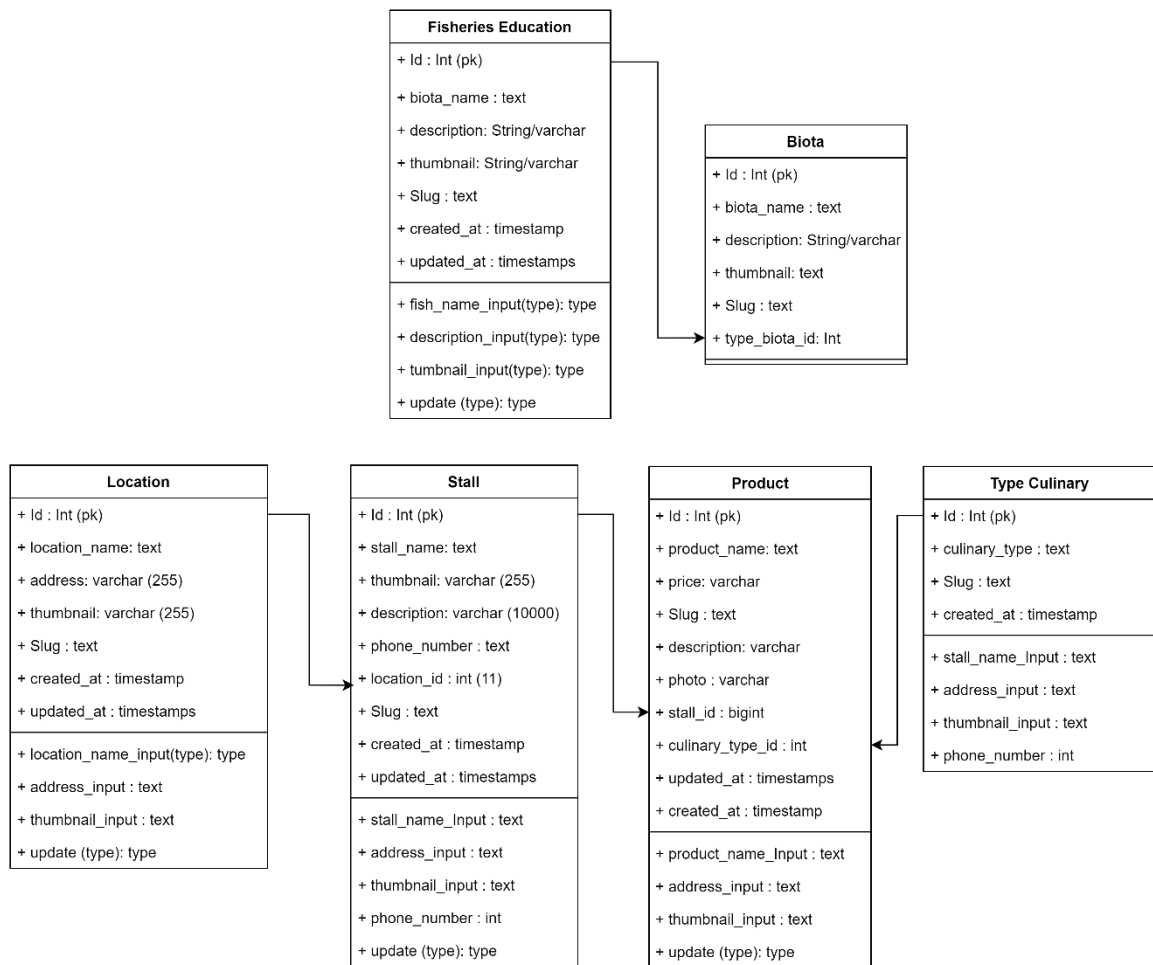


Figure 3. Preliminary class diagram design

**3. RESULTS AND DISCUSSIONS**

With the existence of a design intended for research purposes, it assists the back-end, front-end, and UI/UX designers in the implementation of website development according to the requirements. The research steps include needs analysis, evaluation using the Likert Scale, and designing the resulting UML diagrams as follows.

## Need Analysis

### Visitor Needs

- a) Visitors or tourists can quickly access information online.
- b) Visitors or tourists can access the menus available on the SFV website.

System requirements analysis helps recognize and elucidating user requirements throughout the system design phase, which will later evolve into an information system [22].

