Designing an Inventory Information System at PT.X

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Abstract

PT. X is a table tennis manufacturing industry with a production proportion of around 80% are table tennis boards and 20% are other products such as headis table and match equipment. The administration system currently use by PT. X to recapitulate stock is google spreadsheet. After conducting interviews with the production manager, it turned out that the company has difficulty knowing how many stock items are left in the warehouse after being used for the production of table tennis boards. The company has experienced problems with too much stock several times, so that the cost required for inventory increases. After designing an inventory information system, the results show that the designed inventory information system are easily navigated, easier data input, can automatically calculate the stock of goods in warehouse and decide how many items are needed to be purchased.

Keywords
Information system, Inventory, MySQL, PHP

1. Introduction

PT. X is a table tennis manufacturing industry located in Sukoharjo, Central Java, Indonesia. This company is the first and only table tennis manufacturer which acquired the SNI (Indonesian National Standard) and ITTF (International Table Tennis Federation) certification in Southeast Asia. PT. X adopts the MTS (make to stock) production system with the percentage of 70% of its production while the rest of 30% is for MTO (make to order). The MTS system is intended to meet uncertain consumer demands, while the MTO is to fulfill special orders from the governments. The main components of a table tennis boards consist of a table top made from MDF (Medium Density Board) board, a table leg made of iron and aluminum, and wheels with different specifications according to the types of table tennis. Production is carried out in two factories, Eben Factory for producing table tops and Gihon Factory for table legs production, product assembly, and finishing.

The current administration system used by PT. X in stock recaps by using google spreadsheet. After conducting interviews with the production manager, the weakness of the current system is that the company has difficulty in determining how much stock is left in the warehouse after being used for the production of table tennis. This has an impact on the determination of purchasing parts that should be made based on the final stock in the warehouse. The company also experienced some problems in term of too many stocks in the warehouse, so that the cost needed for inventory increased. Based on these considerations, it is necessary to design an information system to determine the inventory status of the materials in the warehouse.

This research's objectives are to design the inventory system which automatically determine the stock of goods and to decide the number of items that need to be purchased.

2. Literature Review

2.1 Information Management System

Information Management System is a network of information needed by leaders in carrying out their duties (for the benefit of the organization), especially in making decisions in achieving organizational goals. IMS is a technique to provide managers with information that enables them to plan and control operations. Computers have added one or two dimensions, such as speed, accuracy and increased data volume, which allows consideration of more alternatives in a decision, which in an organization consists of a number of elements, people who have various roles in the organization, activities or tasks that must be completed, the place of work, work authority, and the communication relationship that binds the organization. IMS is the application of information systems within the organization to support the information needed by all levels of management (Lipursari, 2013). Information Management System (IMS) is a requirement that an organization needs to achieve work effectiveness and efficiency, especially in the era of modern technological developments. Technological developments encourage the development of organizational administration management from traditional systems to information technology-based systems. IMS will assist technical agencies / units in integrating data, accelerating and estimating data processing, improving information quality and management control, encouraging the creation of new products, improving services and automating part of routine work, and simplifying workflows. This approach and the development of supporting technology will trigger major transformations in business and management (Ulinafiah and Wiyani, 2019).

2.2 Inventory Control

Inventory is the supply of raw materials, partially finished goods called work-in-progress and finished goods, an organization maintains to meet its operational needs. It represents a sizeable investment and a potential source of waste that needs to be carefully controlled. Inventory is defined as a stock of goods that is maintained by a business in anticipation of some future demand. The quantity to which inventory must fall in order to signal that an order must be placed to replenish an item. (Sohail, 2018). Inventory is a number of resources, both in the form of raw materials or finished goods, provided by companies to meet consumer demands, and can be a technique for material management related to inventory (Heryanto and Dananggi, 2014). Inventory management is a very important function that determines the health of the supply chain as well as the impacts the financial health of the balance sheet. Any organization which is into production, trading, sale and service of a product will necessarily hold stock of various physical resources to aid in future consumption and sale. While inventory is a necessary evil of any such business, it may be noted that the organizations hold inventories for various reasons, which include speculative purposes, functional purposes, physical necessities etc.Inventory can be classdified according to functions. Mainly 1) Input- that has raw material, packaging materials, local purchased items for productions, consumables for processing. 2) WIP- semi-finished products, scrap, defectives. 3) Output- finished goods, FG in transit, defectives & rejects, sales returns, repaired stocks etc (Safdar, 2019). Inventory management is a trade-off between the costs of keeping an inventory versus the benefits of holding it. High inventory levels result in increased carrying costs but lower the possibility of lost sales because of stock-outs and slowing production, which can result from inadequate stocking (Kritchanchai and Suwandechochai, 2010).

2.3 Hypertext Preprocessor

PHP or short for Hypertext Preprocessor is an open source programming language that is very suitable or specifically for web development and can be embedded in an HTML script. PHP language can be said to describe several programming languages such as C, Java, and Perl and is easy to learn. PHP is a server-side scripting language, where data processing is done on the server side. Simply put, the server will translate the program script, then the results will be sent to the client who makes the request. Another definition of PHP is an acronym for Hypertext Preprocessor, which is a programming language based on codes (scripts) that are used to process data and send it back to the web browser into HTML code (Kustiyahningsih, 2011). According to Zaki and Winarno (2014), PHP is a server-based web programming language (slide server) that is capable of parsing PHP code from code with PHP extensions so as to produce a dynamic website appearance on the client side.

