Equipment Inventory Management System (EIMS)

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Abstract
Inventory management systems are mostly developed and implemented in production companies wherein the raw materials used in manufacturing a product are inventoried against the number of products developed, and the actual expenditures made until a finished product is produced. Inventory management systems are scarcely utilized in schools since the priority is focused on the offering of quality instruction. The paper is about the automated system for conducting equipment inventory management for the State Universities and Colleges of the country. Specifically, the system captures data as regards records of equipment of each employee, tracks the history of the equipment issued for each employee, and performs automated inventory management and generates reports as regards inventory management of the equipment. The study made use of prototyping method in the design, development, implementation and deployment of the system at the Catanduanes State University by which the users of the system were involved in the course of the study which was done in from July, 2014 to May, 2015. PHP, MySQL and Macromedia Dreamweaver were the software utilized in the development. Pilot testing was done in the said university since the researchers are both faculty members of the said university. Utilizing the study in the state universities and colleges in the country would result to a simplified, organized and facilitative equipment inventory management process. This will result to an improved productivity and effectiveness in the performance of inventory management duties of personnel and would be an input to the decision making process of the school.

Keywords: equipment, equipment inventory, equipment inventory management, information system

Introduction
In today's business environment, even the smaller businesses have come to rely not just with hardware technologies but also in software systems. Automating every processes is a scheme that is embraced in every modern organization of today. It demands employees that could perform his duties in fast, accurate and effective way with less amount of resources wasted [1]. Business experts often say that managing and controlling inventories is an important component in conducting business and can be a basis for the company's top placement over their competitors.

Excessive amount of raw materials purchased or stock outs of finished products can lead to organization's bankruptcy [2].

Inventory management system involves tracking, monitoring, management and control of the resources is a pattern for a total quality management in every organization [3]. Muller (2011) categorize inventory into raw materials, finished goods and work-in process. Raw materials are the items needed to produce finished goods, finished products are the outcomes of the conversion of unprocessed resources to their expected outcome or deliverable; work-in-process is the procedure of transforming the unprocessed resources to their expected outcome or deliverable [4].

Carlson, et. all (2001) pointed out that basically, inventory management systems work by writing down the transaction details instantaneously and re-order stocks whenever it goes a critical level. [5]. Conrad (2016) specifies the following advantages and disadvantages of an automated inventory management system. Its advantages are its fast and efficient document production and a well-timed and appropriate data. Its disadvantages however ranges from dependence on technology, issues relating to accuracy and threats of deception. Accuracy according to Conrad is an issue since manual counting or checking of raw materials and finished products is necessary and computerized system needs thorough security measures must be employed to the system [6].

Inventory management nowadays is no longer confided to the manual process. Computerizing processes in the offices of today is already a mandate for every organization. In the Philippine setting, making use of Information Technology products and application are sought-after by government institutions. This was even mentioned as early as the year 2000 when the former President Joseph Ejercito Estrada addressed his keynote speech on the Knowledge Economy Conference that he would specially want to see the broader, effective, widespread and extensive use of information and communications technology in all sectors of government specifically in making sure that citizenry has open use of information and an immediate and the government's effective giving out of service to the people. [7].

This was even part of the Government Information Systems Plan (GISP) since this could mean making government services visible to the citizens. The GISP envisions that Filipino citizens in the country and abroad as well as those from foreign lands who are willing to invest in the Phiippines could have an open contact to Philippine government information and could easily avail of its services GISP will not just an aid for the country's progress but also an approach for development, increase in income and the country's placement in the international market. It provides a strategic direction of the government for the next five to ten years. It will be a government thrust to people to maximize ICT use for the welfare of the people.

Developing an information system application like the Equipment Inventory Management System (EIMS) could be one of the ways by which this GISP would be attained. Information about developing and utilizing a computerized system for the conduct of inventory process in the government especially in the Philippines is very scarce. This system could somehow be an eye opener for the government agencies to adopt this kind of information system to have a full grasp of its benefit to the organization. EIMS is classified as one of the inventory management software. Although the process of conducting inventory in almost all government institutions is almost similar, however EIMS is focused on the equipment aspect only and inventory management system is focused on the management of entire assets of the organization.