### Needs of Micro-, Small- and Medium-Entrepreneurs Actors

- a) Micro, Small and Medium Enterprises can log into the system.
- b) Micro, Small, and Medium Enterprises have access to input their product data.
- c) Micro, Small, and Medium Enterprises can manage all their product data in the available categories.

### Governance Needs

- a) The government can use this website to digitize smart fishing villages.

### Superadmin

The person responsible for managing the application is the super admin. Adding an administrator and granting them the rights to input, modify, and delete content within the website.

### Admin

People who register as members and have the ability to create questionnaires, manage them, and view the results are called admins [23]. The administrator has the right to input, change, and delete content on the website.

### User

Users can access all information menus on the website.

## Evaluation

### Questionnaire Calculation

We use a Likers Scale for each question to assess the percentage value and the following value weighting table.

Table 1. Weighted Scores

Response	Value
Strongly Agree	5
Agree, Good	4
Neutral / Fair	3
Disagree, Less	2
Strongly Disagree	1

Table 2. Percentage of scores

Explanation	Valeu
Strongly Disagree	0% - 19,9%
Disagree, Less	20% - 39,9%
Neutral / Fair	40% - 59,9%
Agree, Good	60% - 79,9%
Strongly Agree, Excellent	80% - 100%

### Questionnaire Calculation Process

Next, the questionnaire data will be calculated using the following formula:

$$P = (F/T) * 100 \quad (2)$$

Explanation :

P: Percentage (%)

F: Frequency to search for

N: Number of respondents

With seven questions and ten respondents, they are:

- a) Question: What is your level of satisfaction with this UML design?
- b) Results of responses from 10 respondents:

Table 3. Results of responses from 10 respondents

Response	Value
The respondents who answered strongly agree (SS)	4
Respondents who answered agree (S)	4
Respondents who answered enough (N)	2
Respondents who answered disagree (TS)	0
Respondents who answered strongly disagree (TSS)	0

## c) Calculation of the total score or frequency (F)

Table 4. Calculation of Total Score or frequency

Response	Score
Number of strongly agree (SS)	3x5 = 15
Number of agrees (S)	4x4 = 16
Sufficient number (N)	3x3 = 9
Number of disagreements (TS)	0x2 = 0
Several strongly disagree (TSS)	0x1 = 0
Total	= 40

## d) Percentage calculation

To get interpretation results, the number of respondents must be collected based on the highest and lowest scores for each assessment item.

Highest Likert score x number of respondents  $5 \times 10 = 50$

Highest Likert score x number of respondents  $1 \times 10 = 10$

$$\begin{aligned}
 P &= F/T * 100 \% \\
 &= 40/50 * 100\% \\
 &= 80\%
 \end{aligned}$$

With a result of 80%, the level of respondent satisfaction with the UML design is strongly agreed or excellent.

**Decision Making Calculations (Conclusion)**

The following results are the results of the seven questions on the questionnaire with a total of ten respondents.

## a. Research Analysis: Do you think this UML design provides an adequate understanding of the entire system?

Table 5. Results of responses from 10 respondents:

Response	Value
Respondents who answered strongly agree	= 3
Respondents who answered agree	= 3
Respondents who answered enough	= 1
Respondents who answered disagree	= 0
Respondents who answered strongly disagree	= 0

## b. Calculation of the total score or frequency (F)

Table 6. Calculation of total score or frequency

Response	Score
Number of strongly agree (SS)	3x5 = 15
Number of agrees (S)	3x4 = 12
Sufficient number (N)	1x3 = 3
Number of disagreements (TS)	0x2 = 0
Several strongly disagree (TSS)	0x1 = 0
Total	= 30

## c. Percentage Calculation

To get interpretation results, the number of respondents must be collected based on the highest and lowest scores for each assessment item.

The highest likerst score x the number of respondents  $5 \times 7 = 35$   
 Lowest Likerst score x number of respondents  $1 \times 7 = 7$   
 $P = F/N * 100 \%$   
 $= 30/35 * 100\%$   
 $= 85.8\%$

Based on this evaluation, it can be concluded that the UML design is highly effective in providing respondents with an adequate understanding of the overall system.

