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# WEB-PORTAL POULTRY FARMING SYSTEM WITH REAL-TIME DESCRIPTIVE ANALYTICS

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**Abstract:** This study developed a Web-Portal Poultry Farming System with Real-Time Descriptive Analytics to address the ongoing challenges faced by poultry farmers in managing production data, forecasting productivity, and maintaining accurate long-term records. The research focused on Peñalosa Farm located in Barangay 13, Victorias City, Negros Occidental, with the owner, supervisor, and workers serving as the primary respondents. The system was created using the Agile Development Model, enabling continuous refinement of features such as egg production monitoring, hens' management tracking, sales and expense recording, and real-time data visualization. The findings of the study showed that the developed system successfully centralized daily farm operations, ensured accurate data entry, and provided real-time analytics that supported timely decision-making. The descriptive analytics tools allowed users to observe trends in poultry performance, identify fluctuations in productivity, and monitor financial activities more efficiently. Forecasting features offered predictive insights based on historical patterns, enabling the farm to plan resources, anticipate production outcomes, and reduce operational losses. Evaluation results based on ISO/IEC 25010:2023 Software Quality Standards revealed that the system achieved high ratings in functionality, usability, reliability, and performance. Respondents strongly agreed that the system significantly improved the efficiency of farm processes, minimized human error, and enhanced the accessibility of production data. Overall, the study concludes that the Web-Portal Poultry Farming System is an effective digital solution that promotes a more organized, data-driven, and sustainable poultry farming operation. Future researchers are encouraged to enhance the system through mobile integration, automated sensor data collection, and advanced predictive modeling.

**Keywords:** Poultry Farming System, Descriptive Analytics, Web Portal, Productivity Forecasting, Real-Time Monitoring

## I. INTRODUCTION

The poultry farming system integrates a digital solution for monitoring and decision-making. This system provides a centralized web-based platform that enables farmers to track and monitor production rate, forecast productivity, visualize production data in real time and store long-term records for analysis.

Global demand for poultry is rising, but climate change requires better management systems to maintain productivity. Using modern automation in sustainable and equitable food production is essential to strengthen food security and achieve the United Nations Sustainable Development Goals. (UNSDGs)(Chigwada, et al., 2022). The Average + Growth method combines the Average method with a specified growth rate. Here, you can choose between a fixed growth rate, which remains constant throughout the forecast period, or a varying growth rate, which changes according to the changes in the forecasted data. (Baremetrics, 2023)

The chicken or poultry farms increase their production as the population in the Philippines demands more supply of food resources. The livestock production is a billion-peso industry where many Filipinos are depending on. The researchers pursued this delving to address the need in providing an updated technology, to help poultry farmers (Batuto, et al.,2020). Poultry farmers in developing countries are relying on manual poultry management methods which are labor-intensive (Chigwada, et al., 2022).

These technological advancements aim to enhance poultry farm efficiency, particularly for small-scale operations in countries like the Philippines, by saving time and effort while improving overall farm management (Batuto et al., 2020). With good farm management practices, healthy poultry products are produced with the goal of satisfying the consumers as well as business profit. (Naik, et al.,2022).

Web-based portals enable remote monitoring and control of farm conditions, allowing farmers to adjust environmental factors and automate management processes (Naik et al., 2022; Chigwada et al., 2022). These systems offer benefits such as reduced labor costs, improved productivity, and enhanced food security. (Chigwada et al., 2022).

A gap exists in the poultry industry that relies on accurate data recording and trend analysis for efficient management. Many farms still use manual data entry, leading to human errors, inaccurate records, and poor decision-making. This study aims to develop a web-portal that will track and monitor the production rate, forecast productivity, have real-time data visualization of production, and a repository for long-term records for analysis. By integrating these features, the systems can be tailored to address the specific challenges of poultry farmers, and poultry farms can enhance efficiency, improve production forecasting, and make more informed management decisions.

