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Short Paper

Acceptability of the Layer Poultry Farm Management System

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Abstract

Purpose – The web-based application called the Layer Poultry Farm Management System is aimed at helping the farmers and even owners of a layer poultry farm to efficiently and effectively manage their resources and production including the inventories and finances.

Method – This study used Descriptive-Developmental design which showed the processes of developing, testing, and evaluating the Farm Management System. Descriptive research involves testing and uses logical methods to arrive at generalization.

Results – The Layer Poultry Farm Management System's functionality was rated 4.16 with the interpretation of Very Acceptable, reliability was rated 3.90 with the interpretation of Very Acceptable, system's usability was rated 4.43 with the interpretation of Very Acceptable, system's maintainability was rated 3.94 with the interpretation of Very Acceptable.

Conclusion – The system's finance management module has successfully tracked the sales and expenses of the layer poultry farm; the inventory management module has successfully monitored the eggs, culls, layers, brooders houses, etc; the reports management module has successfully displayed the finance and inventory data; and the settings module has successfully provided the admin the ability for system configurations.

Recommendations – To add SSL for better security of the system for web hosting. Also, to integrate the Internet of Things into the system.

Research Implications – This research seeks to promote innovations and the development of new features that can benefit farmers.

Practical Implications – This research proves that technology integration enhances work efficiency.

Social Implications – This research shows opportunities for skilled work in using technology. Also, about the potential reduction of manual labor.

Keywords – layer poultry farm, ISO 25010, functionality, reliability, usability, maintainability

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INTRODUCTION

The introduction of technology has paved the way for the simplification of tasks. Devices such as computers, smartphones, tablets, and others have been integrated into several processes leading to more efficient and more effective outcomes. A computer is an electronic device capable of processing and displaying information. One of the advantages is the storage of data and information. A computer has a higher capacity for more data, especially data that our brain might not retain leading to better results. Integrating the use of computers in business would mean efficiency. Different businesses use computers for storage, communications, data analysis, data analytics, and many more. It also benefited individuals in doing tasks faster with just a simple click. The integration of technology in businesses aims at automating processes leading to more effective and efficient outputs. Recent advances in remote sensing and geographic information systems have significantly increased the importance of agriculture research, particularly in the areas of soil suitability and yield prediction (Sabesh, 2007).

Layer Poultry Farming is an egg-production business wherein poultry birds are raised for their eggs. This egg-production business involves full-time labor which aims at producing sufficient scale for both eggs and poultry meat. Egg production for human consumption was one of the few profitable agricultural sectors (Kidd & Anderson, 2019). Poultry birds are special breeds of hens that can lay eggs from the age of 18 to 19 weeks. These hens are called Layers and they can lay eggs until 72 to 78 weeks. According to AgriFarming (2022), the hens need to be raised starting when they are a day old. Different breeds of poultry birds have different characteristics that's why choosing the right breed is cardinal. Some of the common breeds are White Egg Laying hens and Brown Egg Laying Eggs. The Philippines was not self-sufficient in terms of egg production. Most of the eggs had to be imported into China to fill the needs of local consumption.

The local farmers for both commercial and semi-commercial poultry farms in the old days had to depend on standard breeds which is the native chicken to be profitable (Elfano, 1945/2007). According to Jabbar et al. (2003), together with the swine industry, the poultry industry has long been considered at the cutting edge of livestock production growth in the Philippines. The key areas of expanding activity for these two agricultural sectors are regarded to be Central Luzon and Southern Tagalog.