2.4 MySQL

MySQL is a database that contains one or a number of tables. A table consists of a number of rows and each row contains one or a number of tables. The table consists of a number of rows and each row contains one or several tables. MySQL is an open source database server that is quite popular. With various advantages that are owned, making this database software is widely used by practitioners to build a project. The API (Application Programming Interface owned by MySQL) allows various computer applications written in various programming languages to access the MySQL database (Kustiyahningsih, 2011). According to Sovia and Febio (2017), database is a collection of data or complex information, then the data is arranged into several groups with similar data types called tables / entities, where each data can be related to each other or can stand alone, making it easy to access. MySQL is a database that initially

only runs on Unix and Linux systems. As time goes by and many enthusiasts are using this database, MySQL has released a version that can be installed on almost all platforms, including Windows.

3. Methods

The method used in this research is RAD (Rapid Application Development). RAD is a set of methods developed to overcome the weaknesses of traditional system development methods, such as waterfall models and their variants (Dennis, Wixom, Roth, 2014). It is a method used in rapid application development cycles and also provides good software quality compared to traditional software engineering approaches. Through a rapid application development process, organizations can reduce software development and maintenance costs (Naz and Khan, 2015). It was first introduced by James Martin in the 90s. James Martin believed that the RAD model is a more flexible and adaptive application development model for changing user needs and ensures fast developed system quality at minimal cost, based on research Fatima, et.al (2014). In its application, it emphasizes the short planning process by focusing on software development process consisting of development, testing and feedback (Despa, 2014). Although the RAD method is believed to be capable of supporting rapid software development processes, but in its application, this method has risks that can arise, namely reduced system level scalability, reduced power efficiency and time in the process of system development, and the short time of system development will have an impact on Software quality, based on research Fatima, et.al (2014).. Therefore, in its application, the RAD method should be supported by a team of developers who are experts in software engineering resulting in high cost of development and hardware specifications required. It is strongly recommended to carry out a combination of RAD method implementation with other system development methods accompanied by good support and project management tools, based on research Fatima, et.al (2014). The project manager has responsibility in performing documentation, analyzing each system component, and giving priority to important components of the system. Managers are also responsible for controlling the communication process between team members and stakeholders involved in the system development process (Naz and Khan, 2015).

4. Data Collection

In this data collection, there are some data needed in this study, such as data supplier, remaining stock, material use. At first, observation are conducted in both factory to search the cause of the problem, and then it was discovered if the recording of stock items was still done manually using a whiteboard. After that the production manager and system administrator are interviewed to enquire informations about the inventory information system that is currently used.

5. Results and Discussion

5.1 Model the system

A. Data Flow Diagram

Figure 1 shows the data flow diagram of the proposed system. The figure shows the data flow comes from the admin who collects inventory data and the use of goods. When the admin has obtained the data obtained from the head of production, the inventory data will be updated by the admin. If there is a stock of goods that starts to run low, the admin will place an order for the goods from the supplier, which will then update the inventory data when the goods from the supplier arrive.

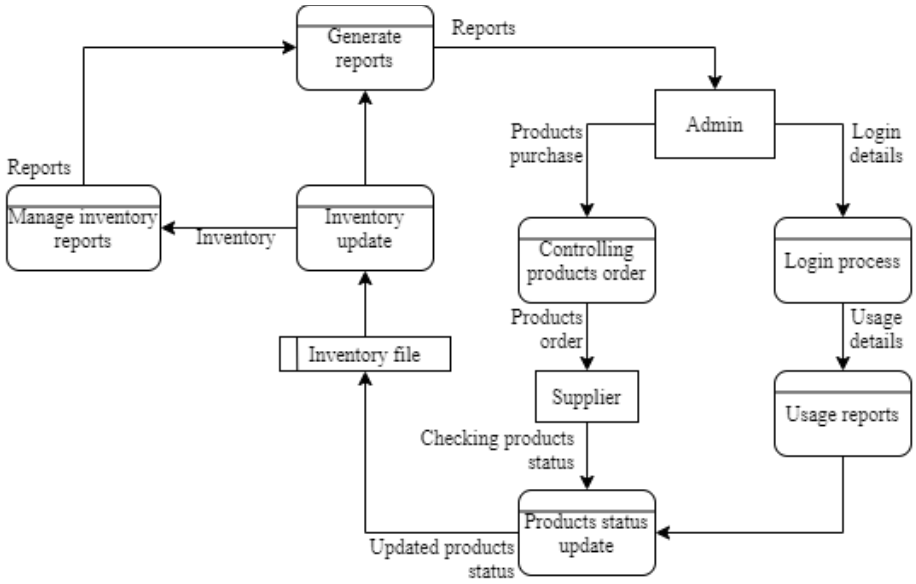

Figure 1. Data flow diagram proposed system

B. Activity Diagram

Figure 2 shows the activity diagram for purchasing goods starts with the initial nodes as the object being prefixed. Then proceed with 12 activities as a state of the system that reflects the execution of an action, including after the purchasing department makes a PO and then it is handed over to the supplier, the supplier receives the PO and then sends the goods, after the goods arrive at the warehouse in charge of checking whether the goods are on order or not. If appropriate, the goods will enter the warehouse and input into the system, otherwise the goods will be returned and also input into the system. In addition, there are also decision points that describe the transition relationship in the warehouse part when checking goods and the initial final node which is the final activity of the activity.

