

A Web-Based Inventory Management System for The Properties and Supplies Office

Jesalva, Julie Mae D.1., Mesia, Aaron Elis M.2., Pangan, Kyle Mikaella W.3., Trillana, Gavin S.4., Avila, Rozel B.5, Dayao, Edna F.6, Espino, Joseph D.7,

La Consolacion University Philippines

juliemae.jesalva@email.lcup.edu.ph, aaronellis.mesia@email.lcup.edu.ph, kylemikaella.pangan@email.lcup.edu.ph,
gavin.trillana@email.lcup.edu.ph, rozel.avila@email.lcup.edu.ph, edna.dayao@email.lcup.edu.ph,
joseph.espino@email.lcup.edu.ph

Abstract: An inventory system is integral to operations in corporations and universities, aiding custodians in efficient inventory management. The BSIT students have developed a web-based inventory system designed to streamline the organization and sorting of inventories. This system features capabilities such as generating QR codes for individual items, allowing users to easily identify and track inventory through scanning. Previously, the university relied on manual inventory processes, involving handwritten records prone to loss or damage. The new system significantly enhances accuracy and security, representing a substantial improvement over the traditional methods.

Keywords — Inventory, La Consolacion, Data, System, QR Code, CITE, Inventorying, Laboratories, Scanning, Advantage, Records, Manage, Web-based, Organize, Inventories

1. INTRODUCTION

Effective Inventory Management is a vital aspect that can mean the difference between success and difficulty for businesses of all sizes and industries in today's quickly changing business environment. Traditional inventory management techniques have been shown to be insufficient for handling the increasing complexity and requirements of contemporary supply chains. Shayatani Kar, Shresth Bhimrajaka, Aditaya Kumar and Subhamita Mukherjee (2022), recognized the need for innovation in this area and set out on a research trip to provide a paradigm-shifting solution: "The Web-based Inventory Management System with QR Code"

Previously, the records of each Inventory are physical copies that can be easily misplaced due to how many are needed to manage each single object and utilities used in the school. A digitalized Inventory which serves more unique and practical purposes. With a simple use of QR codes, Inventories can be easily managed, monitored, and be listed by just a click. This benefits all the staff facilitating and managing the Inventory as they now can have every single file organized to their specifications at the palm of their hands, just by scanning and clicking.

With that a lot of manually written works will now can be instead created using a computer, or be more digitized than before. Now, what does this say about properly managing the Inventory?

With the current struggle of managing the inventory of La Consolacion University of the Philippines physically as it requires a lot of time and energy to be fulfilled and done manually, to alter the hard experience that the stuffs

are experiencing, the researchers were given the idea to create a system involving scanning of QR codes and will begin implementing it on the CITE Department Laboratories. This ensures that the job of the Inventory Managers will be less stressful and more manageable than being done manually throughout the entire school.

1.1. Objective of the Study

The main objective of this project was to enhance inventory management using QR codes. By employing QR code scanning, the university's inventory process became more efficient, enabling quicker storage and encoding of equipment, and eliminating the need for time-consuming manual tasks such as listing, writing, and counting each item individually.

Another aim of this study was to keep track of materials like laboratory utilities, technology devices, and other resources used by students. The system allowed for the input of different types of equipment and maintained a separate inventory specifically for tracking the quantities of each item. It monitored the quantity of each unique material within the university. Additionally, the system addressed potential shortages by scanning each item, updating the inventory, and displaying the current quantity of every material recorded in the system.

1.2. Scope and Limitations

The scope of this project was to develop an Inventory Management System specifically designed for La Consolacion University of the Philippines. The system managed and tracked the department's inventory of equipment, furniture, accessories, and other assets. The main objective was to implement a QR code-based system to

enhance the efficiency and accuracy of inventory management processes. This project focused solely on managing the university's properties, which included equipment, furniture, and other pertinent assets, excluding consumables like office supplies, perishable commodities, or personal items. The project emphasized using QR codes to identify and track properties within the inventory management system. For efficient data capture and retrieval, the system utilized QR code scanning technology, excluding other identification methods such as barcodes or RFID.

The system focused on core functionalities, including property registration with unique QR codes for each item, capturing relevant information like item description, real-time inventory tracking, and generating reports and analytics. The project integrated with the university's existing information technology environment without modifying the infrastructure, defined user roles and permissions, and implemented security measures.