LITERATURE REVIEW

Layer Poultry Farming

Layer Poultry farming has been considered by Cajethan, Ezebuiro, et al (2017) as one of the important agriculture businesses which can employ millions of Filipinos. A Filipino poultry website (2016) noted that Filipino layer poultry farming is still considered one of the best in Asia. It is also considered profitable if proper management is done by the farmer's owners. According to the Philippine Statistics Authority (2018), the production of chicken eggs in the first quarter of the year 2018 increased by 7.42 percent compared to the chicken eggs production in the same period of year 2017. Egg production from layer chicken comprised 84.03 percent of the estimated 130,549 metric tons of total chicken egg production, and the remaining percentage came from native chicken. Major players in terms of egg production is the CALABARZON (Cavite, Laguna, Batangas, Rizal, and Quezon) area with gross output of 39,332 metric tons, followed by the Central Luzon (Aurora, Bataan, Bulacan, Nueva Ecija, Pampanga, Tarlac and Zambales) with 27,533 metric tons, and the Central Visayas (Cebu, Bohol, Negros Oriental, and Siquijor) area with 12,988 metric tons. These three (3) regions accounted for 61.17 percent of the country's total egg production.

According to Dhang (2018), poultry farms like the layer poultry farms are considered traditional and are made of simple wooden structures that are elevated on stilts. The common height between the ground and the flooring is at 2 feet, which allows for the easy removal of the droppings or the waste of the poultry chicken. According to Wu et al.'s 2022 study. Poultry farms are typically tiny and mobile. The accuracy and effectiveness of information perception must be enhanced. They discovered a dearth of information processing technologies and apparatus designed to enhance the efficiency of reproduction. The authors proposed an information-sensing technology integrated into farms. In a study by Al-Nasser et al. (2020), the poultry industry development in the United States and Europe and the movement from small-scale farms to large-scale farms are accomplished due to the transfer of findings in research and technology. These were all made possible because of the Research and Development of several institutions and universities. Technology transfer may be in the form of patents, equipment, processes, and flow of information.

Web-based Applications

According to Alkahtani (1998), Computer Information Systems are now commonly used for doing business activities; these tools can produce information needed in decision-making management. In a study of Gray et al. (2009) it is mentioned that farm management is an ongoing cyclical process of planning, organizing, leading, controlling, and implementing. In here, planning decisions is less versus the implementation and control decisions. A poultry farming website (Poultry Manual, 2016) noted that layer poultry farm management needs skill, passion, knowledge, and experience to make the most out of poultry operation. Automation of poultry farms help to reduce labor cost and increase farm efficiency (Ugwuoke et al., 2017).

A Computer-Based Information System is a computer system and computer application that is used for supporting business activities. It shows that most firms are utilizing Computer-based Information Systems in Saudi Arabia and the United Kingdom but problems are reported in the Training. In a study by Kaloxylos et al. (2014), he stated that a paradigm transition from proprietary and monolithic tools to Internet-based, cloud-hosted, open solutions is now underway and allows for more efficient stakeholder engagement.

Moreover, in a study by Hu, et al (2004), he mentioned that the Web provides a new platform for storing, gathering, presenting, processing, sharing, and using information. Similarly, a web-based port system can be used by people involved in research, producers, farm owners, farmers, decision-makers, etc., for several activities including management.

Stefanova (2017) mentioned in a study that a computer system can deliver monitoring and collaborative capabilities to improve laying hens' health and welfare at industrial poultry farms. This online platform connects egg and breeding farms through cloud technologies which means that an internet connection is needed to provide continuous data monitoring. Cloud technology is being utilized with the help of servers.

In a study by Mico et al. (2016), they integrated sensors in a microcontroller to monitor the poultry farm's temperature, humidity, and soil moisture. The system was developed using PHP. Geographic Information Systems, or GIS play a major part in the dissemination of information for the benefit of farms such as poultry farms, given that information is the key component of achievement in all agricultural activities (Obiniyi & Ibrahim, 2015).

According to Zheng et al. (2021), designing a comprehensive and practical poultry farming information management system requires research on hardware design and networking of the underlying device, database design and communication-related issues, and upper client software design.

METHODOLOGY

This paper employed a combination of developmental and descriptive research. The developmental design is about designing, developing, testing, and evaluating the system. Similarly, the descriptive design centered on the users of the layer poultry management system, enabling the collection of valuable feedback and suggestions directly from these users.