## II. MATERIALS AND METHODS

### Research Design

The descriptive developmental technique, which is the methodical study of designing, creating, and carefully evaluating programs, procedures, and products that must meet standards or criteria, was employed by the researchers. This approach was used in the development of the Web-Portal Poultry Farming System with Real-time Descriptive Analytics to ensure that the system meets user requirements and quality standards.

### Sample Size

**Table 1.0** Sample Size

Participant	Population
Owner	1
Supervisor	1
Worker	10
<b>Total Size</b>	<b>12</b>

Table 1.0 presents the breakdown of the total population size of the Peñalosa farm, which comprises twelve (12) individuals. The researchers gathered a population size of 12. By counting how many people manage the Peñalosa Farm.

**Sampling Technique.** The researchers employed a purposive sampling technique to select participants who were directly involved in the management and operation of the poultry farm. This non-probability sampling method was appropriate given the specific criteria required of the respondents, namely their knowledge of poultry farming practices and their active involvement in using the system developed in this study. The sample consisted of the poultry farm owner, supervisors, and workers from Peñalosa Farm, located in Barangay 13, Victorias City, Negros Occidental. The owner was included through total enumeration, as there was only one individual occupying this role. One supervisor and ten workers were chosen purposively based on their day-to-day interaction with poultry operations and their familiarity with basic technology use. By deliberately selecting participants who could provide meaningful and relevant data, the researchers ensured that the findings would be grounded in informed perspectives, aligned with the objectives of evaluating a web-based poultry farm management system.

**Respondents of the Study.** The participants of the study were the owner, supervisor, and worker of the Peñalosa Farm residing in Barangay 13, Victorias City, Negros Occidental, who knew how to manage a poultry farm. Specifically, the study focused on the poultry farmers who have a personal computer and are knowledgeable about using the system.

**Research Instrument.** In this study, the researchers utilized a combination of researcher-made and standardized survey questionnaires. The data collection process involved conducting on-site interviews and administering questionnaires to each participant, specifically targeting the owners, supervisors and workers of Peñalosa Farm residing in Barangay 13, Victorias City, Negros Occidental. To assess the quality of the researchers' system, an evaluation instrument based on the criteria outlined in the ISO/IEC 25010:2023 Software Quality Model was employed. The evaluation focused on key usability attributes of the system and quality in use through end-user's assessment in terms of effectiveness, efficiency, satisfaction, freedom from risk, and context coverage.

**Reliability and Validity of Research Instrument.** Pilot Test was selected as the individuals representing the owner, supervisor, and worker roles to identify potential confusing parts and assess the clarity of the questionnaire. Based on feedback from the pilot test, necessary adjustments were made to improve the instrument's structure and wording. For reliability, the internal consistency of the instrument was assessed using cronbach's alpha coefficient.

**Content validity** was selected through the review of the instrument by domain experts in software quality and poultry farming, ensuring that all key areas such as system usability, effectiveness, and satisfaction were comprehensively covered.

**Face validity** was confirmed by having farm staff and academic peers assess whether the questionnaire appeared appropriate and understandable.

**Construct validity** was ensured by aligning the questionnaire items with the ISO/IEC 25010:2023 Software Quality Model, focusing on criteria such as usability, functionality, and learnability. These steps provided strong assurance that the research instrument was both valid and reliable for assessing the developed poultry farm management system.

**Data Gathering Procedure.** For the purpose of the proposed study, the proponents used a variety of data collection technologies to help acquire pertinent data. These are the tools for gathering data:

**Interview.** The researchers conducted interviews with the owner, supervisor and worker in Peñalosa farm located in Barangay 13, Victorias city.

**Internet Research.** The researchers gathered additional information through the internet pertaining to the study.

**Survey Questionnaire.** The researchers provided a survey to the users of the application for them to give feedback, comments, and suggestions aimed at enhancing the system by adding new features or removing unnecessary elements from the system to improve its functionality and user experience.

**Data Analysis Procedure.** A data analysis procedure is a systematic process that is used to analyze and interpret data. The procedure typically involves several steps, which include:

**Data Collection.** The first step in any data analysis procedure is to collect the relevant data. This may involve gathering data from a variety of sources, such as interviews, internet research and survey questionnaires.