2. METHODOLOGY

This section discusses the methodologies and techniques used in this study, aimed at the effective development of the proposed project. Additionally, it outlines the functionalities and target users of the Inventory Management System, along with the processes involved.

2.1. Research Instrument

Following the development of the Inventory System for the Property Custodian, the effectiveness of the system was determined by three competent persons in the field of Information Technology. The examiners included one developer, one IT professor, four personnel, and one end user. The system was evaluated for adherence to ISO 25010 standards, focusing on the following quality attributes: functionality suitability, performance efficiency, compatibility, usability, portability, maintainability, security, and reliability.

2.2. Waterfall Model Development Methodology

This study used descriptive methods to ensure the system's performance. By involving respondents in the system's use, researchers gathered feedback to improve its performance through interviews and Google Form surveys. This critique helped researchers enhance their understanding and make necessary revisions, ensuring smooth operation of the inventory system.

The study was conducted in a controlled environment at La Consolacion University of the Philippines, maintaining consistent conditions throughout. Employing a qualitative approach, the researchers focused on evaluating the system's performance. Participants, who were system users, actively

engaged in structured interviews and completed Google Form surveys, providing invaluable feedback and insights.

Research materials included the Google Forms survey platform for data collection, development of interview protocols for structured interviews, and identification of materials for system improvement based on feedback received. Assumptions were made regarding the accuracy of user feedback in reflecting both the strengths and weaknesses of the system. The rationale for this methodology was to leverage user perspectives to continuously enhance the system's performance. For data analysis, researchers utilized qualitative techniques such as thematic analysis to thoroughly examine the feedback.

3. PRESENTATIONS. DISCUSSION, AND INTERPRETATION OF DATA

3.1 Project Evaluation Result

Table 1

Scale	Range	Description
5	4.50 - 5.00	Excellent
4	3.50 - 4.49	Very Good
3	2.40 - 3.49	Good
2	1.50 - 2.49	Fair
1	1.00 - 1.49	Fair

Mean range interpretation scale.

This result section shows the discoveries found in the capstone project that overview the system's functionality in every aspect.

The researchers used the ISO 25010 standard. See the table below.

Table 2

Evaluation results computation.

INDICATORS	MEAN	DESCRIPTIVE RATING
A. FUNCTIONALITY		
1. Functional completeness - Degree to which the set of functions covers all the specified tasks and user objectives.	4.67	Excellent

2. Functional correctness - Degree to which a product or system provides the correct results with the needed degree of precision.	5	Excellent	products, without detrimental impact on any other product.		
3. Functional appropriateness - Degree to which the functions facilitate the accomplishment of specified tasks and objectives.	4.33	Very Good	2. Interoperability - Degree to which two or more systems, products or components can exchange information and use the information that has been exchanged.	4	Very Good
B. RELIABILITY			E. USABILITY		
1. Maturity - Degree to which a system, product or component meets needs for reliability under normal operation.	4.67	Excellent	1. Appropriateness Recognizability - Degree to which users can recognize whether a product or system is appropriate for their needs.	4	Very Good
2. Availability - Degree to which a system, product or component is operational and accessible when required for use.	4	Very Good	2. Learnability - Degree to which a product or system can be used by specified users to achieve specific goals of learning to use the product or system with effectiveness, efficiency, freedom from risk and satisfaction in a specified context of use.	4	Very Good
3. Fault tolerance - Degree to which a system, product or component operates as intended despite the presence of hardware or software faults.	4.33	Very Good	3. Operability - Degree to which a product or system has attributes that make it easy to operate and control.	4	Very Good
C. PERFORMANCE EFFICIENCY			F. SECURITY		
1. Time behavior - Degree to which the response and processing times and throughput rates of a product or system, when performing its functions, meet requirements.	4	Very Good	1. Confidentiality - Degree to which a product or system ensures that data are accessible only to those authorized to have access.	4	Very Good
2. Resource utilization Degree to which the amounts and types of resources used by a product or system, when performing its functions, meet requirements.	4.33	Very Good	2. Integrity - Degree to which a system, product or component prevents unauthorized access to, or modification of, computer programs or data.	4	Very Good
3. Capacity - Degree to which the maximum limits of a product or system parameter meet requirements.	4	Very Good	3. Non-repudiation - Degree to which actions or events can be proven to have taken place so that the events or actions cannot be repudiated later.	4	Very Good
D. COMPATIBILITY			4. Accountability - Degree to which the actions of an entity can be traced uniquely to the entity.	4	Very Good
1. Co-existence - Degree to which a product can perform its required functions efficiently while sharing a common environment and resources with other	4	Very Good	5. Authenticity - Degree to which the identity of a subject or resource can be proved to be the one claimed.	4.67	Excellent

