APPLIED INFORMATION TECHNOLOGY AND COMPUTER SCIENCE
e-ISSN: 2773-5141

AITCS

Vol. 6 No. 1 (2025) 1589-1601
https://publisher.uthm.edu.my/periodicals/index.php/aitcs

# Freshwater Prawn Management System

**Megala Selver Raju[1], Nureize Arbaiy[1]***

[1] *Fakulti Sains Komputer dan Teknologi Maklumat,*
*Universiti Tun Hussein Onn Malaysia, Parit Raja, Batu Pahat, 86400, MALAYSIA*

*Corresponding Author: nureize@uthm.edu.my
DOI: https://doi.org/10.30880/aitcs.2025.06.01.088

**Article Info**

Received: 11 June 2024
Accepted: 17 June 2025
Available online: 30 June 2025

**Keywords**

Freshwater Prawn, FarmManagement System, Web-Based Information System

**Abstract**

Prawn farming is an important part of the aquaculture sector that helps meet the growing demand for seafood around the world. Prawn farms can have complicated data management, though. Manual data management, including keeping handwritten documents, is inefficient and can lead to data loss. It can also cause errors. A web-based platform named the Farming Freshwater Prawn Management System has been built to address these issues and boost organisational effectiveness. Prototype models are used in this project. PHP, HTML, and CSS are the programming languages utilised in its development, and Xampp and MySQL are its server and database, respectively. The system offers an improved method for handling farming data in terms of accessibility, accuracy, and efficiency. By removing the possibility of data loss, lowering errors and inconsistencies, and facilitating thorough data analysis and reporting, it increases the operational efficacy of prawn farming.

## 1. Introduction

Giant freshwater prawn (Macrobrachium rosenbergii) aquaculture stands out as a vital response to the growing worldwide demand for sustainable food production because it can offer both dietary security and ecological balance [1]. Giant freshwater prawn farming is significant by the astounding per capita consumption rates of the species, notably in Malaysia [2]. It accounts for a sizeable share of the country's intake of animal protein. The sector, meanwhile, has difficulties with sustainability as demand rises [3]. Giant freshwater prawn farming is essential to support food intake for its nutrition and the environment while also outlining some of the sector's present constraints [4]. It prepares the ground for an innovative approach to address these issues, ushering in a future where tradition and innovation coexist and taking gigantic freshwater prawn farming to new heights.

Small-scale prawn farming enterprises are essential for stimulating the economy. These support local supply chains and marketplaces, encourage the creation of jobs, and provide revenue for laborers and farmers [5]. In addition to providing a means of survival for people, these farms have a major impact on the region's overall economic growth [6]. Although the efficiency and accuracy of manual data management techniques in small-scale prawn farming may be limited, it's crucial to recognize the financial contributions made by these farms as well as the environment in which they operate. Acknowledging these farms' economic importance and aiding improve their sustainability and productivity can amplify their beneficial effects on the local and regional economies. When it is appropriate, efforts can be made to support, teach, and give resources to assist small-scale prawn farmers in making the shift to more sophisticated data management systems, taking into consideration their needs and circumstances.

A study conducted on the data management system of the freshwater prawn farming industry at the Wong Put Loong company, a Prawn farm in Kampung Renal, Negeri Sembilan, revealed inefficiency, errors and redundant data. Data storage issues persist because of the use of physical files and paper documents, as well as

the lack of a centralized repository. Errors, problems with data integrity, and duplication across multiple systems can also lead to data management concerns. Report preparation can be slowed down and error-prone when data is stored using a popular spreadsheet program. For customer data and stock orders, manual cross-referencing of forms and notes is necessary, which could lead to deviation problems. Information management, inventory control, and general process efficiency are all impacted by these mistakes.

Hence, a Freshwater Prawn Management System (FPMS) is built to address the difficulties of manual data management in the freshwater prawn farming business. Automated data entry, centralized data storage, real-time monitoring, and reporting capabilities are provided to overcome these obstacles. The new system offers better data management and accessibility while improving processes. It gives users the ability to view the latest data and information in real time. This solution simplifies work streamlining and increases productivity by automating data entry and ensuring accuracy. This automation method has the potential to completely change the current practice of importing and exporting giant freshwater prawns. Among the benefits offered are to improve data management, support planning and decision making, and provide an industry competitive advantage. Farms can benefit from this technology by experiencing the effects of continuous growth and improved operational efficiency.

This paper is divided into several sections. The first part introduces the background of the project. Section 2 describes related work. Section 3 describes the project methodology and analysis and design results. Section 4 demonstrates the implementation of the system and its testing. Chapter 5 provides a conclusion.

## 2. Related Work

Prawns are raised in freshwater ponds or tanks as part of the practice known as freshwater prawn farming. Prawn is a popular food source in many regions of the world [7]. An expanding sector of the economy is freshwater prawn farming. Freshwater prawn farming can be done in a variety of ways [8]. The raising of prawns in semi-intensive ponds is one popular technique. The farmer also provides additional feed for the prawns that are often placed in these ponds in large numbers. Raising the prawns in large tanks is an additional popular technique. The farmer supplies all the feed for these tanks, which are normally stocked with prawns in a very high density.

In this project, research is done at Wong Put Loong, a company that operates a prawn farming operation. Freshwater prawn import and export data are now entered manually, which is a tedious and error-prone process. This is a result of the business's continued reliance on the practice of storing corporate data in books. When there is more data, it becomes more difficult to store, update, and conduct new searches, which makes data management more challenging. Completing the reporting process might also be challenging. Some small-scale Prawn farmers prefer to manage their data manually, without the aid of computer systems or advanced technology. Even with this conventional method, the local economy greatly benefits from this small-scale Prawn farming. They support local markets and supply chains, generate income for farmers and laborers, and create employment opportunities. These farms support local communities and individuals by offering a means of livelihood. This promotes economic growth in general.