**System Design**

The final step is to design the system. In designing the SFV system, UML (Unified Modeling Language) diagrams are used, including activity diagrams, flow diagrams, use case diagrams, and class diagrams to create this Web system. Here are the resulting UML diagrams:

**Activity Diagrams**

a. Admin Activity Diagram

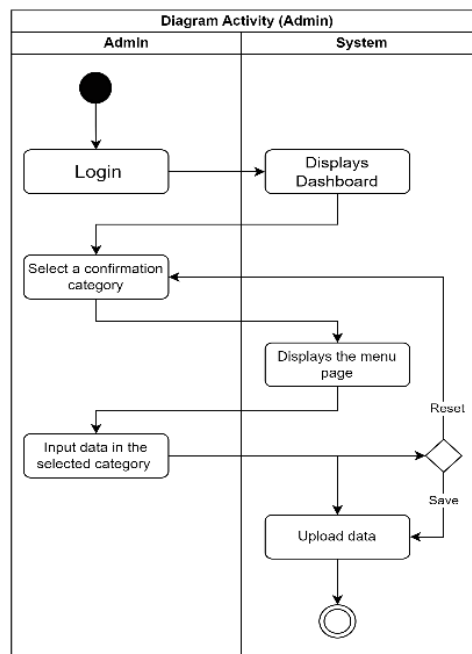


Figure 4. Outcome of the design of the admin activity diagram.

In the above image, it is explained that the admin first logs in to access the dashboard page, where they can then input the intended data.

b. User Activity Diagram



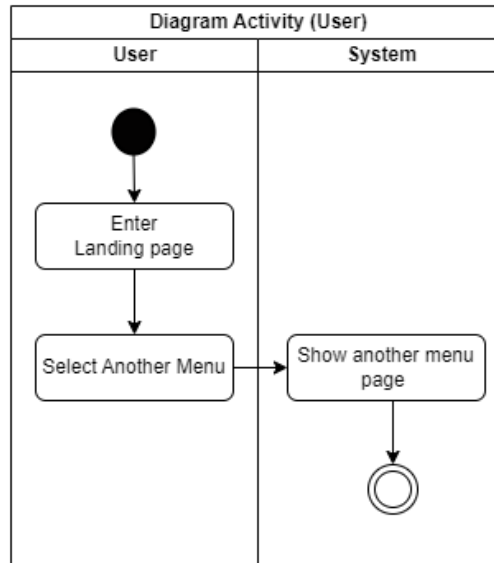


Figure 5. Outcome of the design of the user activity diagram.

In the above image, it is explained that the admin logs in first to enter the dashboard page, which will then input the intended data.

**Use Case**

a. Admin Use Case

The purpose of this study is to calculate the business value with function points based on detailed activity in the use case diagram [24]. The following is the final result of the administrative use case:

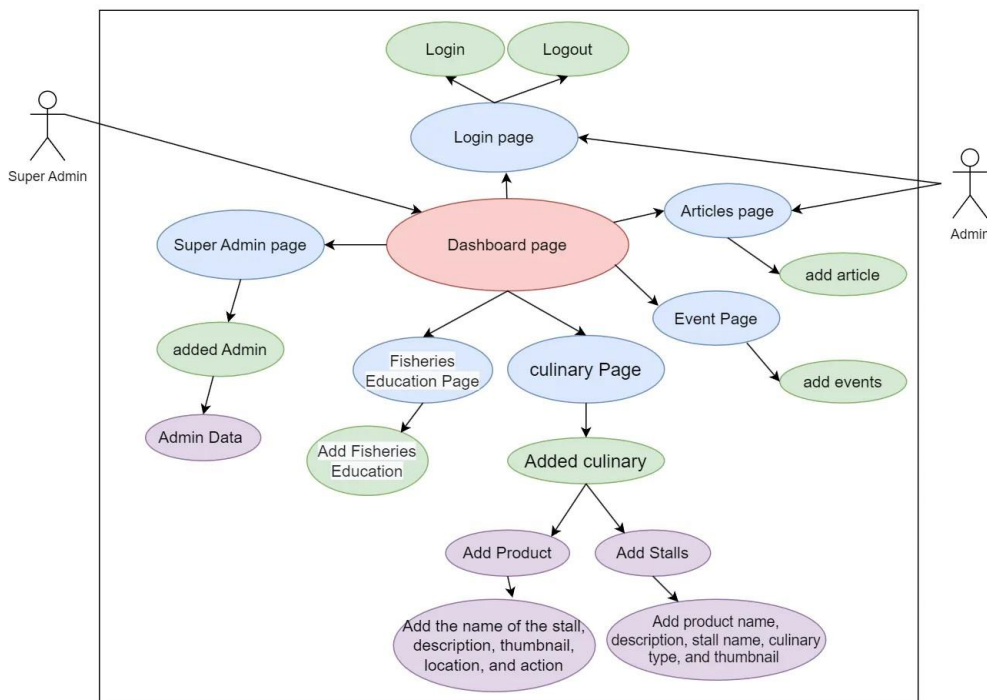


Figure 6. Outcome of the admin use case

In the image it is explained that the super admin can access and manage all dashboard pages, such as the login page, page super admin which functions to add admins and registered admin data, article pages to add articles (events and news), fisheries education pages to add marine biota, and product pages to add culinary types such as adding products, stalls, etc. admin can only access the login page and the culinary page. Meanwhile, the admin use case underwent one change, namely, dividing the actors into 2, namely, admin and super admin, and changing what parts each actor could or could not access.

b. User Use Case

Here is the final result image of the user's use case.