Equipment Inventory Management System (EIMS) is an automated system that was developed by the researchers for the Catanduanes State University and can be utilized also in all state

universities and colleges all over the Philippines. This system captures data as regards records of equipment issued to the employees in this university, tracks the history of the equipment issued for each employee, performs automated inventory management and generates reports as regards inventory management of the equipment. This system was developed to facilitate the conduct of the manual inventory process for this university by which complex and unorganized procedures. This system was focused on the inventory management of the equipment that was delivered and issued to some employees in this institution. This system organizes, simplifies and monitors the conduct of inventory and recording of the devices and equipment including the issuance of Property Accountability Report (PAR).

This has been developed using programs such PHP for the codes, MySQL for the database, graphics software for the Graphical User Interface and run in the intranet of the university. Prototyping was the approach utilized by the developers in developing the system. Completion, implementation, deployment and utilization of the developed system in this university facilitated the doing of transactions in the office particularly inventory management and improved the productivity and effectiveness in the performance of inventory management duties of personnel and served as an effective inputs for strategic decision making of the administration of this university.

The need for effective control and utilization of the resources and equipment in schools and the scarcity of inventory management systems developed and utilized for schools is a gap observed that made the researchers embark on the development and evaluation of the effects of an inventory system in state universities and colleges.

Statement of the Problem
The research was conducted to develop an automated equipment inventory management system for the Catanduanes State University for school year 2014 to 2015. Specifically, this research determined that different issues or lapses of the existing manual system of conducting equipment inventory management system in the university, developed and implemented the system at the university.

Research Design of the Study
This research made use of developmental method wherein observation and informal interview to clarify some observation on the lapses, issues and difficulties meet by the employees involved in the process of conducting equipment inventory management at the university. After gathering the necessary information the development of the system was done, and the design of the prototype of the system was employed by the researchers. After which that the prototype of the system was approved by users of the system, development and implementation of the system at the university was executed.

Significance of the Study
This study has institutional and national significance for the total quality management of state universities and colleges of the country. Facilitative manner of effective use and control of the utilization of public material and fiscal resources in schools in different parts of the country would mean an additional savings on the coffers of the government.

Method of Procedure
This study is developmental in nature and made use of the prototyping approach in developing the system. This method ensured that users were involved in the course of development. This method was used in this approach: (a) perception on the institution needs for an information system; (b) identification of the priority need of the institution which is the inventory

management system; (c) meeting with the concerned individuals regarding inventory process, observation and interviews; (d) preliminary analysis and development of the system; (e) coordination with the inventory management people of the organization while developing the system; (f) integrating the suggestions made by the inventory management; (g) finalizing the system and its implementation.

The system was designed using the following technologies: a) MySQL served as a back-end of the system; b) PHP has been employed as the front-end of the system; c) User interface has been designed using Macromedia Dreamweaver together with Adobe Photoshop for the graphics; d) Animation was designed using Macromedia Flash. Pilot testing were also employed at the Catanduanes State University (CSU). The already an established Local Area Network using Start Topology at the Catanduanes State University was used in the installation of the system. The communication, coordination and interconnection of the departments were done using this network. Having an established Wireless Internet Connection within the organization served as an advantage for easier communication, coordination and interconnection of departments.

The development and design of the system made use of process models and other schematics to visually present the design concepts of EIMS. Such schematics are the System Architecture, Context Diagram and Data Flow Diagrams. System architecture describes the schema or framework and contents of a computer system which may include specifications for hardware, software and networking capabilities of the system developed [8]. Context diagram shows the top-level view of the border or margin of the system, the interaction of the entities outside of the system and the flow of information between these entities [9]. Data flow diagram depicts the transfer of data between entities, processes and data stores within the system [10].

EIMS System Architecture (Figure 1) showed a two-tier level of design -the server side and the client side. There is only one server used and that is the Application and Database Server that will cater to the request for operation of the clients. Clients are the users of the system- Employee(s), Department Head(s), the Vice President for Administration and Financial Affairs (VP AFA) and Supplier.

