Implementation Open Source System Resource Planning in Sustainable Supply Chain Management of Small and Medium Enterprise

Agung Terminanto[1], Achmad Nizar Hidayanto[2], Fajar Budi Utomo[3]

[1,2] Computer Science Department, Faculty of Computer Science, Universitas Indonesia, Depok, Indonesia
[3] Industrial Engineering Department, Faculty of Engineering, Pancasila University, Jakarta, Jakarta, Indonesia
[1]agung.terminanto@ui.ac.id
[2] nizar@ui.ac.id
[3] fajarbd3@gmail.com

Abstract— **In the production logistics context, the success of supply chains corresponds to their ability to meet the logistic performance expectations of customers. This ability depends on the contributions of all supply chain members to the logistical performance of the entire chain. Implementation of ERP system is one way that can be done to improve the performance of company. Implementation of ERP System using open source with ASAP method. Open source selected is Odoo. Use case modeling is used to design and describe user permissions. Created gap analysis and flow map of purchase orders process, incoming product and outbound input to compare business process before and after using Odoo. Implementation is initiated by restore master data activity. Furthermore, setting the Odoo on the Warehouse and Purchase module. After the implementation of Odoo in PT SJM, the existing documents can be accessed in real-time and increased efficiency of activity in the Warehouse, the amount of activity by 31%, the number of documents reduced by 50%, the efficiency traveled by 91% which is 48% faster, and all data is integrated into one database. This indicates that Odoo provides benefits for improving company performance.**

Keywords— *Metode ASAP, ERP Open Source, Odoo, modul Purchase, Warehouse.*

1. Introduction

Supply chain management constitutes a set of approaches utilized to efficiently integrate suppliers, manufacturers, warehouses, and retailers, so that merchandize is produced and distributed in the right quantities, to the right locations, and at the right times, in order to minimize system-wide costs while satisfying service level requirements. In the present era, the development of scope and mass expansion make companies inevitably implement Enterprise Resource Planning best practice systems that are useful for managing resources with best practice methods. With the implementation of the ERP system, it is expected that the system will be more integrated and efficient for the company.

PT SJM (Setiajaya Mobilindo) is a dealer of official sales outlets and after-sales outlets namely car sales, spare parts sales, car service, body repair, and other services needed by customers who have Toyota-branded vehicles. PT SJM is located on Jl. Parung-Ciputat KM.29, Kedaung, Sawangan, Depok City, West Java [1-3].

The business process that takes place in the company starts from the request for goods orders / car service from customers entering the service advisor, then to the foreman, servicing the car by mechanic, and ending up in billing.

The current information system in PT SJM is currently still using the system manually in the process of requesting goods, this allows the occurrence of errors in ordering goods and making monthly reports. Errors that occur as examples are the media used when ordering goods using the Whatsapp application, this is less effective if you want to evaluate the order of certain items. It is very difficult to find proof documents for the order process because the features in the WhatsApp application are very limited and result in delays in the delivery of goods. The following is a recapitulation of the comparison of estimates of freight forwarding and realization of receipt of goods shown in Table 1.

473

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

Table 1. Recapitulation of Delayed Delivery Data (Source: PT.SJM January-March 2018)

DATE OF DEMAND	PO NUMBER	REALIZATION OF RECEIPT OF GOODS	STATUS
5/1/2018	PO/PAR/VI/18/03	9/1/2018	Late
27/1/2018	PO/PAR/VI/18/04	31/1/2018	Late
12/2/2018	PO/PAR/VI/18/05	14/2/2018	On time
28/2/2018	PO/PAR/VI/18/06	29/2/2018	On time
17/3/2018	PO/PAR/VI/18/07	21/3/2018	Late
30/3/2018	PO/PAR/VI/18/08	4/4/2018	Late

Using a fishbone diagram will show the relationship between cause (Cause) and effect (Effect). First is the distribution of questionnaires that aim to determine the causes of delays in the delivery of goods. Then from the questionnaire obtained the following data:

Table 2. Data Tabulation Format (Source: Data Collection)

Respondent	Problem Factor														
	Manpower			Machines					Methods		Mother Nature		Material		
	1a	1b	1c	1d	2a	2b	2c	2d	2e	3a	3b	4a	4b	5a	5b
1	1	1	0	1	1	0	0	0	0	1	1	0	1	0	0
2	0	1	1	1	1	1	1	0	1	1	1	0	0	1	0
3	0	0	0	0	1	1	1	0	1	1	1	1	1	1	1
4	1	1	1	0	1	1	1	0	1	0	1	1	0	1	1
5	1	0	1	1	0	1	1	0	1	0	0	1	1	0	1
YES (1)	3	3	3	3	4	4	4	0	3	3	4	3	3	3	3
NO (0)	2	2	2	2	1	1	1	5	2	2	1	2	2	2	2

Table 3. Respondents' Answers According to Selected Categories (Source: Data Collection)

No.	Statement	Alternative Answers	
	Man Power	Yes	No
1a	Employees have a basic knowledge of the shipping process	3	2
1b	Skilled / expert employees in handling shipping handling activities	3	2
1c	Employees are disciplined when carrying out work	3	2
1d	Supplier cancels the order unilaterally	3	2
	Machines		
2a	Availability of operational fleet as needed	4	1

No.	Statement	Alternative Answers	
	Man Power	**Yes**	**No**
2b	Operational fleet maintenance is carried out periodically	4	1
2c	Computer physical age	4	1
2d	The system is not well integrated	0	5
2e	Electric current on the computer	3	2
	Methods		
3a	Coordination within the team runs according to SOP	3	2
3b	Arrangement and placement of goods	4	1
	Mother Nature		
4a	Arrangement and placement of goods	3	2
4b	Force majeure factor.	3	2
	Material		
5a	raw material factors are hard to find	3	2
5b	The same replacement of goods due to rare items	3	2

From the graph above, it can be concluded that the factors that are very influential in the process of delaying goods are that the system is not integrated in the warehouse section with a percentage value of 100%. Based on the existing problems, an ERP system that has a strong integration system can support to be a repair solution to problems in the company [4].