G. MAINTAINABILITY			3. Replaceability - Degree to which a product can replace another specified software product for the same purpose in the same environment	4	Very Good
1. Modularity - Degree to which a system or computer program is composed of discrete components such that a change to one component has minimal impact on other components.	4	Very Good	OVERALL	4.22	Very Good
2. Reusability - Degree to which an asset can be used in more than one system, or in building other assets.	4	Very Good	Table 2 shows the result of the discoveries found in the capstone project that overview the system's functionality in every aspect. 1. SUMMARY OF FINDINGS CONCLUSION AND RECOMMENDATIONS 1.1. Summary of Findings The researchers conducted a survey with 25 users in different perspectives of (10) IT Professionals and (15) Business Related Customers, to assess the strengths, weaknesses, and potential of the system. The listed findings from the evaluation used to measure the capabilities of the AIOS system prototype. First, the functionality, reliability, and performance efficiency part of the AIOS prototype all resulted with the descriptive rate of Strongly agree, meaning that, there are minimal improvements to be made in terms of the system's functions, how it handled multiple user interactions, and how fast the system can process the inputs made by the user. Consistently, the performance of the system's compatibility, usability, security, and maintainability also appears to satisfy the users, giving them all "Strongly Agree" descriptive interpretation, which means small improvements are needed to further improve the user's experience when using the system. 1.2. Conclusion Based on the significant findings, the drawn conclusions are that the development of the Web-based Inventory Management System would help to improve and lift the current Inventory System of the Properties and Supplies of the La Consolacion University of the Philippines, to a more modernized system as the system contains and features a higher tech and advanced way of recording and managing the items of the University. The system was also surveyed and was deemed qualified to proceed to the standard of significant indicators such a Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability, and Portability. The system was also able to provide a more well improved data sorting management as every department has its own tab to be viewed and be edited by the user. It is also a very secure system as it can only be accessed with the use of a username and password made by the developers.		
3. Analysability - Degree of effectiveness and efficiency with which it is possible to assess the impact on a product or system of an intended change to one or more of its parts, or to diagnose a product for deficiencies or causes of failures, or to identify parts to be modified.	4.33	Very Good			
4. Modifiability - Degree to which a product or system can be effectively and efficiently modified without introducing defects or degrading existing product quality.	4	Very Good			
5. Testability - Degree of effectiveness and efficiency with which test criteria can be established for a system, product or component and tests can be performed to determine whether those criteria have been met.	5	Excellent			
H. PORTABILITY					
1. Adaptability - Degree to which a product or system can effectively and efficiently be adapted for different or evolving hardware, software or other operational or usage environments.	4	Very Good			
2. Installability - Degree of effectiveness and efficiency with which a product or system can be successfully installed and/or uninstalled in a specified environment.	5	Excellent			

1.3. Recommendations

This capstone research aims to elevate the functionality and user experience of the existing QR code web-based inventory management system. Through a multifaceted exploration, the following key recommendations are proposed:

1. Real-time Notification System Integration: - Examine how a real-time notification system might be easily integrated to improve communication inside the inventory management system. Assess how well the system works to notify users in a timely manner about important updates, low stock levels, added items, and other relevant occurrences.
2. User Activity Tracking and Accountability: - Provide a comprehensive "Last User Activity" report tab to provide information on who has accessed the system recently. Examine how this feature affects system security and user responsibility while taking into account the requirement for open and honest user interactions.
3. GUI Design Optimization for Enhanced User Experience: - Carry out an extensive usability analysis in order to improve the GUI (graphical user interface) design. Examine different design components to guarantee a simple and effective user experience. The goal will be to design an interface that is both aesthetically pleasing and optimally functional.

5. REFERENCES

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