Figure 1 and 2 shows the context diagram of CSU-EIMS. Context diagram is an initial diagram that is constructed to show which are being employed in the system. It shows the interaction of the users to the system as well as the flow of data from one user (entity) to the system and vice versa. It also shows what information is provided to the system and what information is provided from the system. It also documents who are using the system and what data will be stored in the system. The figure shows that there are seven entities that are interacting with CSU-EIMS. These are the Human Resources Officer, Supplier, Supply Officer, Employees, Accountant III, Vice President for Administration and Finance and the Supervising Administrative Officer. As could be seen from the figure there are arrows that comes from the entities towards the system and from the system to the entity. Such arrows indicate the direction or flow of data, files, reports and processes that are going to and from the system.
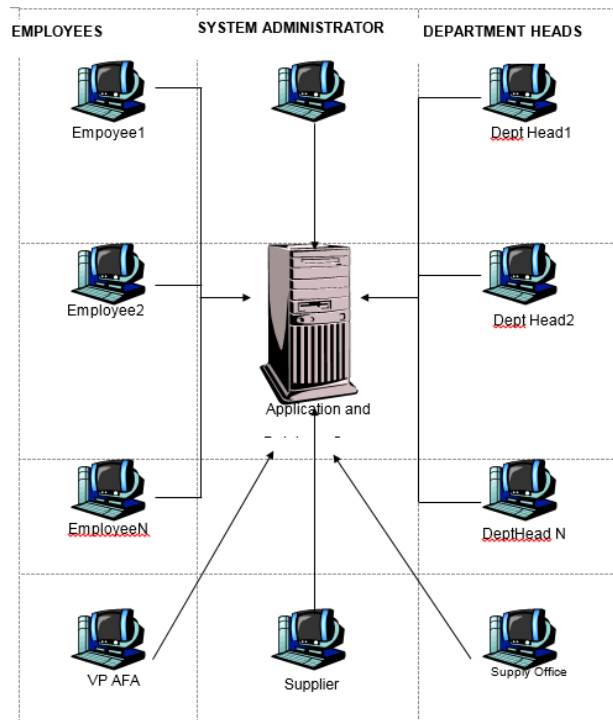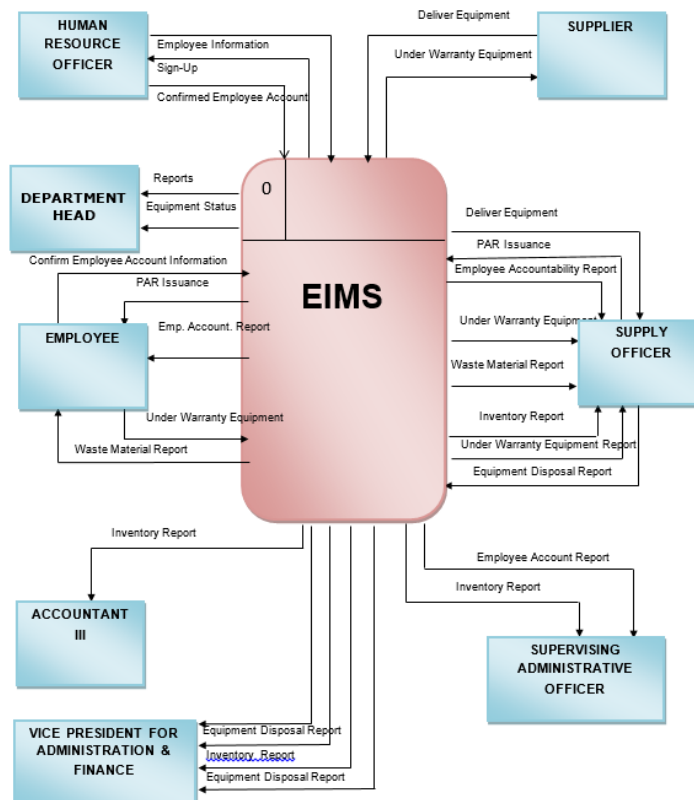
Figure 1
System Architecture of EIMS

Figure 2
System Architecture of EIMS

Findings

At the Catanduanes State University the following lapses were observed in the existing manual system of conducting inventory: (a) Process of inventory is not simplified, excessive documents

and long procedures are being observed; (b) Assets of the institution are not properly identified and maintained; (c) Records of inventory are not accurate, updated and not easily obtained, and; (d) Equipment that are unserviceable are not properly monitored.