Practically, small-scale Prawn farms often have limited resources and may not have access to advanced technology [9]. These small farm managers handle data manually and have limitations in terms of efficiency and accuracy. Farm management depends on the knowledge and expertise possessed to manage the farm. However, these farms continue to contribute to economic development and local needs. Therefore, assistance from the authorities is necessary to support the survival of this small industry in terms of automation and digital technology that can increase efficiency and coordinate operations [10][11]. Modern management solutions that automate data entry, enhance data accuracy, and simplify labor management will revolutionize this process. This will lead to improved decision-making, environmental sustainability, financial success, and competitiveness in the aquaculture sector.

The efficiency, accuracy, monitoring, decision-making, and compliance of manual prawn farming techniques can all be greatly improved by integrating information system technology. Farmers may improve their operations, get better results, and support the general expansion and sustainability of the prawn farming sector by utilizing the potential of these technologies. A Web-Based Information System (WBIS) is a piece of software or a system that makes use of web technologies to give users access to and control over data and information on the internet or inside the intranet of an organization [12]. WBIS can revolutionize the Prawn farming sector by providing better data management, real-time monitoring, decision making, collaboration, supply chain management and market access. This technology helps farmers with the tools and information they need to improve the sustainability, output, and profitability of their Prawn farming operations.

In addition to the investigation, three existing systems are examined to analyze their aspects and link the data analysis to the proposed system. Through this system analysis, stakeholders can learn a lot about the capabilities, advantages, and disadvantages of each system. This analysis helps identify good features that can be adapted into the proposed system or fill in the weaknesses that may exist in the existing system. The three system are AgriWebb, Import and Export Document Management System (MERP), and Ayubie Lobster Malaysia.

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 1589-1601

The AgriWebb system provides knowledge on farm and animal data management that may be tailored to the needs of prawn data management. The MERP system, on the other hand, offers insights into document management in the context of import and export, which could have analogues in the system's requirements for data documentation. Finally, the Ayubie Lobster Malaysia System may provide insightful information about a particular area of aquaculture, perhaps influencing how prawn farming activities are conducted inside the management system. **Table 1** gives the summary of the system's comparison.

**Table 1** *System Comparison*

| System / Features | MERP Import and Export Document Management | Ayubie Lobster Malaysia | AgriWebb System | Freshwater Prawn Management System |
|---|---|---|---|---|
| Registration and Login Module | √ | X | √ | √ |
| Farm Management Module | √ | X | √ | √ |
| Prawn Management Module | √ | √ | X | √ |
| Sales Management Module | √ | X | √ | √ |
| Report Management Module | √ | X | √ | √ |

## 3. Methodology

The Agile approach's project beginning step is to determine the Freshwater Prawn Management System's objectives, aims, and stakeholders. The result of a cross-functional team guarantees involvement throughout the development process. **Table 2** shows the project development process and its activities. The Gantt chart in **Appendix A** shows the project's schedule and task dependencies for the time from October 2023 to July 2024.

**Table 2** *Software development activities*

| Phase | Task | Output |
|---|---|---|
| Requirement | Proposed the project. | Project proposal. |
| | Interview the clinic. | Gantt chart. |
| | Determine the project schedule, activities and output. | DFD |
| | | ERD |
| | | Flowchart |
| Quick Design | Design a basic system. | System architecture |
| | | Database |
| | | System user interface |
| Build Prototype | Choose the appropriate prototyping tools or software based on the project's needs. | Prototype |
| User Evaluation | Involve end-users, clients, and stakeholders in user acceptance testing. | Test case(s) |
| Refining Prototype | Refine the high-fidelity prototype based on feedback. Pay attention to visual design, functionality, and fine-tuning the user experience. | New prototype |
| | Finalize the prototype based on the feedback and testing results. | |

The following sub sections describe the finding from analysis and design phase.

### 3.1 System Requirements

Functional requirements determine the function of a developed system, while its function is described as a specific behaviour that converts input into output. Non -functional requirements are defined as the criteria about the way the system operates [13]. **Tables 3** and **4** show the functional and non -functional requirements for the proposed system.

**Table 3** *Functional Requirements*

| Modules | Function |
|---|---|
| 1. Login and Registration Module | • The system should enable the staff to register and log in to the system by using email address and password.<br>• The system should only allow staff to login with a valid email address and password.<br>• The system should redirect staff to the main homepage upon successful login. |
| 2. Farm Management Module | • The system should manage the amounts of ponds.<br>• The system should allow staff to manage pond size and capacity.<br>• The system should allow staff to manage the quantity of prawns in each pool. |
| 3. Prawn Management Module | • The system should allow staff to add, update and remove prawns.<br>• The system should allow staff to manage harvest prawn data.<br>• The system should allow staff to manage and add, update, and remove prawn harvesting data.<br>• The system should allow users to manage baby prawn data.<br>• The system should allow users to add, update and remove baby prawn data.<br>• The system should allow staff to manage prawn stock information. |
| 4. Prawn Sales Management Module | • The staff should manage prawn sales information. |
| 5. Report Management Module | • The system should be able to generate reports on sales and farm information. |

**Table 4** *Non-Functional Requirements*

| Requirements | Description |
|---|---|
| 1. Operational | The system should be easily maintained and updated. |
| 2. Performance | The system must constantly be responsive and useful. |
| 3. Security | The system should put the users' privacy first. |
| 4. Cultural and political | The system needs to function effectively on a web browser. |

The demand and need of the user for the system's functioning can be referred to as the user requirements. The user requirements of the system are as shown in **Table 5**.

