(RESEARCH ARTICLE)

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Integrated inventory management and asset tracking system with user-centric computer kiosk interface

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Abstract

In today's world, technology plays a critical role. It has become an integral part of our daily lives, and it has made our lives easier, more efficient, and more convenient. Because of this, automated systems have replaced paper-based systems in every company and corporate organization. It now allows companies to streamline their processes and keep track of their data effectively and accurately. That's why the project Integrated Inventory Management and Asset Tracking System with User-Centric Computer Kiosk Interface was designed to help them automate their manual processes and will enable them to manage, organize, and store all items, equipment, purchase orders, and reports efficiently and accurately. The method used in this project is the Descriptive Research Method which provides the process of analyzing, classifying, and giving meaning to every piece of information gathered. The other one is the Developmental Method. The proponents used the Modified Waterfall Model because it provides an orderly sequence of development steps with some flexible iterative stages to facilitate the adequacy of documentation and design reviews to ensure the quality, reliability, and maintainability of the developed system. The proponents used the ISO 9126-1 Model for their evaluation of the system. They used this model as their software evaluation instrument, which contains criteria such as functionality, usability, reliability, efficiency, portability, and maintainability. The results of the evaluation are reflected in Tables 1 and 2, where the mean for end-users is 4.61 and 4.68 for IT experts.

Keywords: Inventory Management; Asset Tracking; Barcode Scanner; User-Centric; KIOSK

1. Introduction

Inventory management has been transformed by technology, making it into an automated one from previously manual operations. We all know that manual inventory can result in difficulties in keeping track of the items, as well as the inventory levels, locations, and movements, which can lead to errors such as miscounting, incorrect data entry, and misplacement of inventory items. These errors can also lead to inaccurate inventory levels, which can result in stockouts, overstocking, and the loss of items. Also, in the event of a fire or other disaster, manual inventory management can also lead to significant losses if inventory records are destroyed or lost. Without a proper backup system, businesses and organizations can lose critical information regarding their data, making it difficult to resume operations quickly. The General Services Department of Global Reciprocal Colleges is in charge of managing facilities, supplies, maintenance, and security. It is also accountable for the quotation and procurement of supplies and materials needed to maintain the school's facilities. The department is still using a manual inventory for their assets, keeping their records in a pile of papers and an Excel spreadsheet. which is inefficient for tracking and maintaining records of assets, especially when it comes to tracking the location and movement of their assets. The problems experienced by the department are basically data redundancy, unorganized records, or missing inventory records. They also stated that there are situations where part of the reports is inaccurate, and there are instances where the items in their inventory

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keep disappearing for unknown reasons. They are also experiencing problems tracking their equipment, which sometimes is not returned on time. By automating their inventory management, this would benefit the GS Department in a variety of ways. Furthermore, automated inventory management systems are often more accurate than manual methods and can help the department avoid costly mistakes and losses due to overstocking or understocking. Therefore, creating a system that will automate the processes of inventory management for the General Services Department can help them track their inventory, monitor stock levels, track their assets, and generate reports on the inventory's transactions. In addition, the system will also have a barcode scanner to lessen their work on manually checking the items that are being checked in or checked out.

Objectives of the study

- General objective

The general objective is to design and develop an Integrated Inventory Management and Asset Tracking System with User-Centric Computer Kiosk Interface and automate their current process. The system features different modules for the GS staff, school staff, and students to use. This includes inventory, equipment monitoring, and the procurement process.

- Specific objective

Specifically, the project aims to achieve the following:

o   To keep track all assets of the General Services Department and improve their inventory management by using barcode scanner.
o   To keep track of the status of the procurement whether it is approved, pending, cancelled, and delivered.
o   To computerize the process of requesting of items by using Kiosk.
o   To create system that provides accurate reports and informations.
o   To increase the department's overall performance and improves efficiency.

2. Methodology

The proponents used to collect all the information they gathered to provide and develop an integrated inventory management and asset tracking system with a user-centric computer kiosk interface. It is very significant to ask, explain, and validate all the information or data collected. The proponents used methodological tools, such as descriptive and developmental methods, to acquire and search for information for the project.

Descriptive research is the process of analyzing, classifying, and giving meaning to every piece of information gathered. It used to enhance the ability of the department to ensure a much more reliable, accurate, and systematic flow of information within the resources. The proponents gathered all the required information by conducting interviews with the end users, which are the staff of the General Services Department, and asking questions with regards to the current state and problems of the department. Through an interview, they expanded the problems with the department's existing process, such as unmonitored procurement status, redundancy of some of the records like supply and borrow requests, unmonitored inventory of stocks, and many more.

When the proponents have gathered enough information about the department, they have conceptualized a system that results in the idea of an inventory management and asset tracking system using a barcode scanner that could solve the department's problems that they may currently be experiencing.