This system does the following functions: (1) allow access to all concerned personnel (log-in and log out) for the purposes of data entry, viewing of records, retrieval and updating of records); (2) provide a user-friendly environment of doing inventory process through graphical user interface, and an interactive and menu-driven operations; (3) capture details of corporate equipment and store in a database; (3) perform an organized and defined process of identifying, capturing data on an equipment, tracking and managing the inventory process; (5) provide a common repository of equipment data for protection, security and reliability; and (6) produce a full range of reports to aid in the decision making process of the organization.

The system works by having every system user logs in. Granting of access, uploading data, viewing of information and reports, and performing operations on the system varies depending on the access privilege set by the system administrator. The employees with account regarding the properties issued to them could only see their individual records regarding this matter from the system. Human Resources Management Office's role is of keying in employees data. Supply officer could only view his work responsibilities as regards inventory process supplier could only view his profile and the information he/she upload into the system and any other announcements and information due him/her. The system administrator has all the rights to access the system and change the data and information entered in it. All the data entered will be stored in the system's database. Such manner of storing data and information in the database would eliminate storing of separate records of the inventory process in every office. The stored data in system's database and will be updated regularly.

The following reports were generated by the system: (a) Property Acknowledgement Receipt (PAR) of Employees; (b) List of Equipment Issued to Employees; (c) List of Equipment by Departments; (d) List of Equipment by Type (e.g. Purchased or Donated); (e) List of Equipment by Category (e. g. Agricultural, Communications, Fire Fighting, IT Equipment, etc.); (f) List of Equipment by Period (e.g. daily, monthly, yearly); (g) List of Equipment that are Under Warranty; (h) Status of Equipment (under warranty, etc.); (i) Equipment that are Returned to the Supply Office, and (j) Equipment that are Returned to the Suppliers

Security was employed in the system since it establishes an authentication and authorization approach; when doing the log-in, the password will be passed in an encrypted form. Data entered are authenticated by key persons involved in inventory procedures, access rights and privileges are ensured for every users of the system hence viewing and modifications of records and any information uploaded in the system are restricted depending on the user's access rights and privileges defined in the system.

Utilizing this web-based solution at the Catanduanes State University resulted to: (a) an organized and user-friendly inventory management process of equipment; (b) fast and efficient process of identifying corporate equipment; (c) captured details of corporate equipment and stored in databases; (d) an effectively-managed enterprise-wide inventory of equipment; (e) organized and defined process by which corporate equipment are identified, captured, tracked and maintained in the inventory system; (f) easy and convenient inventory system access to all concerned personnel (data entry, view and update); (g) a common repository of data for equipment protection, security and reliability; (h) a full range of reports that will satisfy informational requirements especially for management's decision making process.

Conclusion and Implication of the Study

Based from the perceived needs of the institution and the deficiencies observed from the existing university inventory system, the system that was developed simplifies, defines, organizes and standardizes procedures of conducting inventory procedure in the institution. Assets (equipment) are easily be identified, information as regards equipment and inventory process are easily captured, tracked, maintained. Inventory data and information is easily accessible and reports are generated by the system.

With EIMS, excessive papers and paper works, waiting time and turnaround time of the process and long procedures of doing inventory process are minimized, procedure in doing inventory was simplified, streamlined, become coherent and standardized. Having the data updated, available, readily accessible and printable, this will aid in the decision making process of the university. Lastly, equipment that are no longer serviceable and for disposal could easily reported in the system.

It is therefore recommended that the system would be utilized by all entities in this organization. Initially, this will incur a large cost; however as the system is being used utmost benefits over the cost will be attained. The system however is open for suggestions and any other recommendation from the stakeholders. Phase 2 of this system might include inventory of all the assets and the supplies of the institution, as well as warehouse management. Inputs from such Phase 2 would be needed for Phase 3 – determining of available stocks and advice for purchase of supplies and equipment.

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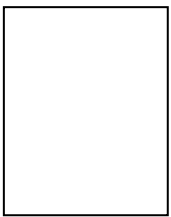
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