With this background, the writer as an Industrial Engineering Student who studies warehouse science, business processes and ERP systems will conduct research related to this in PT SJM. The research is in the form of the implementation of an open source ERP system in the warehouse section of the company.

2. Literature Review

2.1 Business process

Understanding Business Process According to [7] business process is defined as a collection of work relationships that together produce value for customers. Another definition of business process is a collection of interrelated work to solve a particular problem, can be broken down into several sub processes that each has its own attributes but also contribute to achieve the objectives of its super process.[1]

2.2 Business Process Classification

There are various ways to classify business processes, along with the classifications cited from [6] classifying business processes into: Main Processes (Primary processes) : Processes that produce value in the company ranging from material receipts from suppliers to activities on the part of customers. Supporting Processes : Processes that do not directly generate value but are needed to support the main process. Development Process (Development processes) : Processes to improve the performance of the value chain with the main and supporting processes.

2.3 Enterprise Resource Planning (ERP)

The ERP concept can be run well, if supported by a set of applications and computer infrastructure both software and hardware so that data and information processing can be done easily and integrated. Therefore, it is almost impossible to realize the ERP concept without the support of a computer-based system [1]. Basic ERP concepts, namely [OLS-2004]: ERP consists of a commercial software package that ensures seamless integration of all information flows in the company, including finance, accounting, human resources, supply chains, and consumer information ". An ERP system is an information system package that can be configured, which integrates information and information-based processes inside, and crosses

functional areas within an organization. One database, one application, and one unified interface throughout the enterprise ".

The main ERP concepts are described in one diagram, by Davenport, as in Figure 2:
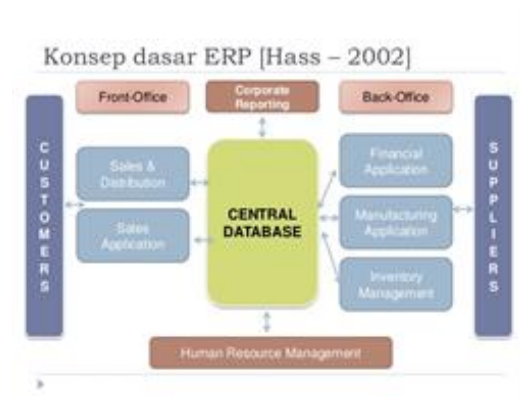

Figure 1. Basic Concepts of ERP

2.4 Benefits of Enterprise Resource Planning (ERP)

Regarding the benefits of ERP systems for companies, there is a general perception that may not be appropriate, namely that the implementation of ERP systems will increase the company's functionality quickly. The achievement of high expectations in the form of cost savings and service improvements depends very much on how far we choose an ERP system that is in line with the company's functionality and how optimally we modify and reconfigure the processes in the system to fit the business culture, strategy, and company structure. (Isnaeni & Komputer, 2008) Some of the advantages of using an integrated information system in this ERP concept include the following: ERP offers an integrated system within the company, so that processes and decision making can be carried out more effectively and efficiently. ERP also allows integration globally. Obstacles that used to be currency differences, language differences, and cultural differences can be bridged automatically, so that data can be integrated. ERP not only integrates data and people, but also eliminates the need for updating and correction of data on many separate computer systems. ERP allows management to manage operations, not just monitor them. With ERP, management is not only able to answer the question 'How is our situation right? our condition?, but also able to answer the question 'What do we do to be better?'. ERP helps accelerate the implementation of supply chain management with the ability to integrate it.

Overall, the ERP system is expected to improve the backbone of the functionality, both at the operational part and the interface with consumers simultaneously. To achieve these benefits, the company must carry out a series of processes and business, some of which can bring problems, so it is often considered as one of the risks that must be borne when implementing ERP.

2.5 Types of Enterprise Resource Planning (ERP) Applications

To implement Enterprise Resource Planning (ERP) in a company, there are many applications that can be used as alternatives to building an ERP system in accordance with the needs and capabilities of the company. The following are some ERP applications: Commercial ERP software vendors include: SAP, Oracle, People Soft. Open Source System ERP software vendors include: OpenERP / Odoo, Openbravo, Compiere, Adempiere, etc. OpenERP Odoo or previously OpenERP is a modern and complete ERP (Enterprise Resources Planning) application that is distributed open source in which there are various business application programs including Sales, CRM, Project Management, Warehouse Management, Manufacturing, Finance and Accounting, Human Resources and others [8]. Odoo (OpenERP) is an open source company management software. This application is able to do all company automation, covering most of the needs and processes of an integrated company [4]. Fabien Pinckaers, founder and CEO of Odoo S.A, developed TinyERP in 2005. Fabien wants to make products and companies that are major players in the management software business using open source products. TinyERP is converted to OpenERP so that it can be known and enter large companies [5]. Each of these vendors certainly has the distinctive characteristics and characteristics of each product. The business owner can determine which ERP product is best suited to the basic philosophy and characteristics of the company by understanding the information about it.

