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Open Source Based Enterprise Resource Planning

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ABSTRACT

In the era of the 4.0 industrial revolution, companies are trying to implement information technology to increase competitive competitiveness. Information technology is implemented within the company to increase productivity and help achieve quality, time standards, and satisfaction for consumers and employees, wherein business this is manifested in a set of systems consisting of information systems and supporting infrastructure. One solution is to implement a system to manage all company resources or what is called an Enterprise Resource Planning (ERP) system. Implementing an ERP system requires high costs and is highly dependent on the vendor. The purpose of this research is to build an ERP system on an open-source basis so that it can be used by middle to lower enterprises as an alternative to ERP systems to support the company's operations.

The ERP system was developed using the waterfall system development method. The result of this research is the development of an ERP system based on open source. The conclusion of this research is that the ERP system can be configured according to the needs of small and medium scale companies. Can record documentation of company operational activities. The centralized database system provides benefits for companies to view data on business operations. Suggestions given for further research are to develop warehouse management and material management modules

INTRODUCTION

In this era of industrial revolution 4.0, many companies are trying to implement information technology to increase competitive competitiveness. In today's business world, there is fierce competition. To survive, a company must have advantages such as low selling prices, accurate availability of goods, and promotion. For this reason, a company needs to have valid information in order to make the right decisions. The availability of valid information can be done by building an information system to provide information. With the existence of a company information system, it can easily get information, both related to the sales transaction process and even the availability of company activity reports (Firdaus, 2017). Information technology is implemented in the company to increase productivity and help achieve quality, time standards and satisfaction for both consumers and employees, where in business this is manifested in a set of systems consisting of information systems and supporting infrastructure. The capability of the information system itself is not limited to providing operational information but also can start from planning, resource management, and reporting for a company. This condition can be done if you use an information system such as Enterprise Resource Planning (ERP) (Akbar, 2015). The Enterprise Resource Planning system is one way

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of planning, managing all related matters within a company. The Enterprise Resource Planning system has the ability to increase efficiency and increase profits for the company (Perdamaian, 2015). In addition, Enterprise Resource Planning can integrate business components in a company from upstream to downstream, is flexible, and has the ability to generate data for analysis and planning (Purwanto, 2017). The concept of Enterprise Resource Planning can be adopted to build an information system that integrates company resources in the form of module packages, so as to provide services for company management in managing internal strength so as to generate benefits for stakeholders (Meizana, 2016). An Enterprise Resources Planning (ERP) or Integrated Management Software (PGI) is an information system that manages and tracks all the information and operational services in a company (Mohadab, 2017). Based on the literature review, the company experienced several problems. In the purchase process, data on material requirements for production do not match the purchase orders made by the purchase division. The ongoing process often results in documents that do not match the request with the purchase. In purchasing activities, there is often a difference in the recording between the goods requested, the goods ordered, and the goods received. Companies also have difficulty tracking the request history. In addition to the problems that occur today, namely implementing an Enterprise Resource Planning System system requires high costs and is very dependent on the vendor. In addition, currently, in Indonesia, there are not many Enterprise Resource Planning Systems that are open source, so it is very difficult for middle to lower enterprises to implement an Enterprise Resource Planning System. This difficulty is due to the very minimal budget for information technology in middle to lower class companies. Business functions in a company are separate and run separately, now the gap between functions can be eliminated and can be integrated with an Enterprise Resource Planning system. With the ERP concept, inter-functions can use the data contained in the company simultaneously. Thus the information received can be immediately known (real time) (Putri, 2016). At a time when business challenges are increasing, such as today by using an Enterprise Resource Planning system, companies will be able to have the right solutions to answer and overcome challenges that will be faced by the company. The implementation of the Enterprise Resource Planning system not only creates integrated business activities, but is also able to provide complete information about all aspects of the business that can help companies continue to develop their business for the better. The purpose of this research is to build an Enterprise Resource Planning system on an open source basis so that it can be used, accessed and modified by middle to lower enterprises as an alternative to the Enterprise Resource Planning system to support business operations. Open source software is code that is designed to be publicly accessible, anyone can see, modify, and distribute the code as they see fit. The advantages of an open source system are:

1. There is a right to distribute modifications and improvements to the code.
2. Availability of source code and rights to modify
3. Open source uses an open data format, so data is transparent and can be freely processed on different computer systems while maintaining its security. Thus, consumers are no longer tied to the willingness of vendors to be able to use their data.
4. Errors (bugs, errors) are found and fixed more quickly.
5. Cost effective.
6. Do not repeat development.
7. Users can make unlimited copies, sell or give away the license results.
8. Prevent unlawful privacy software

MATERIALS AND METHODS

ERP (Enterprise Resource Planning) is a multi-module, business packaging application solution that allows organizations to integrate business processes and company performance, general data distribution, resource management and provide real-time access to information. Authorization and the level of validity of data or information produced by a department have become mandatory for use by other departments (Widjaya, 2012).