**Data Cleaning.** Once the data has been collected, it may need to be cleaned and organized to ensure that it is accurate and complete. This may involve removing duplicates, correcting errors, or filling in missing data.

**Data Exploration.** The next step is to explore the data to identify any patterns, trends, or relationships that may exist. This may involve creating visualizations, such as graphs or charts, or performing statistical analyses.

**Data Analysis.** Once the data has been explored, the next step is to perform a more detailed analysis. This may involve using statistical methods to test hypotheses, identify correlations, or make predictions.

**Interpretation.** The final step in the data analysis procedure is to interpret the results of the analysis. This may involve drawing conclusions, making recommendations, or presenting the findings in a report or presentation.

It is significant to remember that the specific data analysis method chosen will rely on the kind of data being examined as well as the study's goal or research topic. Different research issues may call for different sorts of analyses depending on the type of data being analyzed. To guarantee that the results are credible and valid, it is also crucial to make sure that the data analysis technique is carried out in a systematic and thorough manner.

The descriptive developmental technique, which is the methodical study of designing, creating, and carefully evaluating programs, procedures, and products that must meet standards or criteria, was employed by the researcher.

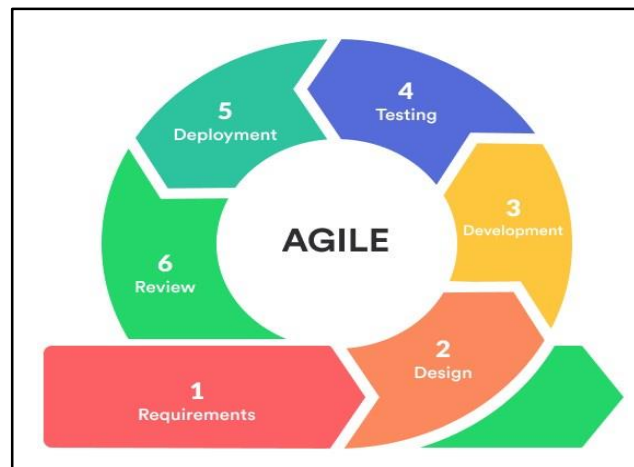


Figure 8 . Software Development Life Cycle

Figure 8.0 shows the methodology utilized in the development of the proposed system. The researchers applied the Agile Approach Model process in the System Development Life Cycle. This model is known for its flexibility, making it suitable for handling changes during the development process. The methodology involves dividing the project into prioritized requirements and completing them step by step in a repeating cycle.

**Requirements.** In this phase, the requirements for the application were gathered and analyzed. This included identifying the user requirements, and data requirements for the system. For the web-portal poultry farming system with real-time descriptive analytics, this involved identifying the specific features and functions needed for the tracking and monitoring production rate, forecasting productivity.

**Design.** In this phase, the system architecture was designed, and detailed specifications were developed. For the web-portal poultry farming system with real-time descriptive analytics, this involved designing the user interface, the data model to capture relevant poultry production metrics, and the workflow for key functionalities

such as tracking production rates and forecasting productivity. The researchers developed a blueprint for the basis of development.

**Development.** This phase involved the actual development of the software. For Web-Portal Poultry Farming System with Real-Time Descriptive Analytics, this included programming the system, configuring the database, and integrating forecasting productivity.

**Testing.** In this phase, the application was tested to ensure that it meets the requirements and specifications. For the web-portal poultry farming system with real-time descriptive analytics, this included testing the forecasting productivity, descriptive analytics charts, and the flow of reports to ensure they work correctly.

**Deployment.** This phase involved making the software increment available to users, which may vary depending on the project requirements, configuring, integrating, and deploying the software application in a production environment.

**Review.** This phase included evaluating the delivered increment and gathering feedback from users. The feedback is for identifying areas of improvement, addressing any issues or concerns, and refining the product backlog for future iterations. The result of the evaluation is used to improve the processes of the application.