2.6 Purchasing & Warehouse Management

Purchasing According to [4] purchasing or purchasing is a very important function in the success of a company. The function that is responsible for getting the quantity and quality of materials available in the time needed at the appropriate price and at the prevailing price.

476

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

Supervision needs to be carried out on the implementation of this function, because the purchase is an investment of funds in terms of inventory and a smooth flow of materials into the plant. [2]

Warehouse Management manages all processes starting from receiving, storage, picking, and shipping. In addition, in the warehouse there is also inventory management. Where inventory is very risky in a warehouse management. How to regulate whether in the warehouse requires inventory or not, and manage so that the goods are maintained in quality. Warehouse Management is part of the company's supply chain, which depends on the functions of other companies, namely the Purchasing and Sales section. Therefore Warehouse Management is also connected to the system of these functions, for example in the process of receiving orders, purchasing, production, and others. [3,7].

2.7 Warehouse Module On Odoo

Is a module that describes the operation of the warehouse in a company, the warehouse module is used to regulate so that there is no data error in the warehouse section [6]. Here are the features of the warehouse module that will be used in this study: Create push / pull logistics rules, make moving items automatically when goods enter a warehouse location. Allow chain on deliveries, record claims on receipt and delivery of goods. Allow to define several packaging methods on products, recording product packaging when moving goods transactions. Decimal precision on weight, Determines how many decimal digits on the product weight.

2.8 Accelerated SAP Method

SAP accelerated is an ERP development method from SAP. SAP utilizes the core of methodologies and tools to develop fast, reliable results, and to help users get the best solution for a business. The methodology also has efficient guidelines for Service Oriented Architecture (SOA), Business Process Management (BPM), and traditional implementation through the project life cycle from evaluation through delivery to include project solution management and operations. [2] There are five main stages, namely project preparation, business blueprint, realization, final preparation, and go live & support.

3.   Research Methodology

3.1 Object Of Research

The object of research in this discussion is the data of goods purchase in the purchase section in the Request for Quotation, Customer Invoice and Supplier Invoice activities. The object of this study was taken at a car service company at PT SJM. The object of research in this discussion can be obtained from the Purchsae and Warehouse sections at PT SJM. This research was conducted from January 2018 to March 2018.

PT SJM is a company that runs in the field of car service services, business processes that have been running on the company have been running quite well. But in reality the existing integration system for running business processes that are already good enough is very weak. This is the cause of the company has not been maximal in carrying out its operational activities. From these deficiencies, it becomes a problem that will be examined and written as the author's Final Project research.

After identifying the beginning of this research, a solution was found to solve the problem by implementing an ERP system in the company. With an ERP system, business processes that were previously not integrated will be very well integrated. Using a database by applying prototypes using cloud. This research is aimed at the part of warehose found in the company. The warehouse section applied in this study is the Request for Quotation, Customer Invoice and Supplier Invoice activities.

The ERP system in the purchase section with the above activities is implemented using open source software, Odoo with module purchase. Therefore, the author determines that the problem that will be examined and discussed in this scientific work is a very weak integration system and must be corrected in PT SJM especially the purchase section by focusing on the Request for Quotation, Customer Invoice and Supplier Invoice activities.

This study aims to provide solutions to the problems that occur in PT SJM by implementing an ERP system that supports a strong integration system by using Odoo software on purchase and warehouse modules.

3.2 Preliminary Studies

In this study there are several studies to support this research carried out and written in a scientific

477

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

work. There are two studies namely, literature studies and journal reviews, field studies. The following is an explanation of these studies: Literature study and journal review. This study is used in making theoretical foundations related to research. Literature studies can be obtained from articles, previous research, books and journals. In addition, the company's archives also become a literature study as a research support. In this study, literature studies and journal reviews that discuss system development, ERP systems, Odoo, and purchase and warehouse at Odoo. Company archives in the form of archives about purchasing section activities that support this research. Field studies were carried out at PT SJM especially the warehouse section to obtain accurate information and data and needed to solve problems that were the subject of the writing of this final project by observing directly into the field. Field studies were obtained through direct interviews with the company.

3.3 Analysis of Research Needs

In this research activity there are several requirements for implementing ERP systems using Odoo in the purchase and warehouse modules that have been analyzed. The needs of this study include: Knowing the business processes that take place at PT SJM and the business processes that take place in the parts of the purchase and warehouse in the company, especially in the Request for Quotation, Customer Invoice and Supplier Invoice activities. Installation for Odoo and purchase and warehouse modules. The data is in the form of accounting company records relating to Request for Quotation activities, Customer Invoice and Supplier Invoice.

3.4 Identification of Odoo Module Framework

The identification of the Odoo module framework is done by identifying the business processes in the purchase and warehouse modules in Odoo. Business processes that have been identified in Odoo's purchase and warehouse modules will be used as a benchmark or reference for developing business processes that are taking place in the company. The result of identifying the purchase and warehouse module framework in Odoo supports the subsequent processes to the Odoo module for the purchase and warehouse implementation. This Odoo module framework identification is specifically focused on the

purchase section by focusing on Request for Quotation activities, Customer Invoice and Supplier Invoice.

3.5 Design and Application Of Odoo

At this stage the initial planning is the process of determining the system design goals. After having a goal, the scope of the system or the limitations of the system is needed, then equating perceptions and views about how the company will implement the system. At this stage, mapping of existing business processes and proposed business processes is done through gap analysis.