The web-based application called the Layer Poultry Farm Management System was developed with the following features:

a. Finance management module which tracked the sales and expenses of the farm;
b. Inventory management module which monitored the eggs, culls, layers, and brooders' houses and also the layers strain, records vaccination and medication, people, machinery, feeds, and vendors;
c. Reports management module which displayed the finance and inventory data; and
d. Settings module which gave the admin the ability to for system configurations.

The Layer Poultry Farm Management System is a browser-based system for local breeders to help them manage their layer poultry farms. It is a web-based management system specifically designed for layer-poultry management. Users were the admin, sales user, and inventory user. It will be used by a small-time local layer poultry farm owner. The system was able to monitor the layer poultry farm revenue as well as its inventories e.g. chicks, medicines and vaccination, equipment, and feeds. It was able to monitor the cost and income of the operation and maintenance of the farm. It was able to keep track of the feeds, vaccinations, or medication as well as the equipment used in the layer poultry farm. It has also the ability to manage the brooder and layer house.

The system was able to record the layer strain which keeps track of the breeds of poultry, their specifications, and their suppliers (e.g. growing period, average weight, and other important information. The system was able to produce reports and offered a comprehensive dashboard to the owner or administrator to have an overview of the overall status of the farm. It also provided important reminders and notifications that need immediate action. This system will not address the waste of the farm.

The Layer Poultry Farm Management System was evaluated using the ISO/IEC 25010 System/Software Quality Model. There are three roles available in the system: Administrator user, Inventory staff user, and Finance staff user. Figure 1 shows the input data from the users: admin, inventory staff, and finance staff. Data from the admin are admin credentials, system settings, and user registration details. Inventory data from inventory staff. Sales and Expenses data from Finance staff.

A five-point scale was used to evaluate the system. Each criterion was rated with a 1-5 rating scale, where 5 is Highly Acceptable and 1 is Not Acceptable. The data gathered

and computed determined the Mean and Overall Mean. Thirty (30) respondents were required to evaluate the system. Questionnaires were used for the evaluation process. The criteria or indicators in the evaluation instruments used were functionality, reliability, usability, and maintainability.

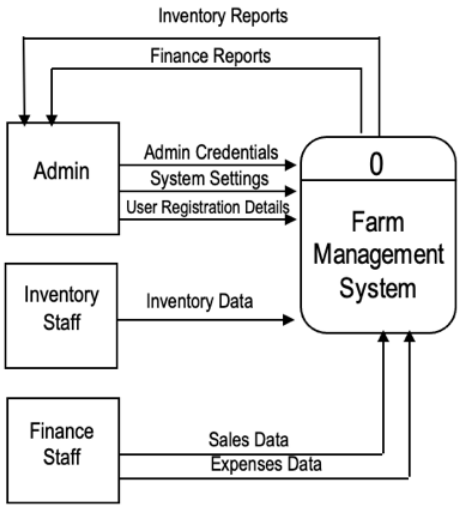

Figure 1. Context Flow Diagram of the Layer Poultry Management System.

RESULTS

The Layer Poultry Farm Management System was able to help the staff of Marlon's Poultry Farm in managing the inventories and finances. Through a computer that is connected to the internet, users can navigate the system. A user interacts with the system using different devices such as laptops and mobile devices through their web browsers which gives the user access to information. The web-based system is hosted and can be accessed via the Internet. With this kind of setup, the user can have immediate access to the farm's status as long as there is an internet connection.

When a user logs in to the system using the correct credentials, he is prompted to the main screen of the system that contains the following modules Inventory, Finances, Reports, and the Users Settings. Figure 2 shows the screenshots of the system using a smartphone's web browser. In the above figure, it shows the login page of the Farm Management System. Valid credentials are needed to login to the system.