The developmental method is also used to identify the scope of the study and to make a system that can solve the problems. The proponents used the Modified Waterfall Model as the software developmental model. This type of model includes requirement gathering and analysis, system design, development, integration and testing, implementation, and maintenance.
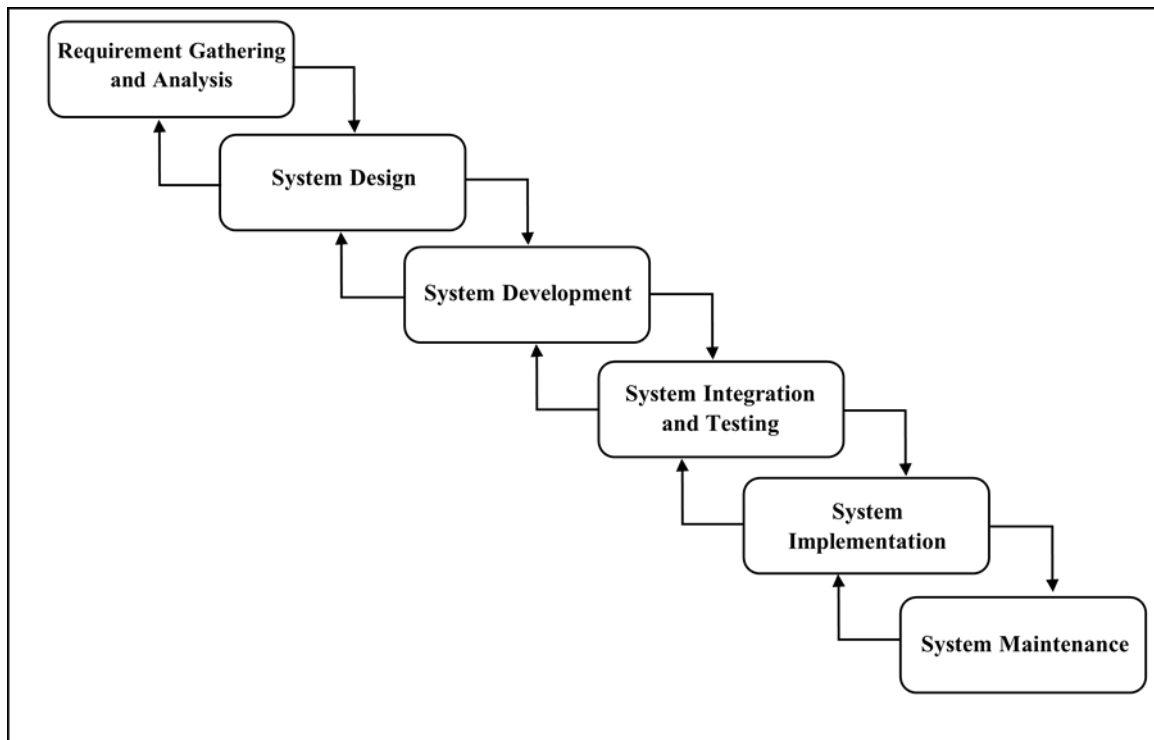
Figure 1 Modified Waterfall Model

Figure 1 shows the developmental method used in this project, which is the Modified Waterfall Model. The Modified Water Fall method is a derivative of the traditional water fall model, but with some minor variations relative to iterations between certain stages.

2.1. Requirement Gathering and Analysis

The proponents gathered all required information by conducting interviews with the General Services Department of Global Reciprocal Colleges and its employees, asking questions with regards to the current state and problems of the department. Through this interview, they stated that the department is currently managing its assets manually and keeping their records on paper and Excel spreadsheets. which is inefficient for tracking and maintaining records of assets, especially when it comes to tracking the location and movement of the items.

Given these challenges, it's clear that there is a need for a more efficient and accurate system for managing the department's assets. A computerized system, such as inventory management software, could greatly improve their asset tracking and record-keeping processes. Such a system would offer benefits like real-time tracking, reduced redundancy, and more accurate reporting.

2.2. System Design

After the proponents conducted a thorough analysis of the department's requirements and processes, They can now start to design and implement a suitable solution that addresses these issues and improves overall efficiency and accuracy in asset management. This involves developing a database system as well as a user-friendly interface to facilitate the entry, tracking, and reporting of asset-related information.

2.3. System Development

In this stage, the proponents translate the system design into actual code and develop the software components that make up the system. The development phase is a critical stage where the design concepts are transformed into working software. The output of this phase is a functional system that can be further refined and tested in the subsequent phases of the software development life cycle.

2.4. System Integration and Testing

After the development phase of the proposed system, the proponents will evaluate the system to see if it is accurate and meets the requirements of the department's work process. Various types of testing are performed to verify the functionality, correctness, and reliability of the software.