**Data Gathering Procedures.** Semi-structured interviews and thematic analysis were used by the researcher to collect and analyze data. The researcher allowed target users, such as owner, supervisor, and workers, to use the system. Evaluation forms were provided to gather feedback regarding the system’s functionality and usability.

The following standard questionnaires were used:

- USE Questionnaire (Usefulness, Satisfaction, and Ease of Use) — administered to end-users
- ISO/IEC 25010:2011 Software Quality Model — administered to IT experts

A total of 3 IT experts evaluated the system using the ISO/IEC 25010 Software Quality Model questionnaires. The respondents consisted of owner, supervisor and worker in a poultry farm who evaluated the system using the USE Questionnaire.

The users and IT experts tested the Web-Portal Poultry Farming System with Real-time Descriptive Analytics. The system achieved 100% functionality during testing and was observed to be running smoothly without errors, ensuring consistency and reliability of its features.

### III. RESULTS AND DISCUSSION

After thorough evaluation of the experts and respondents, the following are discovered:

Table 1. *Level of User Acceptability in terms of Web-Portal Poultry Farming System with Real-time Descriptive Analytics*

Criteria Per Category	Mean	Interpretation
<b>System Capability and functionality</b>		
Ensure data accuracy and consistency across all dashboards.	5	Strongly Agree
Allow secure login for different user roles.	5	Strongly Agree
Input farm data (Egg production, Hens Management, Sales and Expenses).	5	Strongly Agree
Display reports (long-term records) for analysis.	4.67	Strongly Agree
Display real-time data analytics of farm performance.	4.67	Strongly Agree
Display Forecast (Owner and Supervisor)	5	Strongly Agree
<b>TOTAL</b>	<b>4.89</b>	<b>Strongly Agree</b>

Table 1 shows the evaluation of System Capability and Functionality (Functional Suitability) resulted in a high Total Mean score of 4.89, interpreted as Strongly Agree by the IT experts. This confirms the system is functionally complete, correct, and appropriate, validating that all core objectives—tracking production data, real-time visualization, and securely storing records—have been successfully implemented.

Table 2. *Level of User Acceptability in terms of determining the quality of the developed system based on ISO/IEC 25010:2011 Systems and Software Quality Requirements and Evaluation (SQuaRE) Quality Model*

<b>Characteristic</b>	<b>Mean</b>	<b>Interpretation</b>
Functional Suitability	4.78	Strongly Agree
Performance Efficiency	4.89	Strongly Agree
Compatibility	4.84	Strongly Agree
Usability	4.56	Strongly Agree
Reliability	4.89	Strongly Agree
Security	4.74	Strongly Agree
Maintainability	5	Strongly Agree
Portability	4.67	Strongly Agree
<b>Grand Mean</b>	<b>4.80</b>	<b>Strongly Agree</b>

Table 2 shows the overall result of the assessment evaluated by the three IT experts and it was tested that the quality of the developed system based on ISO/IEC 25010:2023 Software Quality Model and Quality, the Web-Portal Poultry Farming System achieved a Grand Total Mean Score of 4.80, interpreted as Strongly Agree. This score confirms the system is of high technical quality. Key strengths include Functional Suitability, Performance Efficiency, and Maintainability, ensuring the system meets its core objectives, is easy for farm personnel to operate, and is flexible for long-term updates.

Table 3. *Level of user acceptability in terms of the usability of the developed system in terms of usefulness, satisfaction, ease of use, and learning.*

<b>Criteria</b>	<b>Mean</b>	<b>Interpretation</b>
Effectiveness	5.00	Strongly Agree
Efficiency	5.00	Strongly Agree
<b>Satisfaction</b>		
Usefulness	4.67	Strongly Agree
Trust	4.33	Strongly Agree
Pleasure	4.67	Strongly Agree
Comfort	4.67	Strongly Agree
<b>Freedom from Risk</b>		
	4.67	Strongly Agree
Economic risk mitigation	4.67	Strongly Agree
Health and safety risk mitigation	4.67	Strongly Agree
Environmental risk mitigation	4.67	Strongly Agree
<b>Context coverage</b>		
	5	Strongly Agree
Context completeness	4.67	Strongly Agree
Flexibility	4.67	Strongly Agree
<b>Grand Mean</b>	<b>4.73</b>	<b>Strongly Agree</b>

Table 3 shows the total result of the assessment evaluated by the three IT experts based on the level of User Acceptability in terms of usability of the developed system in terms of usefulness, satisfaction, ease of use, and learning resulting in a total of 4.73, interpreted as Strongly Agree.