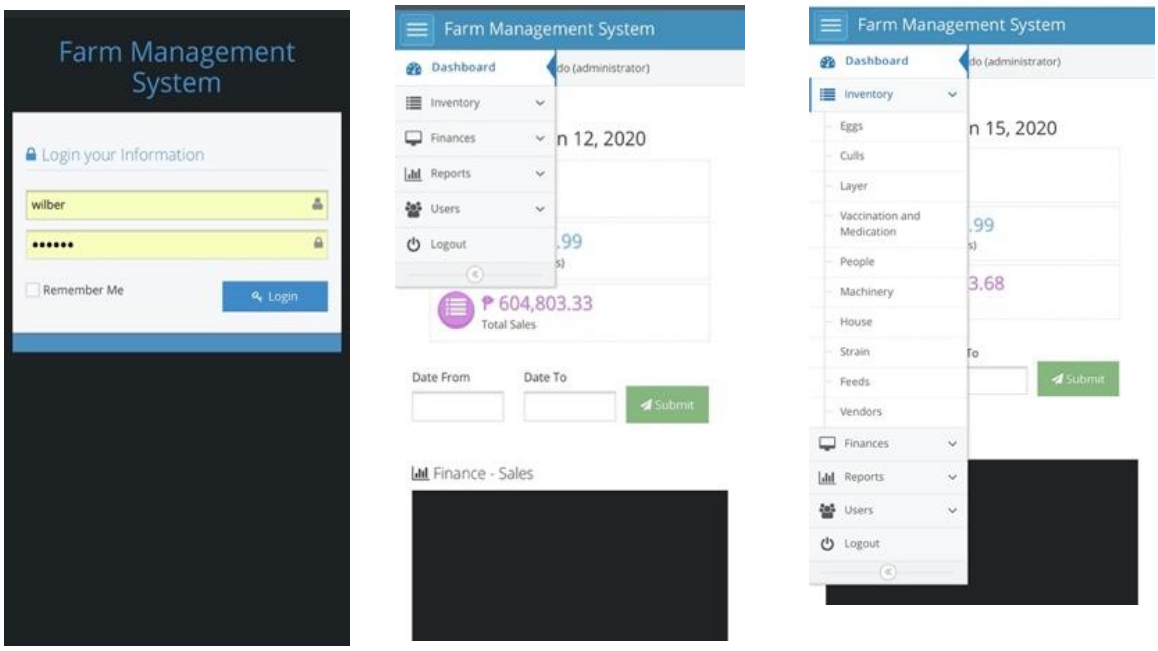

Figure 2. Context Flow Diagram of the Layer Poultry Management System

Table 1 shows that the Layer Poultry Farm Management System was evaluated by 30 respondents and their field of specialization was indicated. 16 respondents have IT-related work or studies and 14 respondents have non-IT-related work. The criteria or indicators in the evaluation instrument are functionality, reliability, usability, and maintainability. The data results of the system were gathered and interpreted using the Mean Range Formula for acceptability. The acceptability of the system was based on ISO standards.

Table 1. Specialization of the respondents

Respondents	**Frequency**	**Percentage**
Non-IT	14	46.67%
IT	16	53.33%
Total	30	100%

Table 2 shows the test cases conducted during the testing procedures. There were four (4) test cases namely: check customer log-in using valid data, check customer log-in using invalid data, verify the accuracy of data in inventory, and verify the accuracy of data in Finances. All these test cases passed.

Table 2. Test cases of the Layer Poultry Farm Management System.

Check customer Login using valid data	Passed
Check customer log-in using invalid data	Passed
Verify the accuracy of data in the inventory	Passed
Verify the accuracy of data in Finances	Passed

Table 3 shows that the Farm Management System was evaluated in terms of several indicators by ISO/IEC 25010. This is an improved version of ISO 9126 just with added requirements for compatibility and security.

Table 3. Weighted Mean and Interpretation.