Figure 3 shows activity diagrams of the procedure for using goods are preceded by the initial nodes as the prefixed object. Then proceed with 5 activities as a state of the system that reflects the execution of an action, including the production section making a request for goods to be submitted to the warehouse, the warehouse department inputs the demand for goods into the system. Then the production department receives the requested item, then ends by the initial final node which is the final activity of the activity.

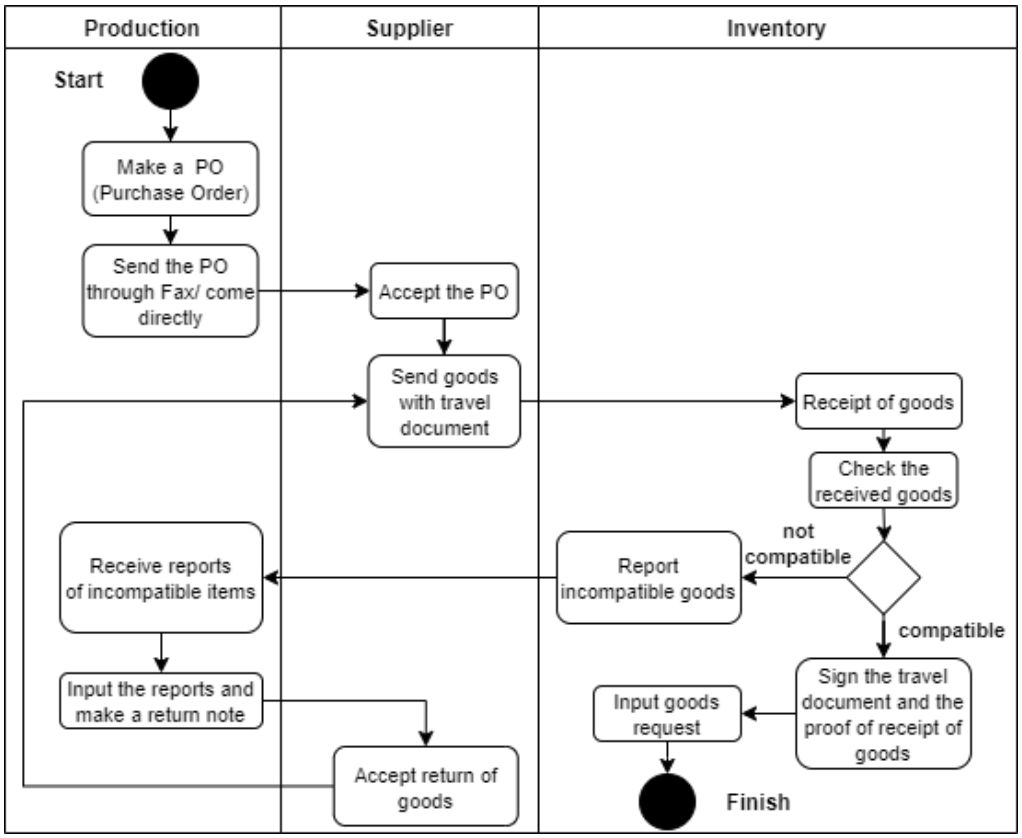

Figure 2. Activity diagram of purchasing goods

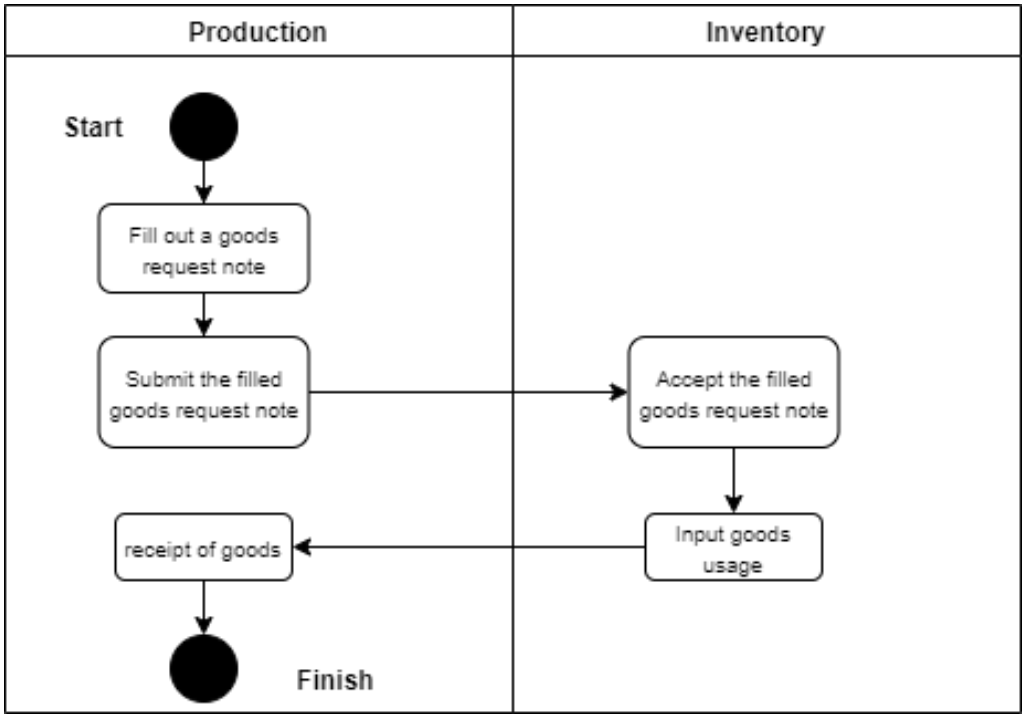

Figure 3. Activity diagram usage of goods

C. Decomposition Diagram

Figure 4 shows that in the decomposition diagram, there are 3 levels (levels), namely top level, level 0, and level 1. A level 0 diagram or it could be a context diagram is the lowest level diagram that describes how the system interacts with external entities. In the context diagram, a number will be given for each running process, generally starting from the number 0 for the initial start.

All entities in the context diagram including the data flow will be directed to the system. In this context diagram there is also no information about the data stored and the diagram display is relatively simple. At level 0, there are three entities, namely data collection, transactions and reports. DFD level 1 is a further stage about DFD level 0, where all processes