**Table 5** *User Requirements*

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 1589-1601

| User Requirements |
|---|
| 1. Administrators and staff members can log into the system with their email and password. |
| 2. Administrators and staff should be able to log out of system. |
| 3. Administrator and should be able to manage and add, update, delete and update prawn harvesting data. |
| 4. Staff should be able to check the quantity of prawn in each pond. |
| 5. Staff should be able to manage the harvest financial operations. |
| 6. Staff should be able to input value to record current prawn sales. |
| 7. Administrator should be able to add new harvest prawn record. |
| 8. Administrator should be able to create new users. |
| 9. Administrator should be able to delete the records. |
| 10. Administrator should be able to edit the records. |
| 11. Administrator should be able to add new staff. |
| 12. Administrator should be able to be able to view and download financial reports. |
| 13. Administrator and staff should be able to manage prawn stock. |

## 3.2 System Analysis

System analysis is accomplished by using UML diagrams, which graphically reflect the functioning of the system. **Figure 1** shows a use case diagram that is drawn for this system. The relationships along with attributes of the key classes in the Freshwater Prawn Management System, such as those for users, prawn management, farm management, prawn sales management, and report management, are illustrated in the class diagram.

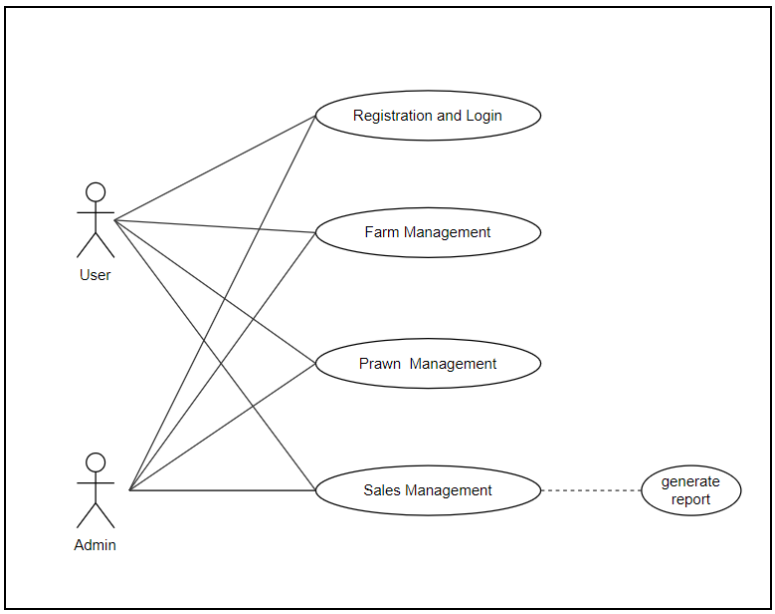


**Fig. 1** *Use Case Diagram*

**Figure 2** shows the class diagram of freshwater prawn management system and **Figure 3** depicts the entity relationship diagram for freshwater prawn management system.