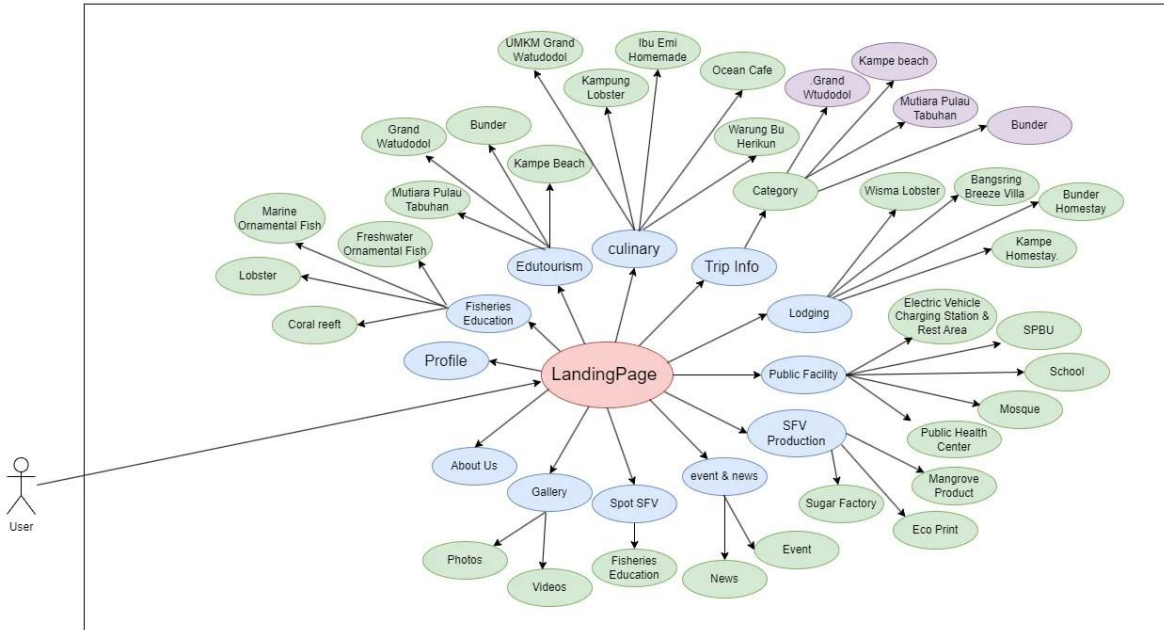


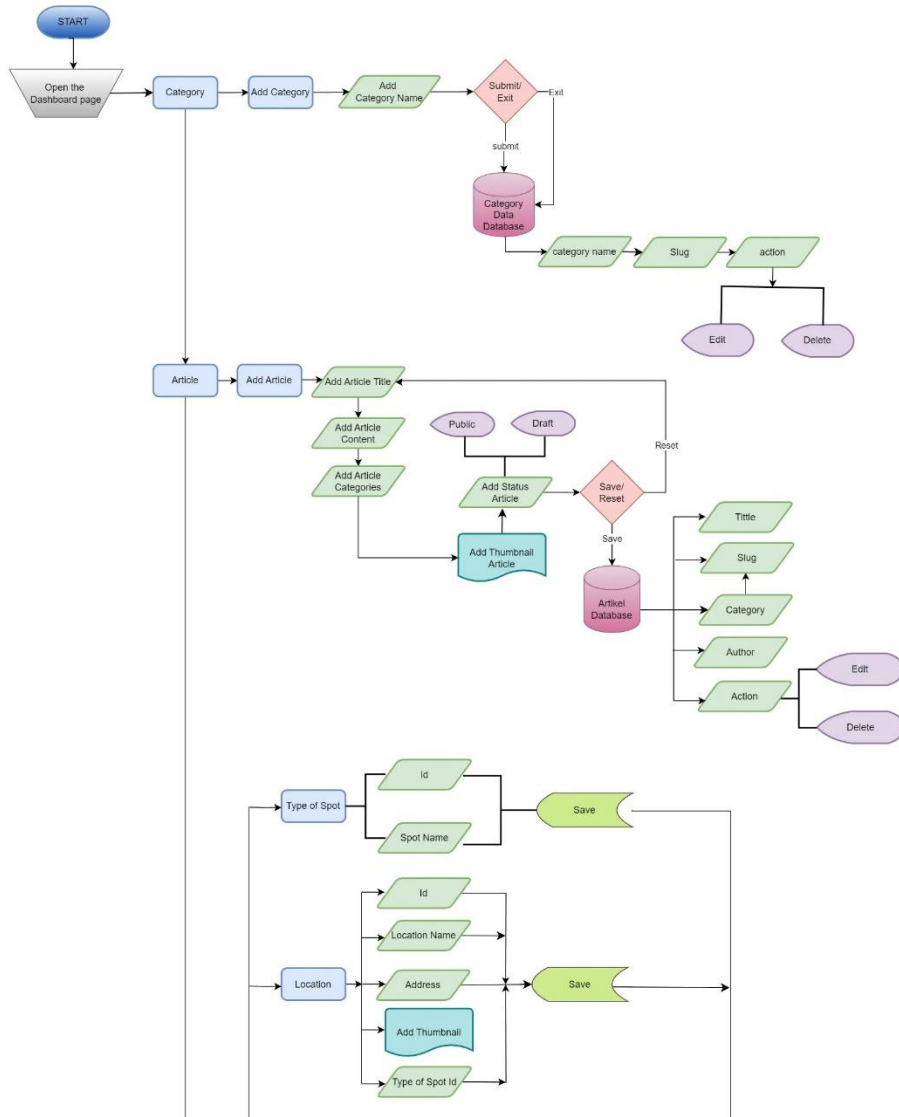
Figure 7. Outcome of the user use case

In the image, it is explained that users can access all the menus available on website pages such as profiles, fisheries education, tourism education, culinary, trip info, accommodation, public facilities, mangrove processing, events and news, SFV spots, galleries and about us at Smart Fisheries Village. where each menu has its content and function. For the user use case, there were five changes, the first change was adding what would be included in the sub, such as the fisheries education sub (coral reefs, lobsters, and ornamental fish), ecotourism (Grand Watudodol, Pearl Island Tabuhan and Bunder ), culinary (Lobster village, GWD UMKM, Ibu Emi's production house, and Ocean Café), trip information, lodging (Lobster guest house, Bangsring Breeze Villa, Bunder Homestay), public facilities (rest area, gas station, etc.) and galleries (photos and videos). For changes second, adding Kampe Beach to the tourism and trip info sub. Next, add Ocean Café to the culinary sub. The third change splits the ornamental fish center into two, namely, the marine ornamental fish center and the freshwater ornamental fish center. The fourth change changes the mangrove tea sub to SFV production which contains mangrove tea, eco-print, and a sugar factory. The fifth change added Bu Herikun's stall to the culinary sub and deleted the content about us which the team contained to just about us.