The next step is to configure the basic system. The final step is the adjustment and improvement of the system to ensure that the fulfillment of the company's business needs is in accordance with the planning carried out. After all modules are integrated, integration testing and testing is carried out by the user, and if there are still requirements based on unfulfilled objectives, it will be an iteration seen from the objectives that have not been met. After the user feels the system application is appropriate, documentation is made of the final preparation.

There are five main stages, namely project preparation, business blueprint, realization, final preparation, and go live & support. There are research phases using the ASAP method which consists of:

Project Preparation At this stage the initial planning is the process of determining the system design goals. After having a goal, the system scope or system boundary is needed.

Business Blueprint This stage is the stage used to equate perceptions and views about how the company will implement the system. At this stage mapping of existing business processes and business processes is proposed through gap analysis.

Realization This stage is the stage of implementing the system within the company based on the needs and business processes of the business blueprint stage. The first step is to configure the basic system. The final step is the adjustment and improvement of the system to ensure that the fulfillment of the company's business needs is in accordance with the planning carried out.

Final Preparation After all modules are integrated, integration testing and testing is carried out by the user, and if there are still requirements based on the objectives that have not been fulfilled it will be

iterated to be seen from the unmet objectives. After the user feels the system application is appropriate, documentation is made of the final preparation.

Go Live & Support This stage is not carried out due to limited time and research costs and implementation and monitoring decisions are on the company side. Then the final stage in this study the researchers provide conclusions about the object that has been studied.

4.   Results And Discussion

4.1 Project Preparation Stage

The Project Preparation stage is the initial stage in using the ASAP method. At this stage contains a preliminary analysis of the needs of the study which includes determining objectives, determining scope, literature study and field studies. Then a risk analysis is possible which will occur if the ERP implementation is carried out in the company.

4.2 Determination of SCM in SM Enterprise

Implement ERP systems in business processes at PT SJM warehouse division using Odoo module purchase open source and warehose.

Integrating the purchase and warehouse activities carried out by the warehouse section with the purchase and sales section.

The scope of this research only reaches the Odoo ERP software implementation stage, especially the purchase and warehouse modules in the activities, namely: Research is only carried out until the Final Preparation stage. The implementation of the system is only in the warehouse division and the part related to the warehouse section of PT. SJM. Making reports on the warehouse division regarding the availability of goods and the purchase of goods.

4.2.1 Literature And Field Study Study

SCM is internationally accepted by research and industrial practice as one element of the business strategy. Within the scope of SCM it is essential to operationalize the objectives which have been defined within the supply chain strategy. For this purpose relevant functions and tasks can be differentiated by their planning horizons and their objective targets. Therefore, a number of different SCM-concepts and SCM-methods as well as Best Practice examples exist to realize the possible potentials in supply chains. In this study there are several

studies to support this research carried out and written in a scientific work. There are two studies namely, literature studies and journal reviews, field studies. The following is an explanation of these studies: Literature study and journal review. Literature study is carried out by looking for theoretical references relevant to research. This study is used in making theoretical foundations related to research. Literature studies can be obtained from articles, previous research, books and journals. In addition, the company's archives also become a literature study as a research support. In this study, literature studies and journal reviews that discuss system development, ERP systems, Odoo, and purchase and warehouse at Odoo. Company archives in the form of archives about the purchase and warehouse activities that support this research. The field study was carried out in a bolt-making plant, namely PT SJM, especially the purchase and warehouse section to obtain accurate information and data and needed to solve problems that were the subject of the writing of this final project by observing directly into the field. Field studies were obtained through direct interviews with the company.

4.3 Business Process Analysis Of Pt. Sjm

PT. Setiajaya Mobilindo (SJM) Parung is a dealer of official sales outlets and after-sales outlets namely car sales, spare parts sales, car service, body repair, and other services needed by customers who have Toyota-branded vehicles. PT SJM is located on Jl. Parung-Ciputat KM.29, Kedaung, Sawangan, Depok City, West Java. PT. Setiajaya Mobilindo has 1 Head Office and 5 Branches located in Depok, Bogor, Cibubur, Cimanggis and Parung. In carrying out each of its activities, PT. SJM is always based on the Vision and Mission that the company has made.

PT. SJM has an organizational structure that is divided into several departments or divisions to run the company's business processes. PT. SJM is directly led by a board of commissioners who supervises the president director in charge of the Branch Manager, then the Branch Manager oversees four main divisions namely the Customer Retention Coordinator (CRC), administrative division, service division and marketing division.

PT. Setiajaya Mobilindo is engaged in car service on a regular basis and the sale of spare parts is included in service companies, namely companies

479

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

whose activities are to service cars, and sell parts needed by customers.

The process begins with the customer who will service the vehicle. Service Advisor will listen to customer requests and record type / date / time / service estimation. Then the Service Advisor will make an order service (Work Order).

After that the WO will be handed over to the foreman. Foreman will allocate work to the mechanic based on the time and level of physical examination of the expertise needed to complete the work.

Then the mechanic carries out the maintenance of the vehicle according to the order and the time specified and coordinates with the part department regarding the parts needed. Then the mechanic will confirm to Foreman if the work has been completed according to the order. The vehicle that has been completed by the mechanic will be carried out a final inspection by the foreman.

After that, foreman will confirm the controller and service advisor officer that the work has been completed. After receiving confirmation from Foreman that the vehicle has been completed, the service advisor will prepare the bill for the customer.

Then the service advisor contacts the customer that the vehicle has been completed. When handing over the service advisor will explain again the work done and the benefits and show the parts that are replaced to the customer.