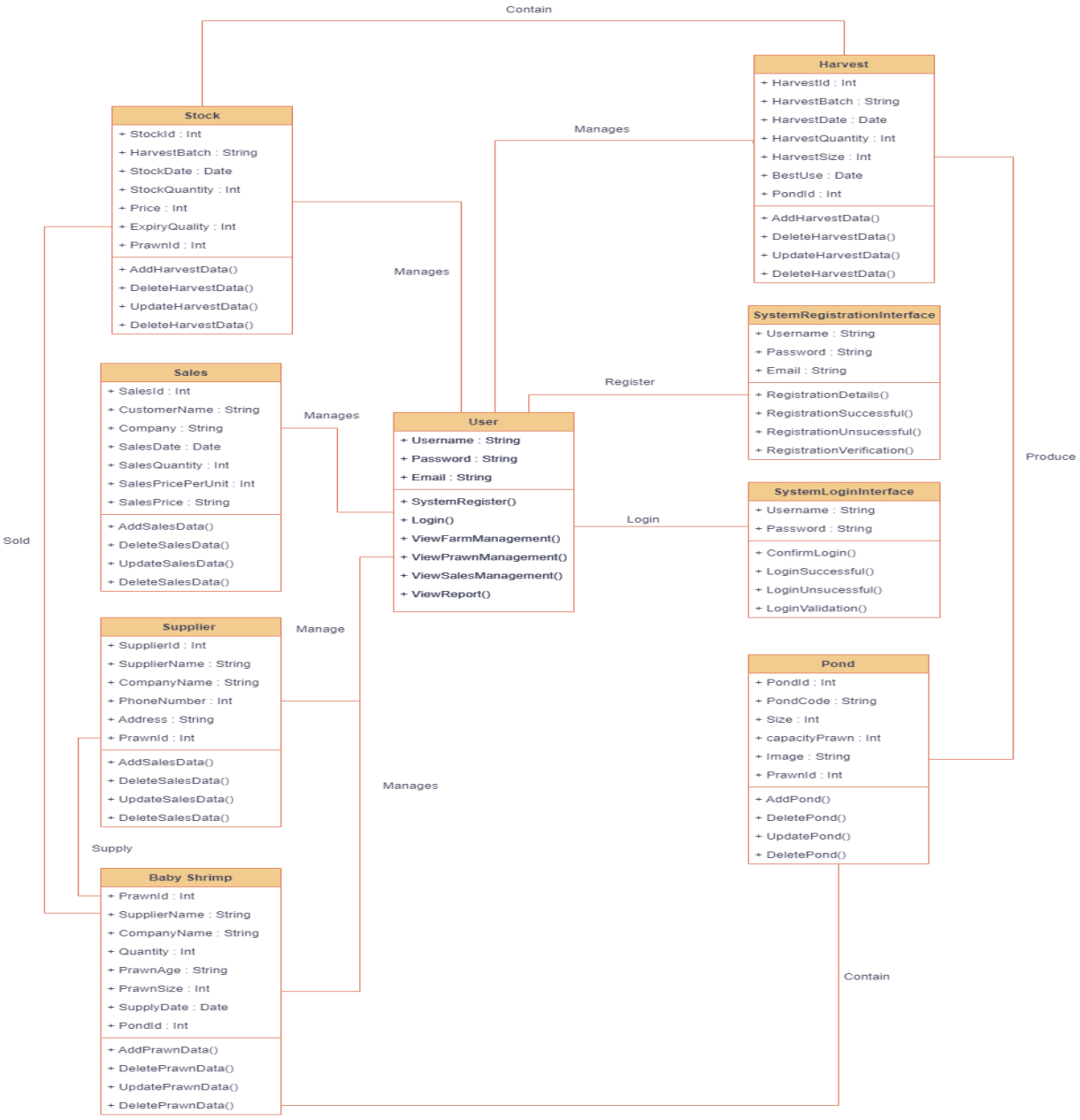


**Fig. 2** *Class Diagram*

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 1589-1601

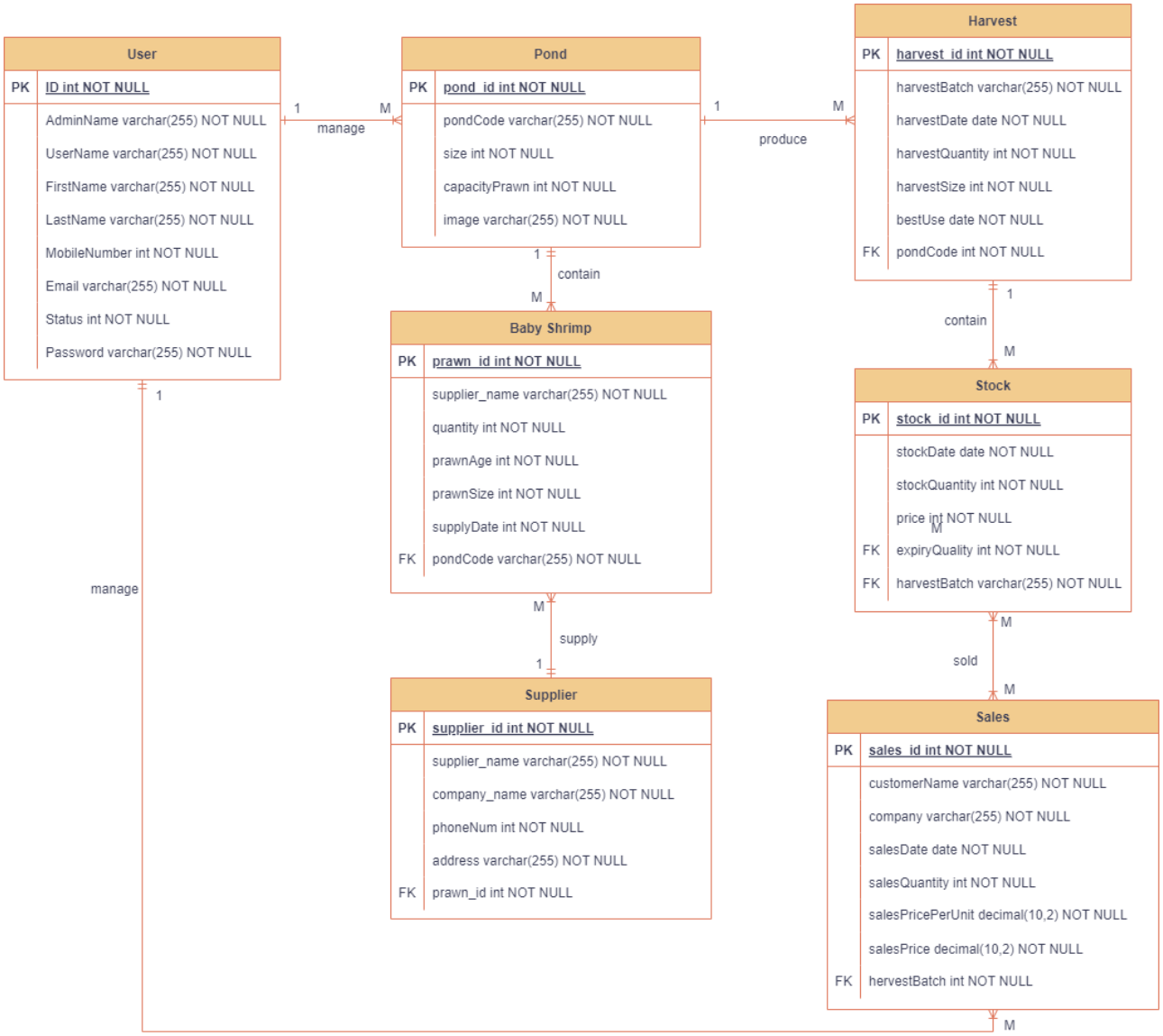


**Fig. 3** *Entity Relationship Diagram*

**Figure 4** shows the flowchart of the new system. Users must first log in to the system with their username and password. If these details are accurate, the user can successfully log in; if not, an error notice is displayed, and the user is redirected to the login page. Alternatively, consumers can register by entering accurate customer information if they don't already have an account. The user may control farm management, prawn management, sales management, report management, and eventually log out of the system after successfully logging in.