**Flowcharts**

a. Admin Flowchart

The final image of the admin flowchart



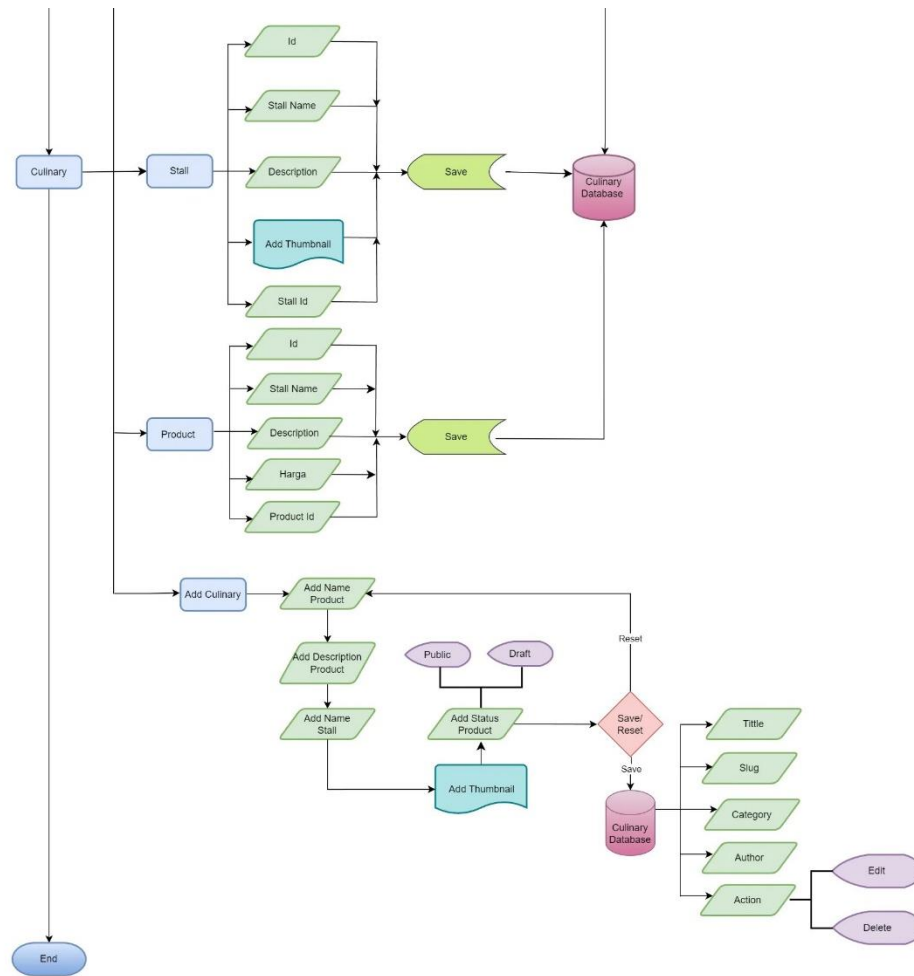


Figure 8. Outcome of the admin flowchart

From this admin flowchart image, admin can access the dashboard with the menus listed (categories, articles, and culinary). The administrator can add and change content according to needs. From this admin flowchart image, the admin can access the dashboard with the menus listed (categories, articles, and culinary). When adding a category, the administrator can add and change content according to needs. From the initial design of the admin flowchart, it has undergone two changes, the first change added actions containing edit and delete in subcategories, articles, culinary, and fisheries education. The second change to the sub-article adds a status containing public and draft.