in DFD level 0 will be detailed in full so that it is more complete and detailed. The existing main processes will be broken down into sub-processes. At this level there is a description of each entity at level 0, namely data material list, supplier list, incoming products transactions, outgoing products transactions, material data reports, supplier list reports, out-of-stock stock reports, stock receipts reports, stock release reports goods, and inventory stocks reports.

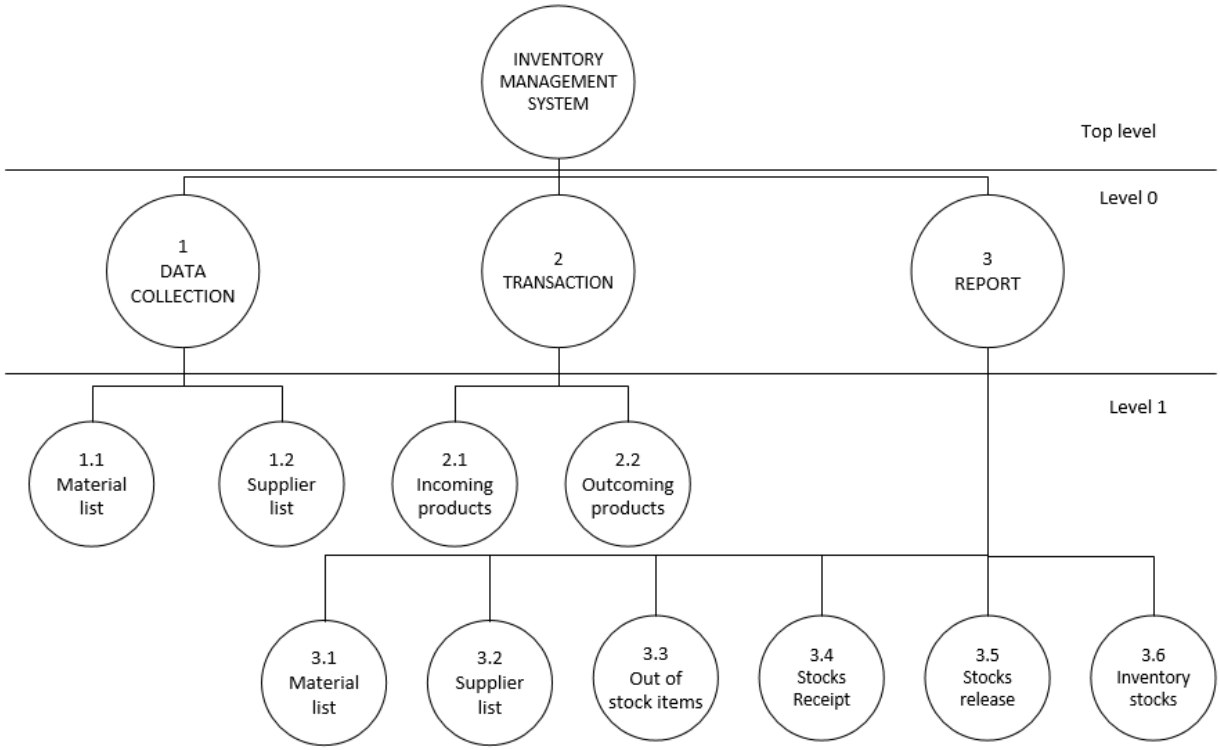

Figure 4. Decomposition diagram proposed system

D. Entity Relationship Diagram

Figure 5 shows that there are six tables in the proposed system ERD, namely user_details, category, supplier, material, usage, and material_use. The user_details table has attributes user_id, user_email, user_password, user_name, user_type, and user_status. The category table has the attributes category_id, category_name and category_status. The suppliers table has attributes supplier_id, supplier_name, supplier_status, and category_id. The material table has attributes material_id, material_name, material_desc, material_quantity, material_unit, material_price, material_tax, material_status, material_date, category_id, supplier_id, and material_entered_by. The usage table has the attributes usage_id, usage_date, usage_name, usage_desc, usage_status, usage_created_date, and user_id. The usage_material table has attributes atas_material_id, price, tax, kamu_id, and material_id.