4.4 Business Blueprint Stage

At this stage an analysis of the current condition of the company will be carried out in the form of an analysis of the current business processes and an analysis of the ERP business process. In analyzing the current conditions in the company, the researcher conducted an interview with the Service Manager and the Coordinator of the PT SJM Warehouse Section to become the As Is document. Whereas for the analysis of ERP business processes, researchers analyzed based on the ERP business process of the Warehouse module based on the sources that the researchers used to become a To Be document.

In this stage, what is being done is analyzing the company's current production process, analyzing the production business process at Odoo, analyzing the gap / fit, designing the proposed production business process, and designing a system design in the form of use case diagrams and activity diagrams..

4.5 Current Warehouse Business Process

Besides involving the warehouse section, it also involves the purchase and production (service) sections. The process begins with the customer who will service the vehicle. Service Advisor will listen to customer requests and record type / date / time / service estimation. Then the Service Advisor will make an order service (Work Order).

After that the WO will be handed over to the foreman. Foreman will allocate work to the mechanic based on the time and level of physical examination of the expertise needed to complete the work.

Then the mechanic carries out the maintenance of the vehicle according to the order and the time specified and coordinates with the part department regarding the parts needed. Then the mechanic will confirm to Foreman if the work has been completed according to the order. The vehicle that has been completed by the mechanic will be carried out a final inspection by the foreman.

After that, foreman will confirm the controller and service advisor officer that the work has been completed. After receiving confirmation from Foreman that the vehicle has been completed, the service advisor will prepare the bill for the customer.

Then the service advisor contacts the customer that the vehicle has been completed. When handing over the service advisor will explain again the work done and the benefits and show the parts that are replaced to the customer. Business process flow at PT. SJM as a whole can be seen in Figure 2.
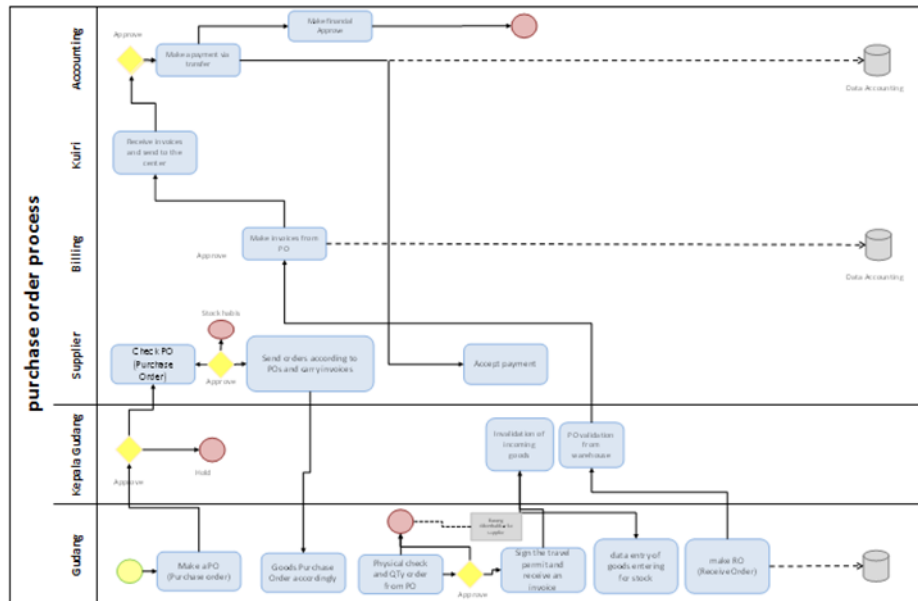
Figure 2. PT SJM Business Process (actual)
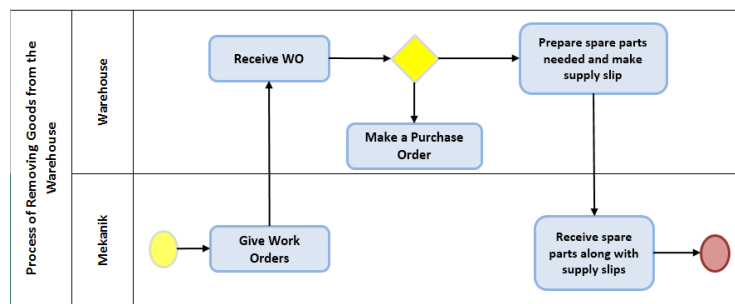
Figure 3. PT Setiajaya Mobilindo (actual) Goods Expenditures Process

The process of removing goods begins with customers who will service the vehicle. The service advisor will listen to customer requests and record the type / date / time / service estimate. Then the service advisor will make an order service (Work Order). After that the WO will be handed over to the foreman. Foreman will allocate work to the mechanic based on the time and level of physical examination of the expertise needed to complete the work. Then the mechanic carries out vehicle maintenance accordingly order and time specified, and coordinate with the warehouse department regarding the parts needed. If the required part is not available, the warehouse admin will make a purchase order.

After the warehouse admin checks the goods, if the goods in the warehouse have reached the safety stock limit, the warehouse admin will make a purchase order. Then the PO must be approved by the Head of the Workshop. After the approve PO will be sent to the supplier for the purchase of goods via Whatsapp. The supplier carries ordered items based on the PO with invoices, travel documents, tax invoices and receipts. Then the goods are checked by the warehouse admin if they are in accordance with the invoice, the goods are received by the warehouse with proof of signature and company seal. If it is not suitable, it will be returned to the supplier. Then the warehouse admin inputs data based on the invoice received.