b. User Flowcharts

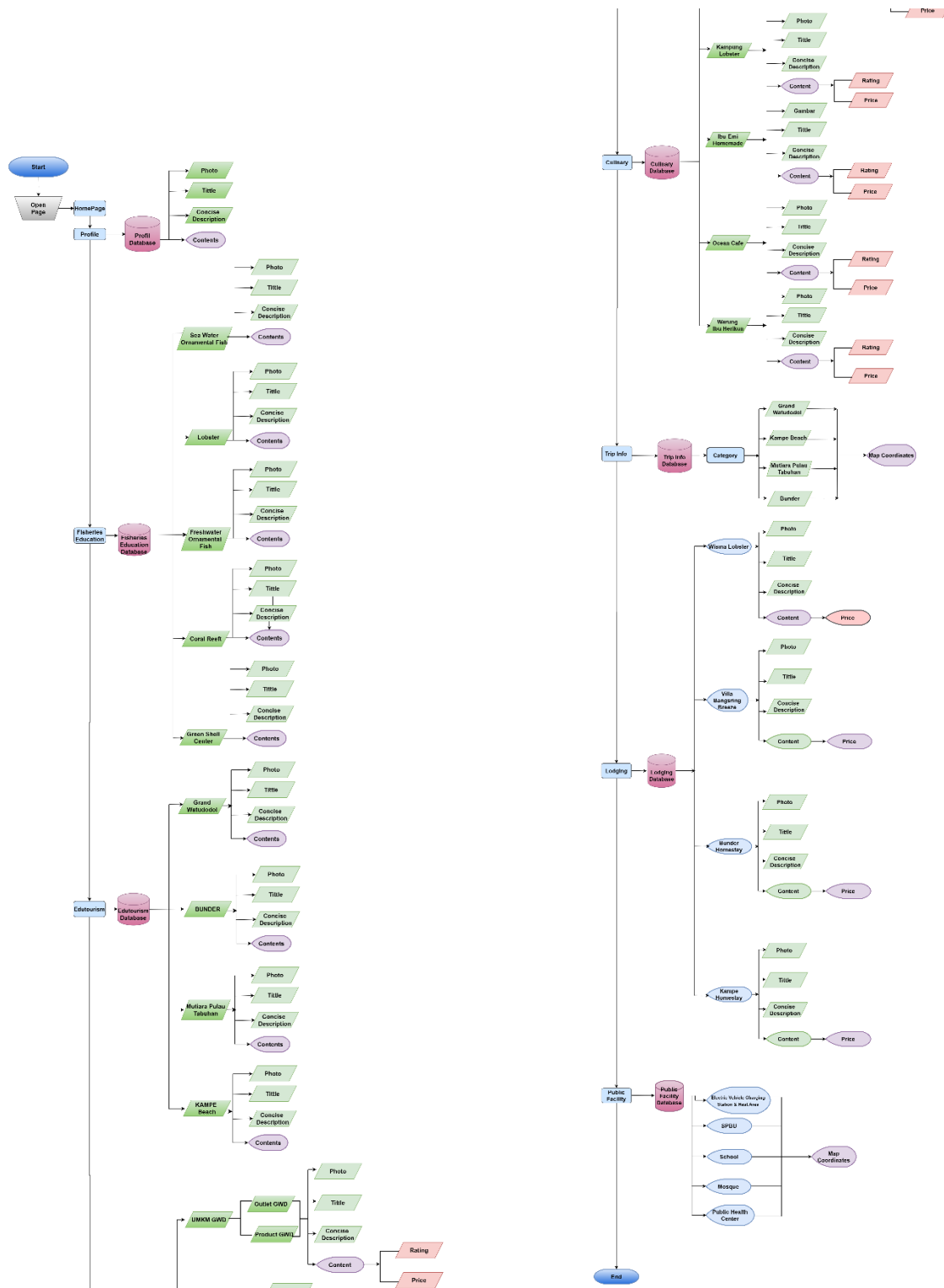


Figure 9. Outcome of the user flowchart

From the following flowchart, image can access all available menus, except changing or adding content listed on the target menu. The initial design of the user flowchart has undergone 3 changes, with the first change adding educational groups including ornamental fish, lobster, and coral centers. The second change adds educational tourism, culinary and trip information groups included. Like Eduwisata, there are Mutiara Pulau Tabuhan, Bunder, and Grand Watudodol, as well as lecturers (UMKM GWD, Lobster Village, Ibu Emi's production house. and Ocean Cafe) and added the NFO trip category (Mutiara Pulau Tabuhan, Grand Watudodol and Bunder). The third change added Kampe Beach to the education sub Herikun's stall to the culinary sub, and Kampe homestay to the lodging sub. The fourth change adds prices to the types of culinary and lodging promoted in the culinary and lodging sub.

### ***Class Diagram***

In the final result, this class diagram underwent 3 changes, the first change adding a table of types of places that have data relationships with biota, which will be included in the fisheries education table. For the second change, there are additions to the personal access table, a password reset, and a password reset token for the authentication media. In the last change, we added data relationships from users, articles, and categories, and then added an event table.

From the picture, explain that there are users table (super admin, admin, user) articles and categories which are data relations. The event class does not have a data relationship, while the relationship between personal access, password reset, and password reset token is included in authorization and authentication. The type of place table has a one-with-many relationship to the biota class because in one place you can discuss several marine biota. The relationship from the location table to the stall table is one-to-many because one location can have several stalls, the stall table to the product table also has a one-to-many relationship because one stall can have many products, the same goes for the culinary type table to the product table too. has a one-to-many relationship because one type of culinary can be used for several products. The final class diagram image

