Model of The Material Inventory Management Using Multimedia based Information System

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Abstract. This research is constituted by the low inventory service performance that causes decreased performance of the institution. This study was aimed at build an inventory model using multimedia based information system that generates inventory data output form of text and 3D visuals for the specific needs of the user. This study is developmental research and development program using the System Development Life Cycle (SDLC). The program menu includes inventory data, circulation usage, maintenance and development as well as financial transactions. Feasibility testing program conducted by Stub Testing, Unit Testing, Black Box and White Box Testing and Integration Testing. Execution of the program includes Log System, Security Access, Menu of Manager, Data Entry, Circulation, Maintenance, and Report. This information system is able to present a statement in the form of text, graph and 3-D visual (multimedia), data entry by scanning barcode system, multi user system, top-down and grass-root access so as to meet user needs in comprehension. The use of this information system can improve the efficiency of material inventory services to achieve higher productivity. The program is designed as an open source program that can be used and developed more widely.

1. Introduction
Management of goods and inventory equipment will determine the performance of institutions, including educational institutions. The fact was that generally the management of goods and inventory equipment in educational institutions including universities was not properly managed [1], so the level of utilization is still low [2]. Inventory management manually has always threatened the smooth working alongside the magnitude of risk of damage and loss of inventory. This weakness led to the functionality and support for institutional performance is not optimal [3].

Preliminary studies found that inventory management at universities and other institutions is very weak because it is done manually [4,5]. Some institutions were already using the inventory information system but the system cannot meet the needs of specific users comprehensively as the program is developed not through a needs analysis [6, 7, and 8]. The weakness of inventory management can reduce the efficiency and productivity of the institution, as reported in several studies [9, 10]. To solve these problems there is a need to build an inventory information system that can accommodate the specific needs of users.

The purpose of this study is to build a model based multimedia information inventory system to improve service quality and enhance the performance of the institution. The system built has a special
uniqueness that distinguishes it from other system information models, i.e. it is based on multimedia, data entry via keyboard and barcode scanner, data access by a top-down and grass-root, multi-user web-based access and open source software.

Inventory information system plays a very important role. Inventory defined as a list of goods, materials and so on, whereas inventory is an activity calculation, maintenance, organization, regulation, recording and reporting of goods [11,12]. Materials and equipment inventory are essential components that determine the performance of the institutions, both companies, educational institutions as well as government agencies. For a university, goods and inventory equipment including laboratory equipment and learning facilities will determine the quality of graduates, while the equipment will work to support the management of performance services [2,3,12]. The management system of goods and equipment is one of determinant in decision making [13].

Since 1994 many public institutions, education and companies in the world developed a computer-based inventory of information system [11], and proven use of information systems was able to improve management service [12], and improving institutionally productivity [14]. The development of inventory information systems continues to respond users’ needs. Cadavid and Zuluaga [2] states the five main aspects to be covered in information system, namely (1) Classification, including the recording of goods and equipment such as specifications, quantity and time of procurement. (2) Forecasting, are inventory-related with an estimated inventory as average usage, the average period of use, the estimation of maintenance time, repair and replacement period. (3) Performance record, namely recording of inventory performance such as Mean Absolute Deviation (MAD), Mean Square Error (MSE), Tracking Signal Range (TSR). (4) Economic Order Quantity (EOQ) and the Economic Production Quantity (EPQ). (5) Inventory control systems, namely to respond inventory needs for transactions Order Point, Order Quantity (s, Q) System, Order Point, Order Up to Level (s, S) System, and the Periodic Review, Order Up to Level (R, S) System. To user with specific needs can expand menu facilities of access program menus as necessary. Information Systems inventory is absolutely necessary for the institutions that manage lots goods and various equipment [12,15].

Inventory management manually always threatens the achievement of performance optimally in the public institutions, education and enterprise [2,12]. Educational institutions which have goods and equipment in large quantities and various specifications absolutely requires in its management information systems [5,7]. This is in line with the results of the study of Sriadhi [6] who found the facts universities in Indonesia generally have weaknesses in managing inventory, as it is still done manually. This condition gave negative impact in achieving optimum performance.

The increasing needs of users in inventory management trigger the development of information systems more rapidly. The development of a web-based inventory information system is able to increase effectiveness and efficiency [16]. This is in line with research report that developed an information system of inventory to improve the quality of service in the institution [9,17].

The above studies emphasize that the construction of useful inventory information systems to improve the performance of institutions. The development of an information system a series of activities, methods, strategies and automation of equipment used for the stakeholder to develop and maintain the information systems [15]. Building such the system requires a long and complex process, due to several reasons (a) The absence of the standard system, (b) The emergence of the problem, (c) Improving the effectiveness and efficiency in decision-making, (d) The work instruction that has a relationship with other units [11].

Information system is a series of activities involving sub-systems in order to achieve, at least including nine elements, namely (a) Users who use and interacts directly with elements of the system, (b) Hardware systems, (c) Network System of computer, (d) Software system (client and server), (e) Database system, (f) Humans interactions with computers, (g) Operating procedures, (h) Maintenance procedures, (i) Data processing [2,11].

The information service system does not provide data only, but how the data and information are managed and presented as needed. Information will be qualified if it has some expected criteria, namely: (a) Accessibility, which is associated with ease to obtain information for users, (b) Completeness, the
availability of data required, (c) Accuracy, the accuracy of data and information that is free from error, (d) Relevance, based on needs, (e) Timeliness, namely the availability of right information at time, (f) Clarity, which is clear and concise information expressed in both content and form and language, (g) Reliability, that information must be obtained from a valid source, (h) Consistency, the provisions on the values of truth [18].