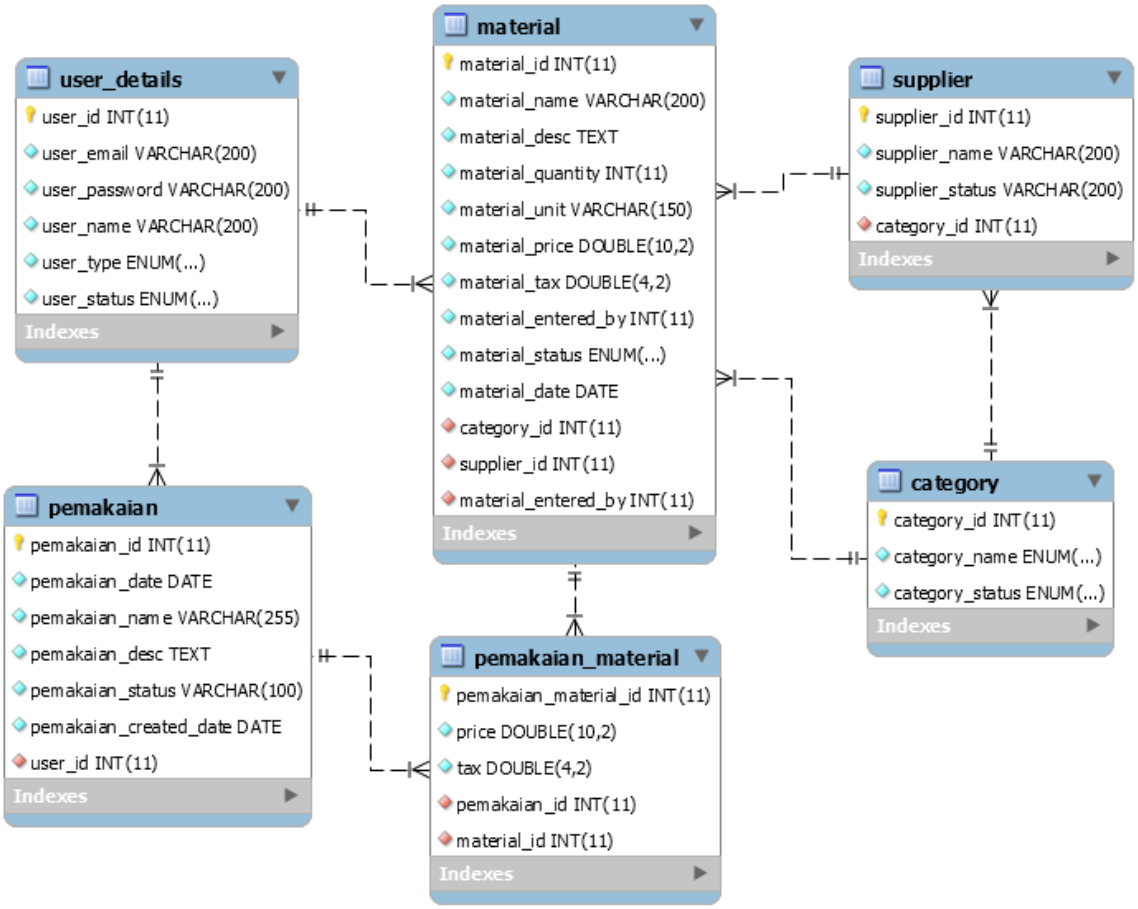

Figure 5. Entity relationship diagram proposed system

5.2 Prototype of Inventory Management Information

Figure 6 shows login page display on the warehouse management information system prototype which functions to enter admin information who will access the system that has been created. Admin must enter the appropriate email and password information to enter the system.

Figure 6. Login Page

Figure 7 shows a main menu display on the warehouse management information system which functions as main menu display.

Figure 7. Main menu

Figure 8 shows a display of the supplier menu page on the warehouse management information system prototype which functions to organize information about suppliers. Admins can add, edit, or delete suppliers. The admin can press the Add button to add a supplier which will bring up a form, shows in figure 9.