Indicators	Weighted Mean	Interpretation
A. FUNCTIONALITY	4.16	Very Acceptable
Functional Completeness	4.33	Very Acceptable
Functional Correctness	4.13	Very Acceptable
Functional Appropriateness	4.03	Very Acceptable
B. RELIABILITY	3.90	Very Acceptable
Availability	3.60	Very Acceptable
Fault Tolerance	4.03	Very Acceptable
Recoverability	4.07	Very Acceptable
C. USABILITY	4.43	Very Acceptable
Appropriateness	4.53	Highly Acceptable
Learnability	4.70	Highly Acceptable
Operability	4.40	Very Acceptable
User Interface Aesthetics	4.07	Very Acceptable
D. MAINTAINABILITY	3.94	Very Acceptable
Modularity	3.97	Very Acceptable
Modifiability	3.97	Very Acceptable
Testability	3.87	Very Acceptable

DISCUSSION

The Layer Poultry Farm Management System used a five-point scale for its evaluation. Each criterion was scored from 1-5, with 5 representing Strongly Agree and 1 representing Strongly Disagree. The information gathered was calculated to provide the Mean and Overall Mean, which were then utilized to evaluate the findings for the system's overall technical viability.

The Layer Poultry Farm Management System was evaluated by 30 respondents composed of 16 respondents with IT-related work or studies and 14 respondents with non-IT-related work.

The criteria or indicators in the evaluation instrument are functionality, reliability, usability, and maintainability. The following requirements were assessed in this system namely: functionality, reliability, usability, and maintainability. The system's functionality was rated 4.16 with the interpretation of "Very Acceptable". The system's reliability was rated 3.90 with the interpretation of "Very Acceptable". The system's usability was rated 4.43 with the interpretation of "Very Acceptable". The system's maintainability was rated 3.94 with the interpretation of "Very Acceptable".

Inventory Management

The user was able to manage the inventory of the farm; the user was able to add or edit several eggs. Eggs are classified as small eggs, medium eggs, large eggs, extra-large eggs, and jumbo eggs; the user was able to add or delete number of culls; the user was able to add or edit layers; the user was able to add or edit vaccination and medication; the user was able to add or edit people; the user was able to add or edit machinery; the user was able to add or edit house; the user was able to add or edit strain; the user was able to add or edit feeds; the was able to can add or edit vendors.

Finance Management

The user was able to manage the finances of the farm; the user was able to add new sales for eggs; the user was able to add new sales for culls; the user was able to add or edit expenses.

Reports Management

The user was able to generate reports for finances and export them in Excel; the user was able to generate reports for finances and export them in pdf; the user was able to generate reports for inventory and export them in Excel; the user was able to generate reports for inventory and export it in pdf; and

Settings Management

The user was able to add another user as long as he was an administrator.

CONCLUSIONS AND RECOMMENDATIONS

A web-based application called the Layer Poultry Farm Management System was developed. It aimed at helping local breeders of a layer poultry farm to manage their production including the inventory and finances efficiently and effectively. The following features have been integrated successfully into the farm management system.

a. The finance management module has successfully tracked the sales and expenses of the farm;
b. The inventory management module has successfully monitored the eggs, culls, layers, and brooders' houses and also the layers strain, records vaccination and medication, people, machinery, feeds, and vendors;
c. The reports management module has successfully displayed the finance and inventory data; and
d. The settings module has successfully provided the admin the ability to for system configurations.

Moreover, the system was successfully tested to be useful in terms of functionality, reliability, usability, and maintainability using ISO 25010. The respondents perceived the Farm Management System to be Very Acceptable.

Based on the conclusion derived from this paper, the following recommendations are endorsed:

1. To add SSL for better security;
2. To change the domain name to a much simpler and easy-to-remember name; and
3. To integrate the Internet of Things into the system.

To sum up, the overall weighted mean is 4.11. The respondents perceived the Layer Poultry Farm Management System as "Very Acceptable" in terms of functionality, reliability, usability, and maintainability.

IMPLICATIONS

The study on the Acceptability of the Layer Poultry Farm Management System will help the farmers in streamlining the processes within the layer poultry farm leading to improved efficiency and increased productivity.

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This study received no funding.

DECLARATIONS

Conflict of Interest

The researcher declares no conflict of interest in this study.

Informed Consent

I have read and understand the provided guidelines in this journal publication. I am fully knowledgeable about this publication including all its rules and regulations.

Ethics Approval

I declare adherence to the accepted ethical standards.

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