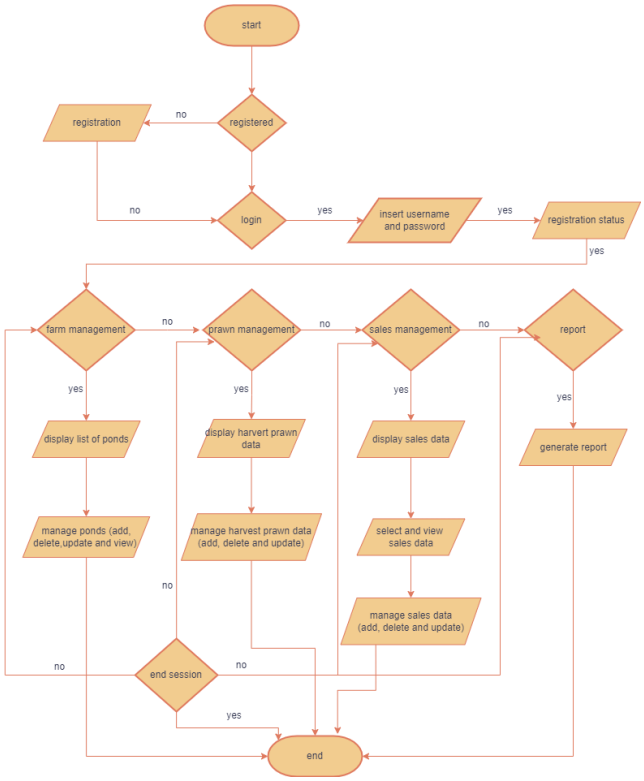


**Fig. 4** *Flowchart*

## 3.3 System Design

System architecture for this system is shown in **Figure 5**. This system architecture consists of several interconnected parts that allow data on prawn farming activities to be more easily collected, stored, processed, and shared.

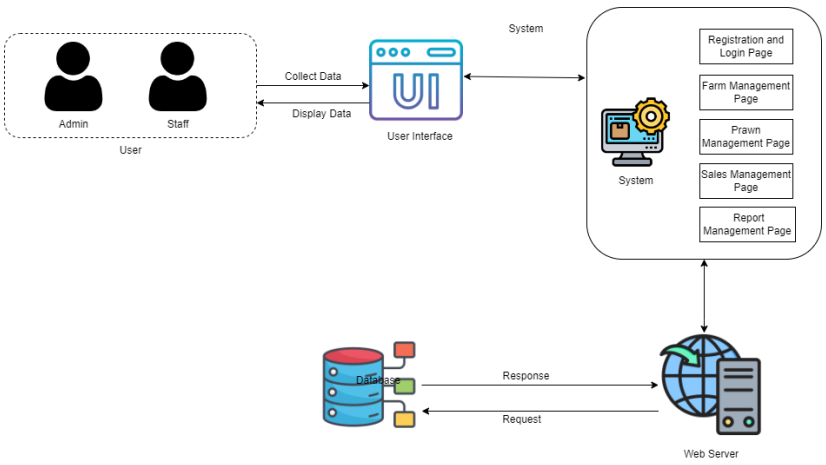


**Fig. 5** *System Architecture*

The freshwater prawn management system has the following relational schema of database tables:

i. User (Id, AdminName, UserName, FirstName, LastName, MobileNumber, Password, Email, Status)
ii. Pond (pond_id, pondCode, size, capacityPrawn, image, prawn_id)
iii. Baby Shrimp (prawn_id, supplier_name, quantity, prawnAge, prawnSize, suuplyDate, pond_id)
iv. Supplier (supplier_id, supplier_name, company_name, phoneNum, address, prawn_id)
v. Harvest (harvest_id, harvestBatch, harvestdate, harvestQuantity, harvestSize, bestUse, pond_id)
vi. Stock (stock_id, harvestBatch, stockDate, stockQuantity, price, expiryQuality, prawn_id)
vii. Sales (sales_id, custometName, company, salesDate, salesQuantity, salesPricePerUnit, salesPrice, harvest_id)

Applied Information Technology and Computer Science Vol. 6 No. 1 (2025) p. 1589-1601

System interface design is shown in **Figure 6** to **11**.