#### **IV. SUMMARY OF FINDINGS**

Based on the detailed presentation, discussion, interpretation, and analysis of research findings, the following summary is hereby presented:

1. In terms of the system's capability to track and monitor poultry farm data, the system obtained a mean rating of 4.89, indicating that it is highly functional, accurate, and consistent in managing egg production, hens' management, sales, and expenses.
2. In terms of displaying long-term records and real-time descriptive analytics, the system was rated 4.67, indicating that it effectively presents historical and real-time poultry data needed by users for monitoring and decision-making.
3. In terms of the system's forecasting feature, the system obtained a rating of 5.0, showing that users found the forecasting productivity tool highly effective and reliable in predicting future egg production based on previous data trends.
4. In terms of the usability, accessibility, and security of the system, the evaluation resulted in a rating of 5.0, indicating that the system is easy to use, secure, and appropriate for the roles of owner, supervisor, and workers.
5. The recommended features for end users of the system were tested by three IT Experts using the ISO/IEC 9126-1:25021 Software Quality Model Instrument. The result demonstrated that the developed system met the required quality standards and is necessary to enhance the performance of related processes.

#### **V. CONCLUSIONS**

The result of the alpha and beta testing activities and evaluation positively proved. Therefore, the researcher concludes that:

1. The Web-Portal Poultry Farming System successfully delivered a centralized web-based platform, achieving its primary objective by providing the tools necessary for modern, data-driven farm management.
2. The comprehensive evaluation by IT experts confirms that the developed system is of high product quality, consistently rated as Very Satisfied across all assessed criteria of the ISO/IEC 25010:2023 model, including Functional Suitability, Compatibility, Usability, and Performance Efficiency.
3. The exceptionally positive rating from the end-users (total mean of 4.79, Strongly Agree) establishes that the system is a valuable and necessary tool for farm operations. By utilizing descriptive analytics, the system empowers farmers to make well-informed judgments, leading directly to decreased operational expenses, minimized losses, and increased productivity.
4. The study concludes that the developed system provides a viable and valuable transition from manual, labour-intensive methods to a modernized, data-driven approach, significantly enhancing the overall efficiency of poultry farm management.

#### **VI. RECOMMENDATIONS**

1. It is highly recommended that a Web-Portal Poultry Farming System with Real-Time Descriptive Analytics should have a print feature that automatically adds a timestamp to all generated reports, so that the users can print the reports for record conflicts.
2. It is recommended that the production report be implemented in a vertical orientation. A vertical layout improves readability, and allows for easier comparison of data.
3. It is recommended that when inputting an egg production report, all egg sizes should already be displayed in the panel layout so that workers do not have to go through a selection process. This reduces hassle, saves time, and makes the reporting workflow more efficient.
4. It is recommended that in the request edit, only the specific items that the worker changed should be sent to the administrator or supervisor. If the worker updated the quantities to Super Jumbo 10 and Jumbo 5, then only these two updated values should appear in the request not all the other data.
5. It is recommended that the forecast should clearly show the details. If the system predicts a total of 300 eggs, it should also display the distribution across the different egg sizes. This means the overall forecast of 300 eggs must be broken down by each egg size category.
6. It is recommended that the sales module use a dynamic table where, once the supervisor or administrator selects a specific date, the system automatically displays all sales details for that particular day.
7. Future researchers are encouraged to utilize this study as a benchmark to further enhance and optimize similar systems and processes.

#### **CONFLICTS OF INTEREST**

The authors declare that for this article they have no actual, potential or perceived conflict of interests. Financial disclosure: The research work is funded by the researchers.

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