After inputting the admin warehouse data to make RO (Receive Order), the Receive Order is the result of receiving spare parts orders that show in detail based on quantity, unit price and the total amount to be paid later. This receipt order will be compared to the suitability with the purchase order submitted earlier. Then the part makes the payment invoice based on the RO which is then sent to the Central Accounting via courier. Accounting validates based on items received in the warehouse. After all the files have been validated then accounting makes payments via bank via transfer to the supplier.

481

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

Figure 4. Process of Making Purchase Orders for PT Setiajaya Mobilindo (actual).

4.6 Application of Supply Chain Management

After analyzing the gap that arises between the actual PT SJM warehouse business process and the openerp warehouse business process, then designing new business processes that have been adjusted according to existing needs. In this case the target business process for PT SJM remains divided into two, it's just different naming, namely the business process planning the ordering of goods and the receipt of goods and the business process of spending goods. At first the warehouse section checks the availability of goods in the warehouse, whether routine checks or orders made by the customer. After that admin warehouse makes purchase order.

Then the PO must be approved by the Head of the Workshop. After the approve PO will be sent to the supplier for the purchase of goods via Whatsapp. The supplier carries ordered items based on the PO with invoices, travel documents, tax invoices and receipts. Then the goods are checked by the warehouse admin if they are in accordance with the invoice, the goods are received by the warehouse with proof of signature and company seal.

4.7 Use Case Diagram

Use case diagrams are used during the analysis process to find system requirements and to design system functionality. In this study use case diagrams are used to describe the access rights of each actor. Administrator Actors generally have a function to manage users such as creating accounts and setting access rights. The head of the purchasing department has access rights to access all activities that occur in the purchase management module and can only see the product in the warehouse management module. The principal of the warehouse head of raw materials has access rights to access all activities in the warehouse management module. The list of users and access rights can be seen in Table 4.1.

Table 4. Functional Requirements for User Module Manufacturing (Source: Data Collection)

User	Functional Needs
Manager Warehouse	make a quotation
	change quotations
	delete quotations
	print quotation
	make purchase order
	change purchase order
	delete purchase order
	print purchase order
	Approve Request for Quotation
	see the purchase analysis
	see warehouse analysis
	See the product
	Record invoices
	make supplier data
	change supplier data
	delete supplier data
Staff Warehouse	make a quotation
	change quotations
	print quotation
	make purchase order
	change purchase order
	print purchase order
	See the product
	Record invoices
	make supplier data
	change supplier data

Functional Requirements for User Module Manufacturing (Source: Data Collection)

Based on the user's functional requirements, it takes as many as 2 users consisting of warehouse manager and warehouse staff. Use case diagrams that describe the system's functional requirements can be seen in Figure 4.7.
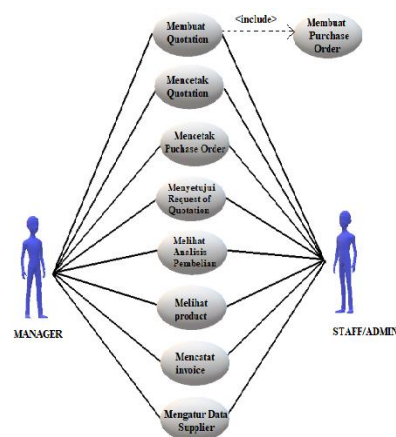
Figure 5. Use Case Diagram of Warehouse and Purchase Modules

483

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

4.8 Activity Diagram Creating Quotation

Make the quotation data done by the warehouse staff. The warehouse staff enters the required data, such as: product name and number of products. After completion, save the quotation data. Activity diagram makes a quotation can be seen in Figure 4.8.
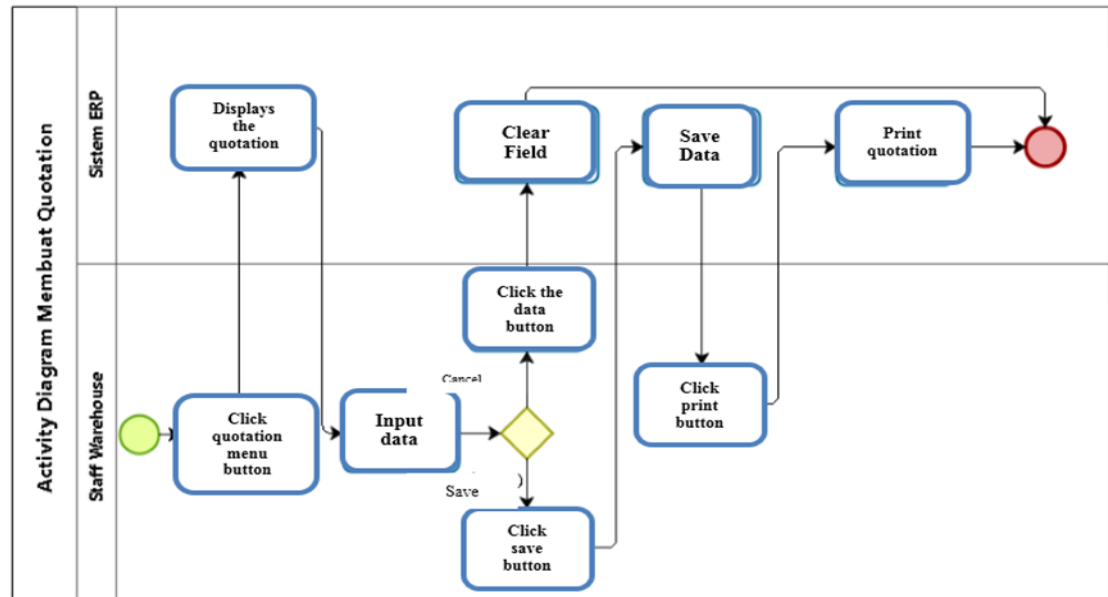
Figure 6. Activity Diagram Making Quotation