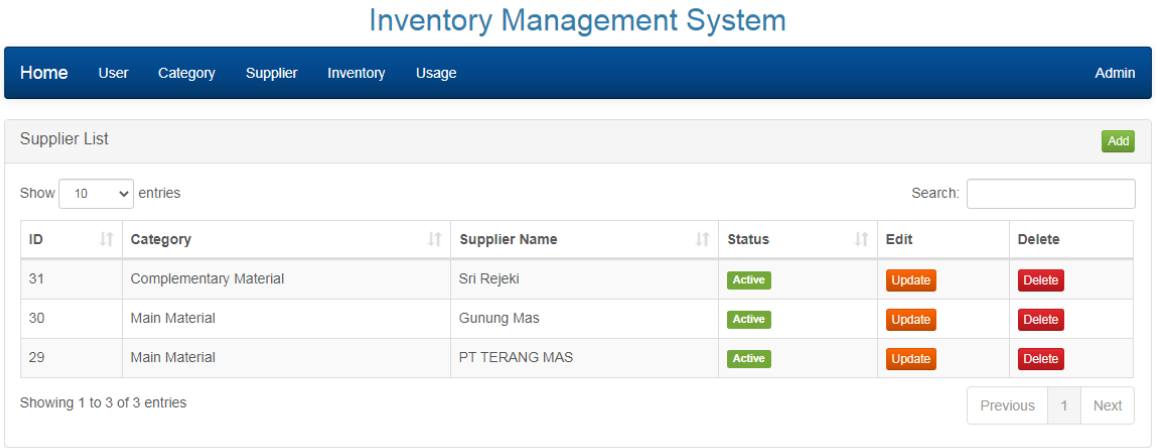

Figure 8. Supplier menu

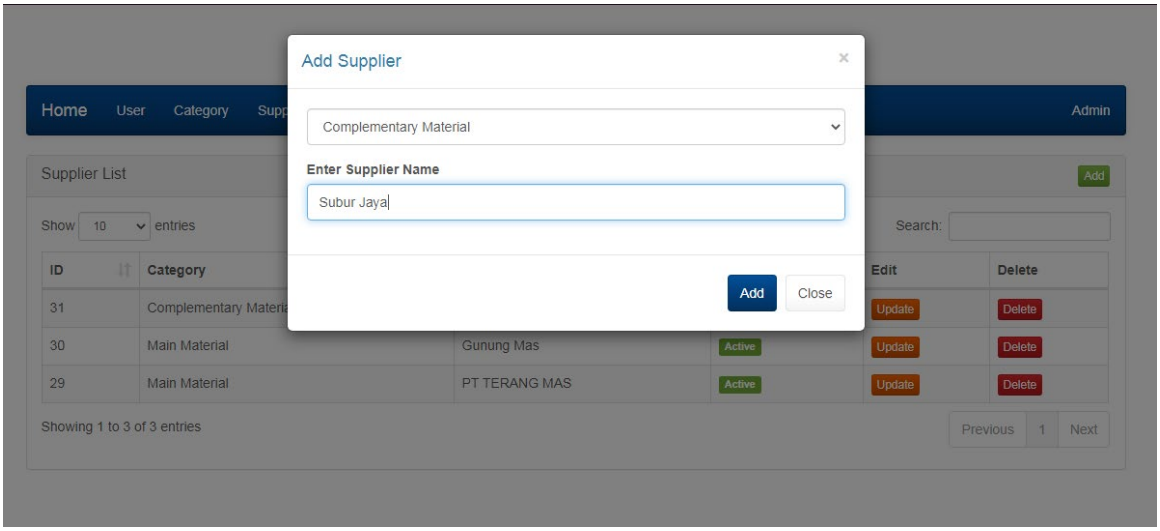

Figure 9. Form supplier

Figure 10 shows a display of the inventory menu page on the warehouse management information system prototype which functions to manage information about inventory. Admin can add, edit, or delete inventory. Admin can press the Add button to add inventory which will bring up a form shows in figure 11.