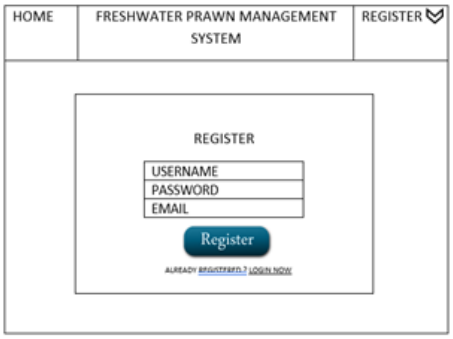


**Fig. 6** *Registration Interface*

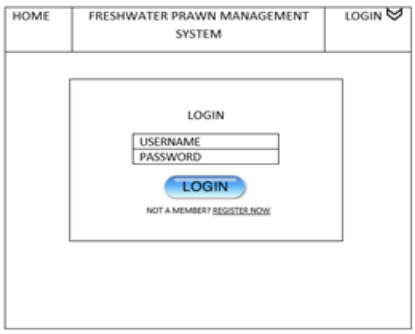


**Fig. 7** *Login Interface*

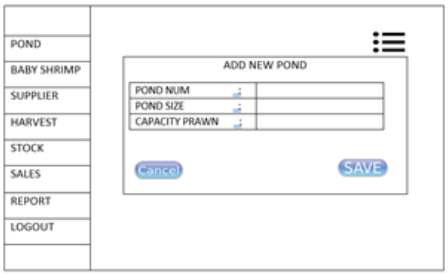


**Fig. 8** *Add New Pond Interface*

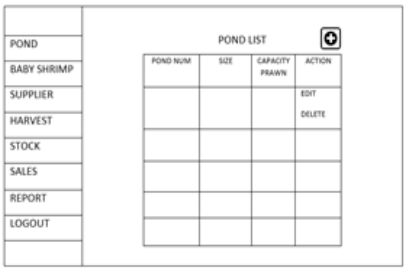


**Fig. 9** *Pond List Interface*


**Fig. 10** *Generate Report Interface*


**Fig. 11** *Add New Sales Interface*

The results of the analysis stage are very important for providing guidance for the subsequent phase of implementation. These results offer insightful knowledge and comprehension of the needs, limitations, and intended features of the system. They support the programming duties needed to convert the logical concept into a working system. In the analysis phase, the needs and specifications of the system are carefully examined and assessed. This entails comprehending user requirements, spotting possible obstacles, and determining whether different design solutions are feasible. The conclusions drawn from this analysis phase provide the groundwork for the future phase of implementation.

## 4. Result and Discussion

A web platform was used to build the system. This section presents the results of the system implementation and testing. The HTML, CSS and PHP programming languages were used to build the system. Laragon and Adobe Dreamweaver are the software used.

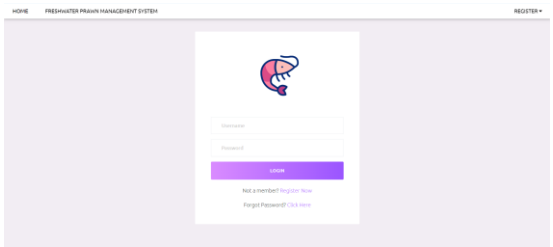

**Fig. 12** *User Login Interface*

**Figure 12** shows the user interface of Freshwater Prawn Management System login page. **Table 6** shows the test case for registration and login module. The purpose of this test is to verify whether the staff and admin are allowed to login into the system and whether the system will show an error message if incorrect credentials is entered.

**Table 6:** *Test Case for Registration and Login Module*

| Test Case ID | Description | Expected Output | Actual Output |
|---|---|---|---|
| M1-1 | Admin fills in all fields during registration. | Registration successful | As expected |
| M1-2 | Admin register without filling all field | Registration unsuccessful | As expected |
| M1-3 | Admin and users enter valid username and password | Login successful | As expected |
| M1-4 | Admin and users enter invalid username and password | Login unsuccessful | As expected |

**Figure 13**, **Figure 14**, **Figure 15,** and **Figure 16** depict the farm interface for managing information for pond, baby shrimp and staff task. Admin and user can add, update, view and delete items from the list. The data can also be searched and sorted based on the preferences of the admin and user. The test case for managing farms is shown in **Table 7.**

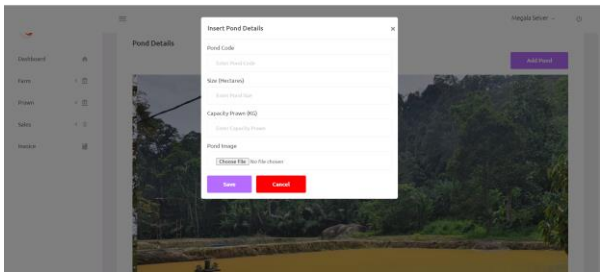

**Fig. 13** *Manage Pond Interface*

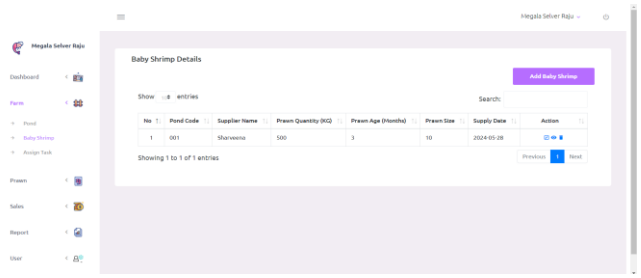

**Fig. 14** *Manage Baby Shrimp Interface*

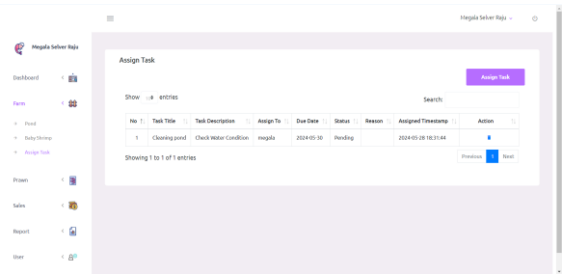

**Fig. 15** *Admin Assign Task Interface*

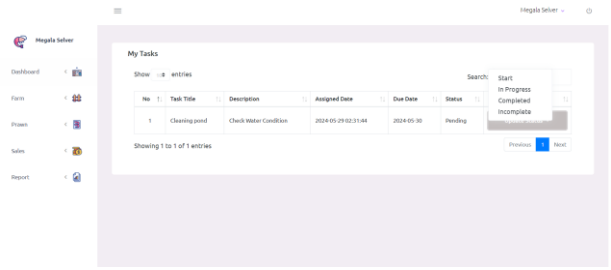

**Fig. 16** *Staff Task Interface*

**Table 7:** *Test Case for Farm Module*

| Test Case ID | Description | Expected Output | Actual Output |
|---|---|---|---|
| M2-1 | Admin and user visits farm page including pond, baby shrimp and staff task page. | Product list displayed | As expected |
| M2-2 | Administrator and user add product by filling in all field | New product added to list | As expected |
| M2-3 | Administrator and user add product but did not fill in all field | Error message shown | As expected |
| M2-4 | Administrator and user updates product details by changing value in table | Product information updated | As expected |
| M2-5 | Administrator and user delete product by clicking of icon | Product removed form list | As expected |

In **Figure 17** and **Figure 18** depicts the prawn interface to manage information for harvest and stock. Administrators and users can add, update, view and delete items from the list. The data can also be searched and sorted based on the preferences of the administrator and user. The test case for managing farms is shown in **Table 8**.