2.5. System Implementation

Once the testing phase is complete, any identified issues or deficiencies are addressed and fixed during the debugging and refinement process. After these issues are resolved, the system can proceed to the implementation and maintenance phases. Successful evaluation ensures that the system is ready for real-world use and that it aligns with the goals and requirements set at the beginning of the project.

2.6. System Maintenance

It is required to keep a computer system running properly. The last step of this model is that the proponents will monitor the system's functionalities from time to time.

3. Results and discussion

The system was evaluated based on the set criteria of functionality, usability, reliability, efficiency, portability, and maintainability to determine the end-user's and IT experts acceptance. System demonstration was done by the proponents for the respondents to understand and identify the functions of the system and to introduce to them how to use the system.

Table 1 Mean Score of End – Users

Criteria	Mean	Interpretation
Functionality		
Suitability	4.65	Strongly Agree
Accurateness	4.48	Agree
Interoperability	4.52	Strongly Agree
Security	4.48	Agree
	4.53	**Strongly Agree**
Reliability		
Maturity	4.34	Agree
Fault Tolerance	4.39	Agree
	4.37	**Agree**
Usability		
Understandability	4.65	Strongly Agree
Learnability	4.65	Strongly Agree
Operability	4.70	Strongly Agree
Attractiveness	4.78	Strongly Agree
	4.70	**Strongly Agree**
Efficiency		
Time behavior	4.65	Strongly Agree
Resource Utilization	4.65	Strongly Agree
	4.65	**Strongly Agree**

Maintainability		
Changeability	4.74	Strongly Agree
Stability	4.57	Strongly Agree
Testability	4.74	Strongly Agree
	4.68	**Strongly Agree**
Portability		
Adaptability	4.61	Strongly Agree
Installability	4.70	Strongly Agree
	4.65	**Strongly Agree**
OVERALL	**4.60**	**Strongly Agree**

Table 1 shows the results of the evaluation of the system by end-users (GS and GRC staff and students). Based on the results, the overall mean scores for functionality, usability, reliability, efficiency, and portability are 4.53, 4.37, 4.70, 4.65, 4.68, and 4.65, with an overall mean score of 4.60. This result indicates that the end users agree with the system that functions well with enough capabilities and security that the user could use the system and can function well.

Table 2 Mean Score of IT Experts

Criteria	Mean	Interpretation
Functionality		
Suitability	5	Strongly Agree
Accurateness	4.80	Strongly Agree
Interoperability	4.80	Strongly Agree
Security	4.80	Strongly Agree
	4.85	**Strongly Agree**
Reliability		
Maturity	4.80	Strongly Agree
Fault Tolerance	4.40	Agree
	4.60	**Agree**
Usability		
Understandability	4.0	Agree
Learnability	4.20	Agree
Operability	4.60	Strongly Agree
Attractiveness	4.80	Strongly Agree
	4.40	**Agree**
Efficiency		
Time behavior	5	Strongly Agree
Resource Utilization	5	Strongly Agree
	5	**Strongly Agree**
Maintainability		
Changeability	4.60	Strongly Agree

Stability	4.80	Strongly Agree
Testability	4.80	Strongly Agree
	4.73	**Strongly Agree**
Portability		
Adaptability	4.40	Agree
Installability	4.80	Strongly Agree
	4.60	**Strongly Agree**
OVERALL	**4.70**	**Strongly Agree**

Table 2 shows the results of the evaluation of the IT experts. Based on the results, the overall mean scores for functionality, usability, reliability, efficiency, and portability are 4.85, 4.60, 4.40, 5.73, and 4.60, with an overall mean score of 4.70. This result indicates that the system was agreed upon and accepted by the IT experts because of its compatibility, adaptability, functions, capabilities, and security, so that the user could use it.

4. Conclusion

Following the summary of findings, the following conclusions state that the proponents developed a system that:

- That has a user-friendly design that provides an efficient way to monitor the department's inventory, assets, quotations, purchase orders, and supply and borrow requests from other users.
- That improved the department's item monitoring by using a barcode scanner. It implies that the implemented solution for tracking and managing the department's inventory and assets effectively. This enhancement in monitoring capabilities leads to better control over resources within the department.
- That generates accurate reports, provides precise information, and eliminates unnecessary duplication of reports and information within the system.
- That tracks the status of the department's procurement process. It indicates if the procurement is approved, pending, cancelled, and delivered.
- That computerized their item stockouts by using Kiosk, and allows the requestor real-time updates on the inventory status. This means that as the items are out of stock, the inventory information is immediately reflected in the Kiosk.
- That increases the department's overall performance and improves efficiency through a system that is designed to positively impact various aspects of the department's operations.

Compliance with ethical standards

Finally, the proponents are greatly grateful to all of their friends, classmates, and relatives for their unwavering support and encouragement throughout this journey.

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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