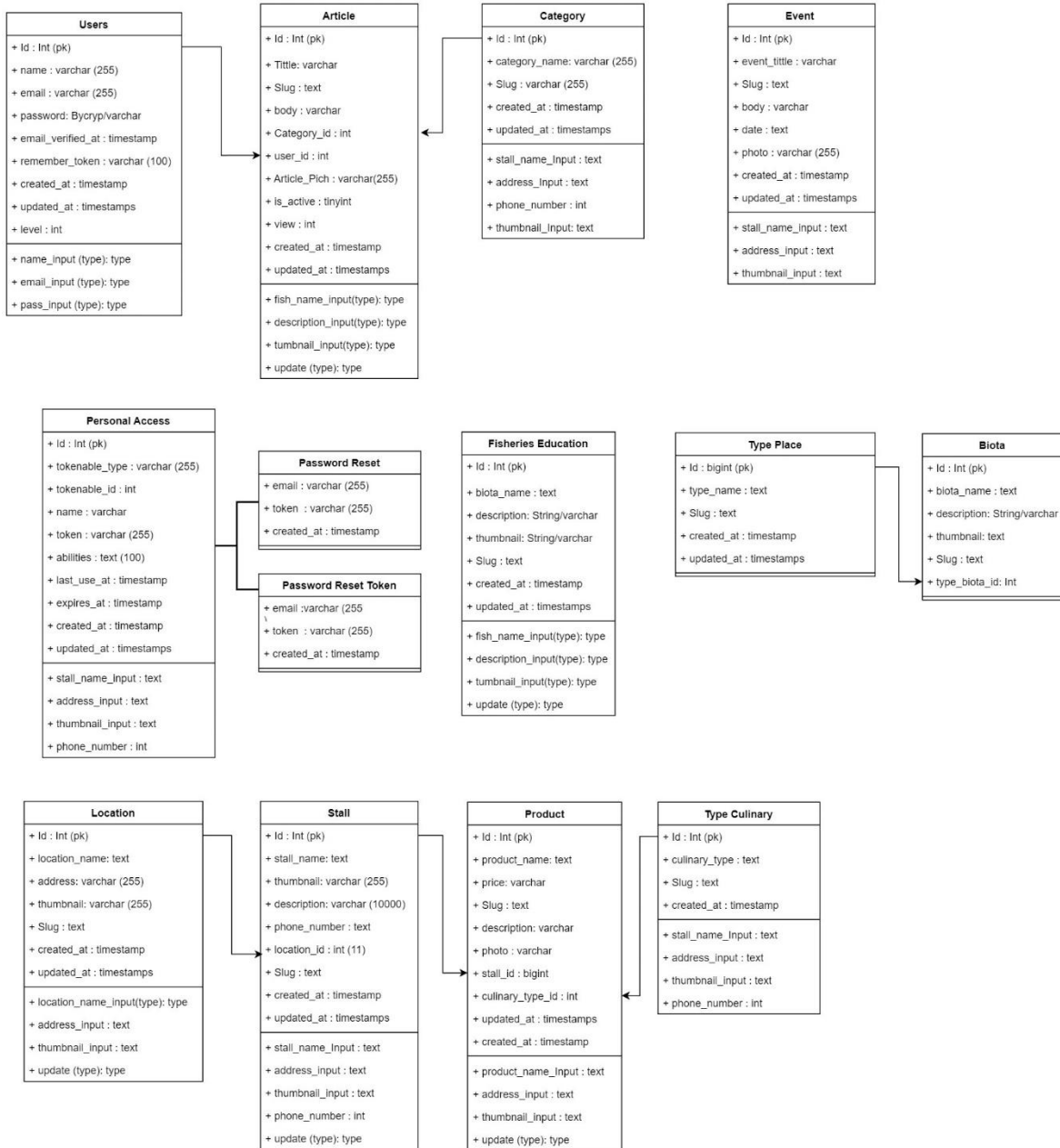


Figure 10. Outcome of the class diagram

With this, the research objective has been achieved, which is to facilitate back-end, front-end, and UI/UX designers in the application of website creation according to their needs. Additionally, the study will focus more on the theories and basic principles of UML, exploring its use in real-world projects with measurable results. This allows for a systematic evaluation of the impact of UML on design quality and project success.

#### 4. CONCLUSION

Based on the results of the analysis and design above, it can be concluded that the system analysis was carried out by analyzing the functional and nonfunctional requirements of the system. Apart from that, it

was continued by designing a system that included activity diagrams, use case diagrams, data flow diagrams, and class diagrams for the database that had been designed, which was expected to be able to accommodate data and activities in Bangsring Village. After designing the Smart Fisheries Village (SFV) system based on this website, it can make it easier for back-end, front-end, and UI/UX designers to use the website according to agency requests. This research tries to utilize this progress in the context of a smart fishing village, which will make it easier for visitors and village communities to find digital information about fisheries education, tourism education, culinary, lodging, trip information, mangrove processing, public facilities, as well as various agendas and news about training. website-based online training in Bangsring Village.

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