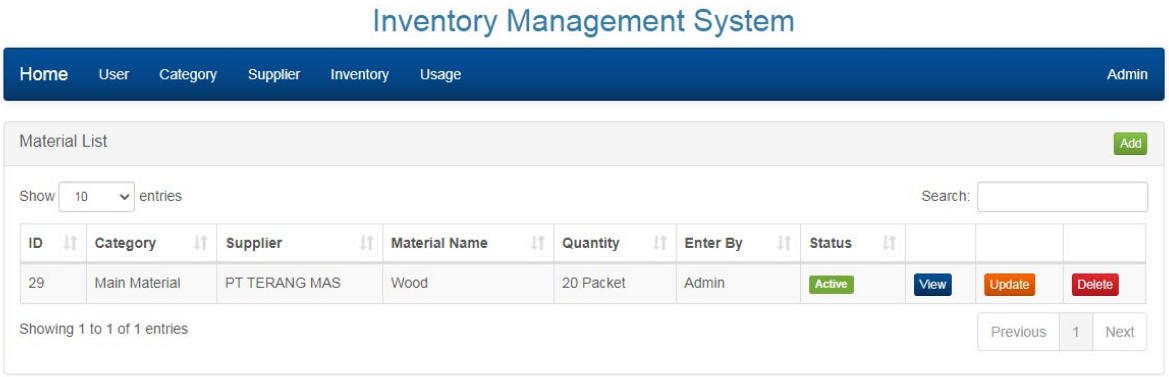

Figure 10. Menu inventory

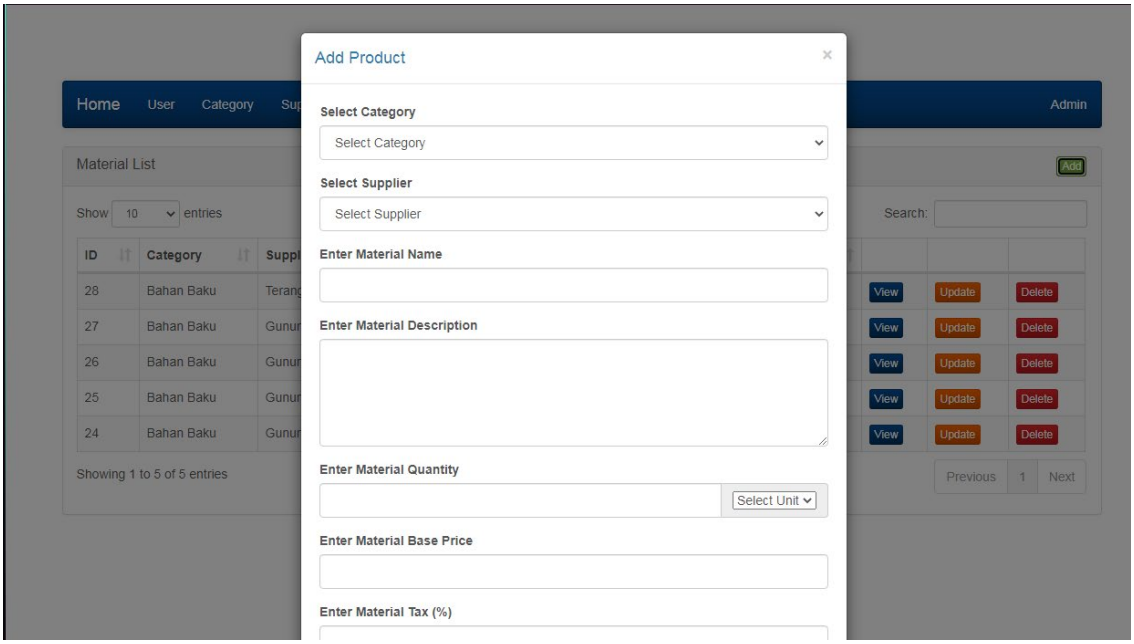

Figure 11. Form inventory

Figure 12 shows a display of the usage menu page on the warehouse management information system prototype which functions to manage information about inventory. Admin can add, edit, or delete material usage reports. Admin can press the Add button to add a usage report which will bring up a form, shows in figure 13.