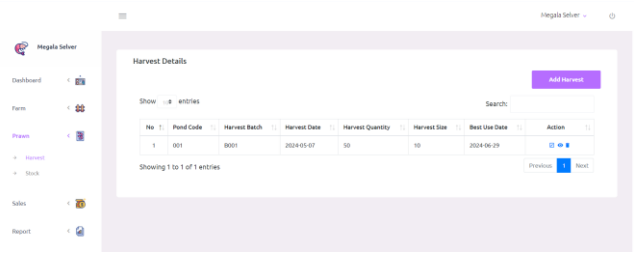


**Fig. 17** *Manage Harvest Interface*

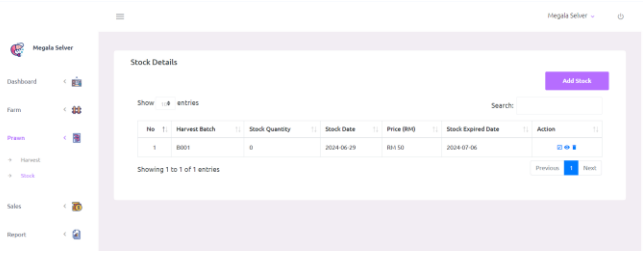


**Fig. 18** *Manage Stock Interface*

**Table 8:** *Test Case for Prawn Module*

| Test Case ID | Description | Expected Output | Actual Output |
|---|---|---|---|
| M3-1 | Administrator and user visits prawn page including harvest and stock page. | Harvest and stock list displayed | As expected |
| M3-2 | Administrator and user add harvest and stock details by filling in all field | New harvest and stock added to list | As expected |
| M3-3 | Administrator and user add harvest and stock details but did not fill in all field | Error message shown | As expected |
| M3-4 | Administrator and user updates harvest and stock details by changing value in table | Harvest and stock information updated | As expected |
| M3-5 | Administrator and user delete harvest and stock by clicking of icon | Harvest and stock details removed form list | As expected |

**Figure 19** and **Figure 20** depict the sales interface to manage information for suppliers and sales. Administrators and users can add, update, view and delete items from the list. The data can also be searched, view invoice and sort based on the preferences of the administrator and user. The test case for managing sales is shown in **Table 9.** For this module there are five test cases. The purpose of this test is to verify whether the user is allowed to create new data and whether the system allows the user edit, search, or delete the data.

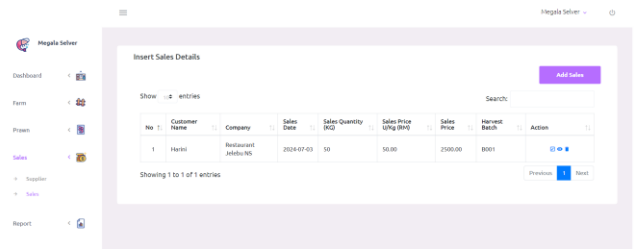


**Fig. 19** *Manage Sales Interface*

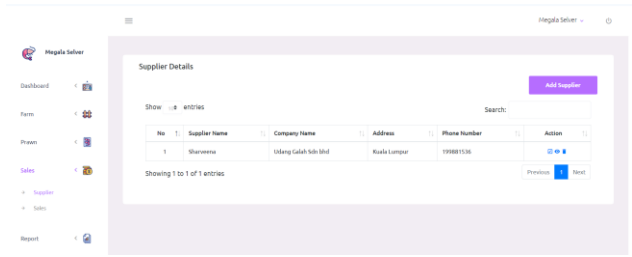


**Fig. 20** *Manage Supplier Interface*

**Table 9:** *Test Case for Sales Module*

| Test Case ID | Description | Expected Output | Actual Output |
|---|---|---|---|
| M4-1 | Administrator and user visits sales pages including supplier and sales page. | Supplier and sales list displayed | As expected |
| M4-2 | Administrator and user adds supplier and sales details by filling in all field | New supplier and sales added to list | As expected |
| M4-3 | Administrator and user adds supplier and sales details but did not fill in all field | Error message shown | As expected |
| M4-4 | Administrator and user updates supplier and sales details by changing value in table | Supplier and sales information updated | As expected |
| M4-5 | Administrator and user deletes supplier and sales by clicking of icon | Supplier and sales details removed from list | As expected |
| M4-6 | Administrator and user can view and print sales invoice. | Invoice will be printed | As expected |

**Figure 21** depicts the interface for monthly sales and prawn quantity. Administrator and staff can generate the report based on the date range. **Table 10** shows the test case for Report module. There is total 1 test case for this module. The purpose of this test is to verify whether the staff and administrator can generate monthly reports.