The system development method used is a waterfall. Following are the phases in the Waterfall Model according to the Pressman reference

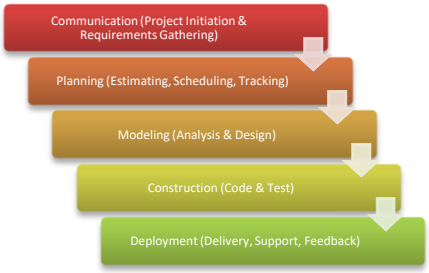

Figure 1.
Waterfall Model

1. Communication (Collection of Project Initiation & Requirements)
   In this stage, communication is carried out with parties related to the research topic, this is done to understand and achieve the goals to be achieved. The result of this communication is a project initialization that analyzes the very problems and collects the necessary data, and helps define the features and functions of the application. Data collection-additional data can also be taken from journals, articles, papers and the internet.
2. Planning (Estimating, Scheduling, Tracking)
   At the planning stage, it explains the technical tasks that will be carried out, the risks that can occur, the resources needed to create the system, the work products to be produced, the work scheduled to be carried out, and the tracking of the system work process.
3. Modeling (Analysis & Design)
   The system architecture design and modeling stage focuses on designing data structures, software architecture, interface displays, and program algorithms. The purpose of tapad analysis and design is to better understand the big picture of what will be done.
4. Construction (Code & Test)
   This stage is the implementation of design changes into machine-readable code or language form. After the coding is complete, testing the system and the code that has been made is also carried out. The tester's goal is to find errors that may occur to fix.
5. Implementation (Delivery, Support, Feedback)
   This deployment stage is the stage of software implementation, software repair, software evaluation, and software development based on the feedback provided so that the system can continue to run and develop according to its function.

Data collection technique is Literature review. A literature study is a data collection technique by conducting study studies of books, literature, notes, and reports related to the problem being solved. In this study the authors conducted a literature study by taking journal references, books related to research topics, including those related to ERP.

This sub-chapter explains what tools are used in this research. The devices used include software and hardware. The hardware and software specifications used in the trial are as in table 1:

Table 1.
Development Tool Specifications

No	Device	Specifications
Hardware		
1	Computer	Intel Pentium Dual-Core | Memory 1GB | HD 500GB (Windows 7)
Software		
2	Windows	7
3	XAMPP	For Windows 7.2.9
4	Notepad ++	Version 8.0

RESULTS AND DISCUSSION

Identify the company's business process system

The business process systems identified in the company are the flow of product sales, procurement and purchase of raw materials, production processes, and financial records.

1. Product sales
   Sales activity starts when there is an order from the customer to the sales department. The sales department will receive the order and will make a sales order. Sales orders are sent to the production department to calculate raw material requirements and proceed to the production process.
2. Financial
   Financial recording activities occur because of income and expenses by the company. Sales reports and purchase results reports will be used by the finance & accounting department as the basis for making financial reports such as income statements and balance sheets
3. Production process
   Production process activities consist of checking the production schedule. If the production schedule does not match, it will confirm to the sales department to negotiate with the customer. After agreeing with the customer, it will proceed to the next process. If the stock of raw materials in the warehouse is not available, the production department will confirm back to the sales department to negotiate with the customer.

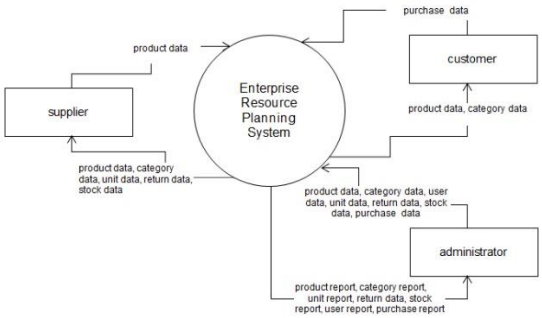

Figure 2.
Context Diagram

The construction stage is the stage of implementing the system so that it can be operated. At this stage, the Interface Implementation is explained. Here are some implementations of the Enterprise Resource Planning system that have been built:

This is the login page. For system access, users must log in by input their username and password.