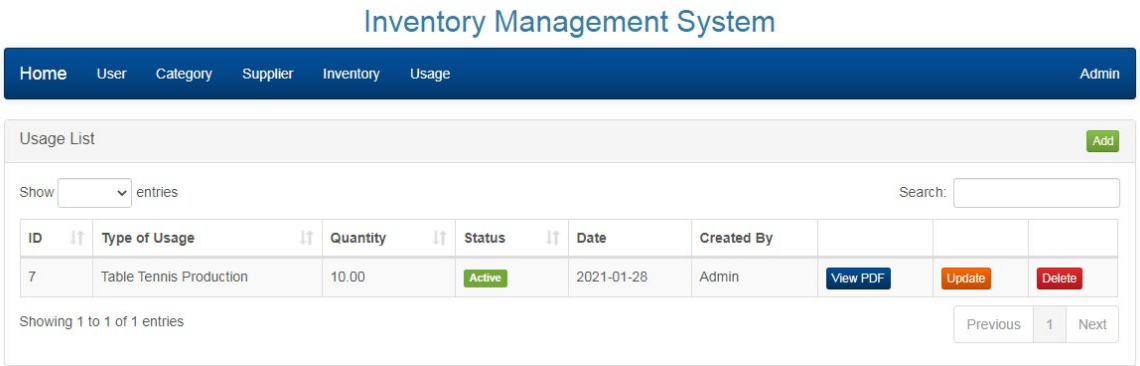

Figure 12. Usage Menu

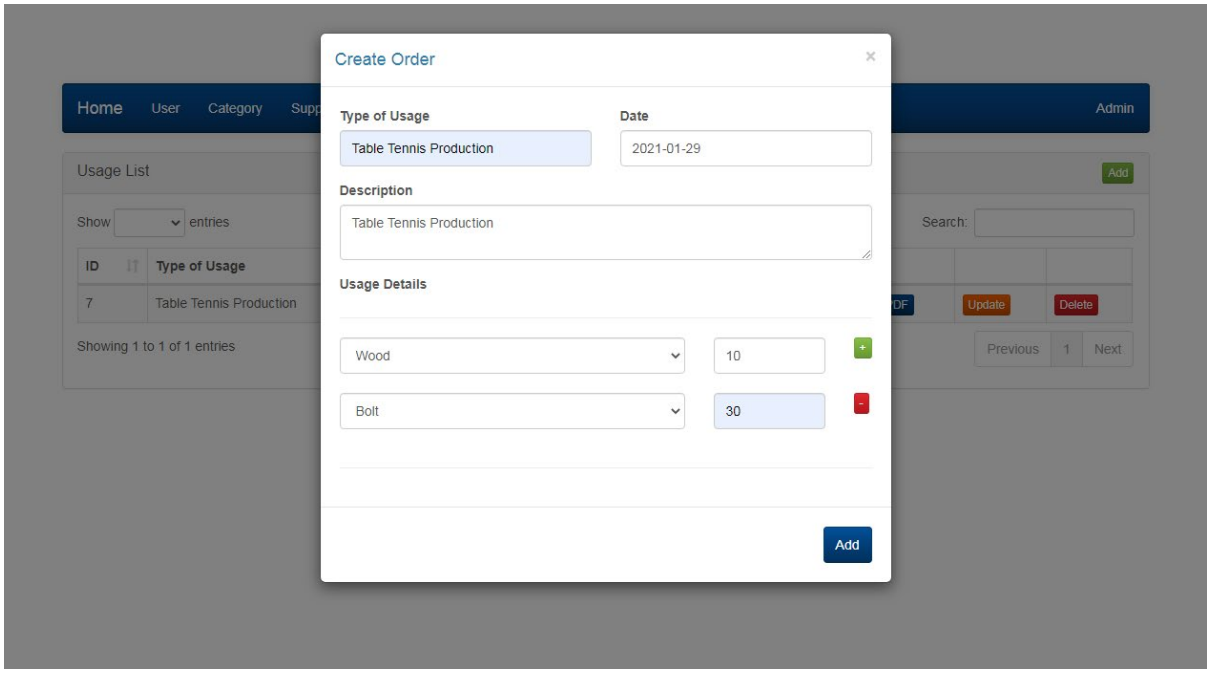

Figure 13. Material usage form

5.3. Analysis

The advantage for designing the inventory management system is to make it easier for the admin to record the remining material of production process and stock in the warehouse. When the material purchasing process is carried out, the company can calculate how much it will buy based on stock which is still remain in the warehouse.

After designing an inventory information system, the results show that the designed inventory information system are easily navigated, easier data input, can automatically calculate the stock of goods in warehouse and decide how many items are needed to be purchased.

The downside of this proposed system is that the system administator should learn from scratch before using this system, but it should not be difficult as the inventory information system is pretty straightforward.

6. Conclusion

In this research we develop an information system that can calculate the remaining stock of goods in the warehouse automatically when the administrators enters the number of incoming and outgoing goods and provide clues as to the number of items that need to be purchased by the company based on the actual stock quantity that is automatically calculated by the system. Besides, this system can help administrators to check the final stock amount of goods so that there are no errors in calculating the stock of goods.

References

Dennis A., Wixom, B. H., and Roth, R. M., System Analysis and Design Sixth Edition, United States of America: John Wiley & Sons, Inc, 2014.

Despa, M. L. (2014). Comparative study on software development methodologies. *Database systems journal*, 5(3), 37-56.

Fatima, F., Javed, M., Amjad, F., & Khan, U. G. (2014). An Approach to Enhance Quality Of The Rad Model Using Agents. *The International Journal of Science and Technoledge*, 2(13), 202-210.

Heryanto, A., Fuad, H., & Dananggi, D. (2014). Rancang Bangun Sistem Informasi Inventory Barang Berbasis Web Studi Kasus di PT. Infinetworks Global Jakarta (Web-Based Goods Inventory Information System Design, Case Study at PT. Infinetworks Global Jakarta). *Jurnal Sisfotek Global*, 4(2).

Kustiyahningsih, Y., Rosa, D., Pemrograman Basis Data Berbasis WEB Menggunakan PHP dan Mysql (*Web Based Database Programming Using PHP and Mysql*), Yogyakarta: Graha Ilmu, 2011.

Kritchanchai, D., & Suwandechochai, R. (2010). *Supply chain management in health sector in Thailand: a case study*. International Journal of Services, Economics and Management, 2(2), 211-224.

Lipursari, A., Peran Sistem Informasi Manajemen (SIM) dalam Pengambilan Keputusan (*The Role of Information Management System in Decision Making*), *Jurnal STIE Semarang*, Februari, 2013, vol. 5, no. 1

Rahman, M. A., Sarker, B. R., and Escobar, L. A., Peak demand forecasting for a seasonal product using Bayesian approach, *Journal of the Operational Research Society*, vol. 62, pp. 1019-1028, 2011.

Naz, R., & Khan, M. N. A. (2015). Rapid applications development techniques: A critical review. *International Journal of Software Engineering and Its Applications*, 9(11), 163-176.

Safdar, A., Inventory Management, Available : https://www.managementstudyguide.com/inventory-management.htm, February 2019.

Shetty, D., Ali, A., and Cummings, R., A model to assess lean thinking manufacturing initiatives, *International Journal of Lean Six Sigma*, vol. 1, no. 4, pp. 310-334, 2010.

Sohail, N., A Study of Inventory Management System Case Study. *Journal of Adv Research in Dynamical & Control Systems,* vol. 10, 10-special issue, 2018.

Sovia, R., & Febio, J. (2017). *Membangun Aplikasi E-Library Menggunakan Html, Php Script, Dan Mysql Database* (*Building E-Library Applications Using Html, Php Script, And Mysql Database*). Jurnal Processor, 6(2).

Ulinafiah, D., & Wiyani, N. A. (2019). Penciptaan Layanan Prima Melalui Penerapan Sistem Informasi Manajemen di Perpustakaan IAIN Purwokerto (Creating an Excellent Service through the Implementation of Management Information Systems at IAIN Purwokerto Library. *re-JIEM (Research Journal of Islamic Education Management),* 2(2), 223-239.

Winarno, E., and Zaki, S. A., (2014). Pemrograman Web Berbasis HTML5 (Web Programming Based on HTML5) *PHP, dan JavaScript, PT Elex Media Komputindo, Jakarta.*

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