The development of information system built to follow the methods considered appropriate that able to accommodate the needs of users, one of which is the System of Development Life Cycle (SDLC). This method includes four stages, namely (a) Investigation system, (b) Analysis system, (C) Design system, and (d) Implementation system [19]. For considerations of efficiency and productivity in services-based multimedia of the information system built with online access using website. World Wide Web (www) is an interconnected system in a hypertext document that contains a variety of information, whether text, images or visual, audio, video, animation and other multimedia information that can be accessed through the device web browser. Web browser via the web client will read a web page on a web server through Hypertext Transfer Protocol (http).

PHP (Hypertext Preprocessor) is a scripting programming language that is placed on form in web server and is widely used for programming dynamic web sites, although it may be used also for other usage. In a web-based programming can use the MySQL database application that is one database application for storing data in an application [18]. MySQL is an implementation relational database (RDBMS) of the General Public License (GPL) which allows the user freely to use MySQL for non-commercial derivative products [12]. MySQL has several features, among others, (1) Portability, (2) Open source, (3) Multi-user, (4) Performance tuning, (5) Various data types, (6) Command and full function, (7) Layered security systems, (8) Scalability and restrictions, (9) Connectivity, (10) Block program, (11) Interface API, (12) Client and online equipment, (13) Flexible table structure [20].

2. Research Methodology
This study used the development method (Research & Development). The program design applied the System Development Life Cycle (SDLC) conducted in four stages: (1) Investigation system, (2) Analytical system, (3) Design system, and (4) Implementation system [19]. This model was chosen because it is one of appropriate models and widely used in the design of information systems.

The program of inventory information system built covered in a diagram that illustrates the link menu of each functions and are integrated in one system. The first level is the Login Menu, continued to the second level is a Manager Menu, Data Inventory, Circulation, Maintenance and Report. Inventory code built using 8-11 digits (Figure 1) in order to be more flexible in giving the number of goods.

![Inventory code diagram](image)

**Figure 1. Inventory code**

Data collection in this study is conduct through observation, interviews and document studies. Needs analysis of the user has become the basis for the development of content of the program to be built. The information system built to follow the life cycle of the procedure. The program development of the information system use of programs (tools), such as Microsoft Word for word processing, Visio 2010 and Net bean IDE 6.0 for charts and graphs, Photo-Shop and CorelDraw to visual and other necessary programs. The program first worked in the local host, using XAMPP as a local web server which includes Apache Web Server, PHP Script Language, MySQL Database, and phpMyAdmin Database Manager. The feasibility of the program were tested with Stub Testing, Unit Testing, Black Box and White Box Testing, as well as Integration Testing. Once declared eligible through testing, the program was uploaded to the online system.
3. Results and Discussion
The inventory information system development is done in several stages. The system was built based
on the needs of the user. At this stage of field studies have been conducted
data collection and information about what was required by the user, particularly, from the
inventory manager. Starting from user needs identification followed by discussions
about the feasibility of the system to be built, including operational feasibility, feasibility
technical feasibility and economic feasibility, and time development feasibility. On the basis of that
system, this information is built with five main menu: (1) Login System, (2) Menu Manager, (3)
Inventory, (4) Transactions /Circulation, (5) Maintenance, and (6) Report.

Modeling program was firstly developed as a reference in stages system development. The inventory
information system program was built in accordance with the needs of users, and the results of a needs
analysis served as the basis for making system models in the program design. The systems model built
are shown in Figure 2, 3 and 4.

![Diagram of Inventory Information System](image)

Figure 1. DFD level 1 of inventory information system
Access to the program is user-defined through login access. The system filters access to information based on the rights granted to the user, such as the right to view, fill, edit, delete, and print. The program consists of five blocks of main modules, namely grouping the inventory, data entry, data update, circulation, and reports.

The tests performed on each block to determine whether the program performance is in conformity with the design expected. The testing process will execute software to determine whether the system is in accordance with specifications and the desired system. The first test was Sub Testing namely testing the program to know whether the control structure has been able to map the performance of the entire module. The next test is Unit Testing: to test whether any module is able to function properly using Black Box Testing and White Box Testing. The last test was Integration Testing, testing on interaction among modules that include user scenario, the flow of data, and system testing interface to ensure the flow of data processing runs in accordance with the criteria system expected.

The testing program has been carried out and the results show desirable performance though it still requires some revision. The program performance will be adjusted for the revising tests by the system. The following are some of the test results presented as an example of the display program.

Figure 3. Activity diagram of Login

Figure 4. Activity diagram of data entry

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Figure 5. Login system

Figure 6. Manager access menu
The test results as described above indicate that the program has been able to run based on the design performance. Correspondence between the program's performance criteria defined by the system through the stages of testing has been a basis in making decision to determine whether or not this information system program is properly used.

This inventory information system program has some uniqueness, such as the provision of information not only in text form, but also tables and visual form of 3D image of the item described. Data Input is by using keyboard and can also with barcode system. In addition, the program provides access facilities on top-down and bottom-up.

The test result also shows the great benefits of the information system in terms of improving the quality service in material inventory to improve work efficiency and productivity. The program development of the inventory system is able to answer the poor service problem and using this program is as the solution to overcome existing problems.

4. Conclusion
Material inventory management system will determine the performance achieved in an institution. The use of information systems based on information technology is one solution to solve the problem of low performance. To obtain optimum results, information systems must be built based on user needs. Module program at least includes user access levels, the data collection system with the identity and material specifications, transaction and circulation, as well as maintenance and history reports.

The inventory information system developed has some uniqueness, such as (1) the report by text, tables and 3D image form, (2) data input system uses scanning barcodes, (3) data access system with
top-down and bottom-up, (4) the program was built and designed as open source software. The use of information systems is not only used to support the smooth running of work activities and quality of services, but also to improve the stability and efficiency of the use of materials that will support higher productivity achievement.

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