4.9 Activity Diagram Creating a Purchase Order

Make the purchase order done by the admin / staff warehouse, After the PO gets approval from the Purchase Manager, the form will immediately be sent to the destination Supplier. After arriving at the specified Supplier, the Supplier will verify the PO by sending a reply email and sending the order material to the company. The output of this process is PO confirm. PO status is done if the Receive Product button on the PO form is clicked. Activity diagram making purchase order can be seen in Figure 4.9.
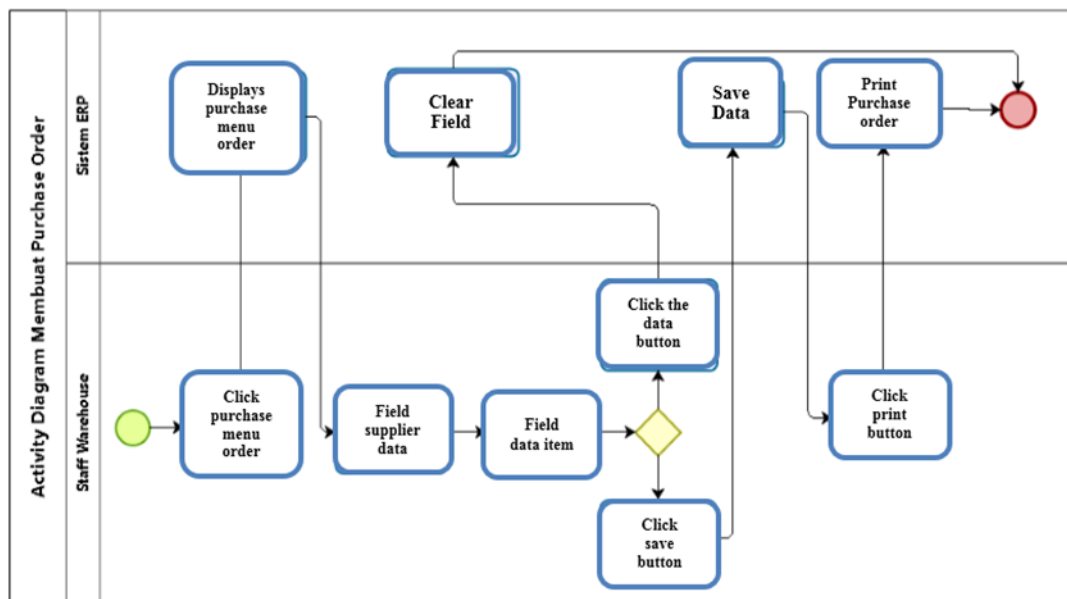
Figure 7. Activity Diagram Making a Purchase Order

4.10 Activity Diagram Making and Viewing Products

Make product data done by the warehouse manager by using the product menu then fill in the product data when you want to create a new data product, and select enter the product name to find an existing product. Activity diagram making and seeing products can be seen in Figure 4.11.
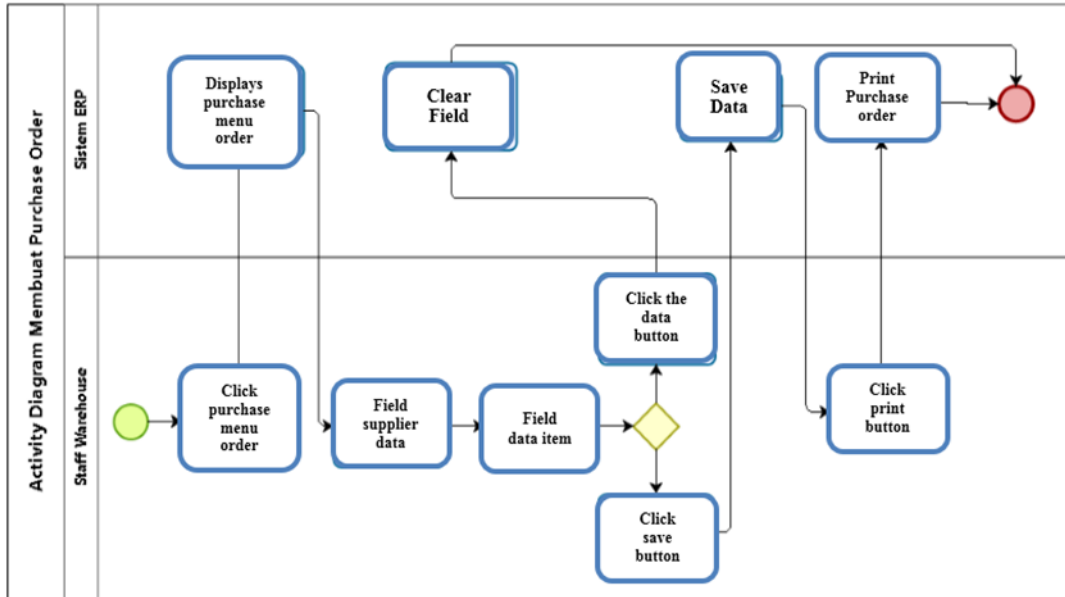
Figure 8. Activity Diagram Making and Viewing Products