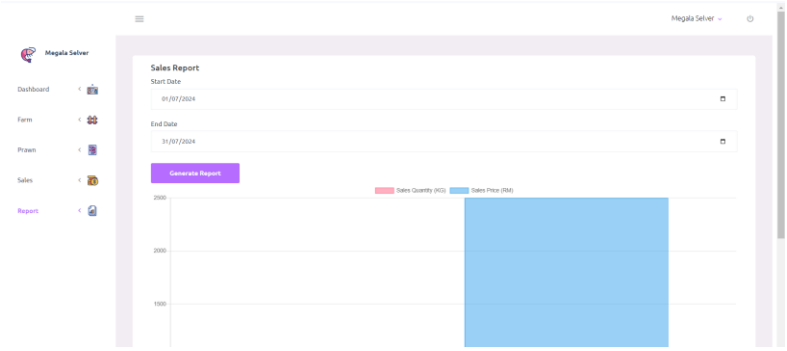


**Fig. 21** *Generate Report Interface*

**Table 10:** *Test Case for Generate Report*

| Test Case ID | Description | Expected Output | Actual Output |
|---|---|---|---|
| M5-1 | Administrator and user visits report page. | Bar Chart of earning and status is shown. | As expected |

## 5. Conclusion

Prawn farmers may increase productivity, optimize resource management, improve disease management, make data-driven decisions, adhere to regulations, and maintain their competitiveness in the market by implementing an information system. It makes operations more profitable and sustainable, which promotes prawn farming's long-term success. In a nutshell the freshwater prawn management system fulfilled all of the project's criteria in terms of scope, system, and user. The system offers an easy-to-use interface that makes handling different chores much more efficient and improves user experience. Its functions, which include automatic reporting, PDF invoice creation, and live chat for communication, simplify procedures and increase worker productivity. But it's critical to remove constraints like reliance on digital literacy and dependable internet access. The integration of sophisticated analytics, boosting offline capability, providing multilingual support, optimizing mobile compatibility, and growing CRM capabilities should be the main priorities for future growth. Through ongoing development and integration of user feedback, the system may firmly establish its position as an essential instrument for managing freshwater prawns.

## Acknowledgement

The authors would like to thank the Faculty of Computer Science and Information Technology, Universiti Tun Hussein Onn Malaysia for its support.

## Conflict of Interest

Authors declare that there is no conflict of interest regarding the publication of the paper.

## Author Contribution

This journal requires that all authors take public responsibility for the content of the work submitted for review. The contributions of all authors must be described in the following manner:

*The authors confirm contribution to the paper as follows:* ***study conception and design:*** *Megala Selver Raju Nureize Arbaiy;* ***data collection:*** *Megala Selver Raju, Nureize Arbaiy;* ***analysis and interpretation of results:*** *Megala Selver Raju, Nureize Arbaiy;* ***draft manuscript preparation:*** *Megala Selver Raju, Nureize Arbaiy. All authors reviewed the results and approved the final version of the manuscript.*

## References

[1] R. Banu and A. Christianus, "Giant freshwater prawn *Macrobrachium rosenbergii* farming: A review on its current status and prospective in Malaysia," *J. Aquacult. Res. Dev.*, vol. 7, no. 4, pp. 1–5, 2016.

[2] R. Abdullah *et al.*, "Evaluation of water and soil qualities for giant freshwater prawn farming site suitability by using the AHP and GIS approaches in Jelebu, Negeri Sembilan, Malaysia," *AIMS Geosci.*, vol. 7, no. 3, pp. 507–528, 2021.

[3] B. Haslawati, I. Saadiah, R. P. Siti-Dina, M. Othman, and M. T. Latif, "Environmental assessment of giant freshwater prawn, *Macrobrachium rosenbergii* farming through life cycle assessment," *Sustainability*, vol. 14, no. 22, p. 14776, 2022.

[4] M. B. New, *Farming Freshwater Prawns: A Manual for the Culture of the Giant River Prawn (Macrobrachium rosenbergii)*, FAO Fisheries Technical Paper No. 428. Rome: Food & Agriculture Organization, 2002.

[5] I. Sivaraman, M. Krishnan, and K. Radhakrishnan, "Better management practices for sustainable small-scale shrimp farming," *J. Clean. Prod.*, vol. 214, pp. 559–572, 2019.

[6] T. N. Phong, V. T. Thang, and N. T. Hoai, "What motivates farmers to accept good aquaculture practices in development policy? Results from choice experiment surveys with small-scale shrimp farmers in Vietnam," *Econ. Anal. Policy*, vol. 72, pp. 454–469, 2021.

[7] M. B. New, "Commercial freshwater prawn farming around the world," in *Freshwater Prawn Culture: The Farming of Macrobrachium rosenbergii*, pp. 290–325, 2000.

[8] C. M. Nair and K. R. Salin, "Current status and prospects of farming the giant river prawn *Macrobrachium rosenbergii* (De Man) and the monsoon river prawn *Macrobrachium malcolmsonii* (H.M. Edwards) in India," *Aquacult. Res.*, vol. 43, no. 7, pp. 999–1014, 2012.

[9] M. B. New and C. M. Nair, "Global scale of freshwater prawn farming," *Aquacult. Res.*, vol. 43, no. 7, pp. 960–969, 2012.

[10] J. Min, F. M. Cooke, and G. Saat, "Local entitlements and commercial shrimp farming in Sabah, Malaysia," in *Fisheries and Aquacultures Development in Sabah: Implications for Society, Culture and Ecology*, pp. 117, 2017.

[11] O. N. N. Fernando and G. N. Wikramanayake, "Web-based agriculture information system," B.Sc. thesis, Univ. of Colombo, Sri Lanka.

[12] F. M. J. M. Shamrat, M. Asaduzzaman, P. Ghosh, M. D. Sultan, and Z. Tasnim, "A web-based application for agriculture: 'Smart Farming System'," *Int. J. Emerg. Trends Eng. Res.*, vol. 8, no. 6, 2020.

[13] S. Alsaleh and H. Haron, "The most important functional and non-functional requirements of knowledge sharing system at public academic institutions: A case study," *Lect. Notes Softw. Eng.*, vol. 4, no. 2, pp. 157, 2016.