Figure 3.
Login Page

The customer page is used to manage customer data. Customer data includes customer name, customer address, customer mobile number.

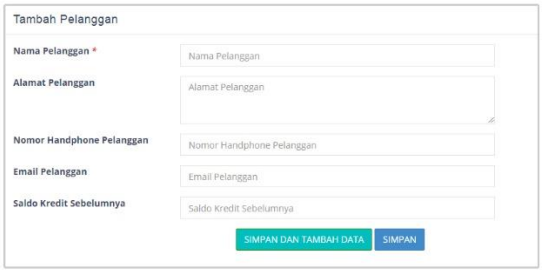

Figure 4.
Add Customers

The customer page is used to manage supplier data. Supplier data includes supplier name, supplier mobile number, supplier address, and supplier details.

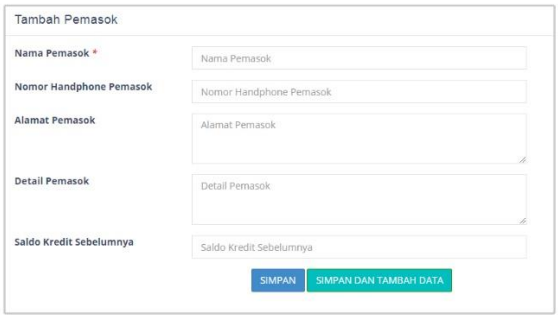

Figure 5.
Add Supplier

The purchase page is used to manage purchase data. Purchase data includes the name of the supplier, invoice number, details, date of purchase, and item information.

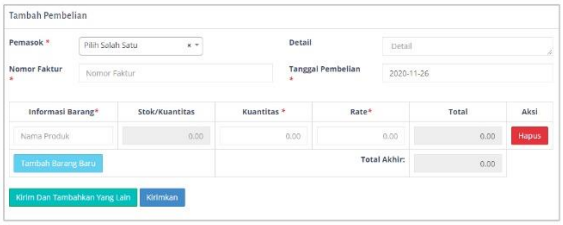

Figure 6.
Add Purchase

The product page is used to manage products. Product data includes product name, category, unit, tax, serial number, model, selling price, pictures, suppliers.

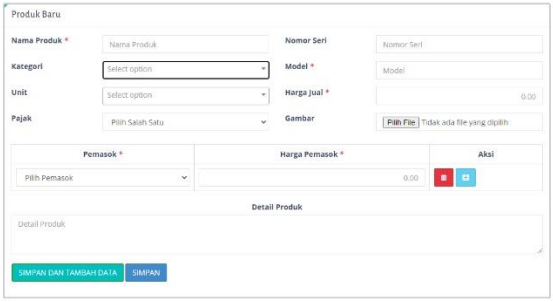

Figure 7.
Add Product

The unit page is used to manage the units as the unit measure for the product.

Figure 8.
Add Unit

The invoice page is used to manage invoice data. Invoice data includes customer name, date, item information.

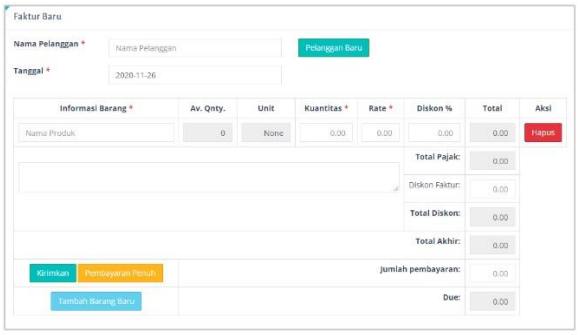

Figure 9.
Add Invoice

CONCLUSIONS AND SUGGESTION

After conducting research on the existing problems, it can be concluded that:

1. ERP system development modules are carried out based on an analysis of company requirements
2. The results of the implementation show that all needs can be followed up so that data integration for decision making (purchase orders) can be carried out accurately.
3. ERP systems are very suitable to be implemented for sales companies because they have features ranging from upstream (purchasing stock) to downstream (sales).
4. ERP system can be configured according to the needs of small and medium scale companies.
5. Can record documentation of the company operational activities.
6. The centralized database system provides benefits for companies to view data on business operations.

In connection with the results of the research that has been carried out by the team of authors, suggestions that can be submitted for further development of this ERP system are as follows: Suggestions given for further research are to develop warehouse management and material management modules.

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