4.11 Activity Diagram Receiving Goods

Receiving goods is done by the warehouse staff, when the goods that have been ordered come from the supplier, the warehouse staff will check the goods, whether they are in accordance with the request. After in accordance with the request, the item will be placed in the location that is already available, after that the data updates the data in the system then save. Activity diagram receiving goods can be seen in Figure 4.12.
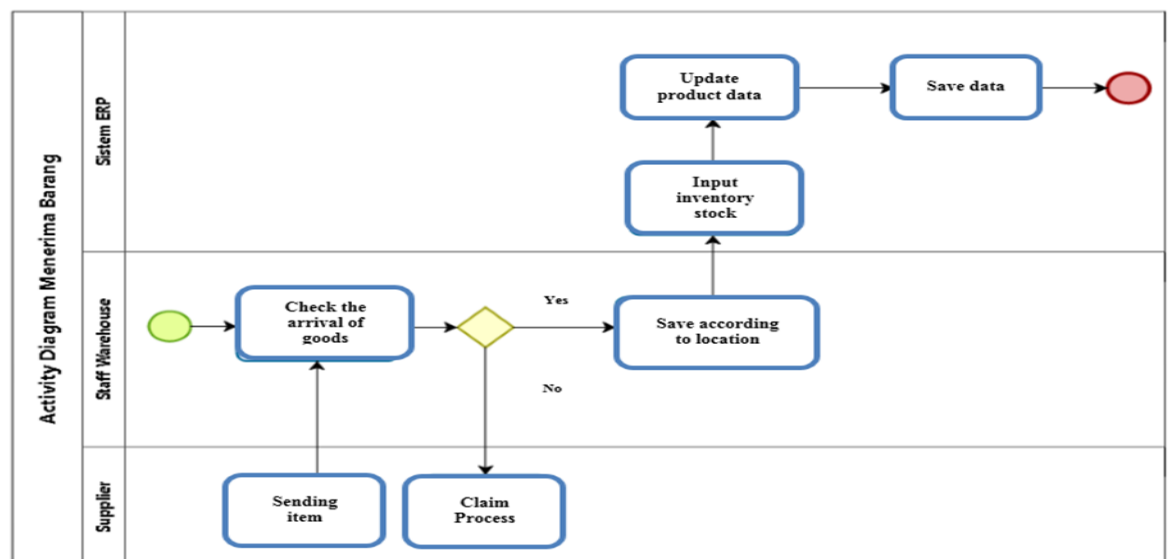
Figure 9. Activity Diagram Receiving Goods

485

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

4.12 Risk Analysis

The purpose of risk analysis is to determine the minor risk that can be accepted and the major risk that is not acceptable so that it requires further handling.

Table 5. Possible Risks (Data Collection Sources)

Risk Code	Risk			Average Likelihood	Level	Average Impact	Level
	Level 1	Level 2	Level 3				
OR	Operational Risk	Generally	**OR1.** Operational employees are not willing to use an ERP system.	1.5	Unlikely	3	Major
			OR2. Operational employees enter the wrong data into the ERP system.	1.5	Unlikely	3	Major
		Warehouse Area	**OR3.** ERP systems contain inaccurate inventory records.	2.5	Possible	3	Major
			OR4. Customer files contained in the ERP system are out-of-date or incomplete.	2.5	Possible	3	Major
AR	Analytical Risk	Generally	**AR1.** The top manager refused to use an ERP system that had been developed.	1.5	Unlikely	2	Severe
			AR2. Company managers refuse to obtain relevant and needed information from an ERP system that has been implemented.	0.75	Almost Never	2	Severe
		Warehouse Area	AR3. The ERP-generated warehouse module is not suitable.	1	Unlikely	3	Major
			AR4. ERP systems fail to produce goods demand data.	1.5	Unlikely	3	Major
OWR	Organizational - Wide Risk	Top management	**OWR1.** Support from top managers for ERP implementation is not enough.	1	Unlikely	3	Major

Risk Code	Risk			Average Likelihood	Level	Average Impact	Level
	Level 1	Level 2	Level 3				
		ERP planning	**OWR2.** Errors in the planning of ERP development are incompatibility with business strategies.	1.5	Unlikely	2	Severe
		System Usage	**OWR3.** Users are not comfortable using ERP systems in their daily work.	1.5	Unlikely	1	Minor
			OWR4. Problems related to the ERP system are not immediately reported by the system user to the System Maintenance Section.	1	Unlikely	2	Severe
			OWR5. Data access rights are granted to users who do not have rights	2	Possible	2	Severe
			OWR6. Confidential warehouse area data can be accessed by people who should not have the right to access the area	1	Unlikely	2	Severe
			OWR7*. Users (staff and managers) do not receive sufficient and continuing training on the operation of the ERP system.*	*2*	*Possible*	*2*	*Severe*
TR	Technical Risk	System Integration	TR1. Each module in the ERP system cannot see its integration.	1	Unlikely	2	Severe
			TR2. The previous system is not compatible with ERP systems that have been implemented.	2	Possible	2	Severe
		System Weaknesses	TR3. Invalid data cannot be directly detected by an ERP system that has been implemented.	2	Possible	3	Major

487

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

Risk Code	Risk			Average Likelihood	Level	Average Impact	Level
	Level 1	Level 2	Level 3				
		System Maintenance and Revision	TR4. Hardware and software crash when run.	2	Possible	3	Major
			TR5. The existence of bugs in the ERP system is not handled quickly by the System Maintenance Section.	2	Possible	3	Major
			TR6. Data that is outdated and duplicated in an ERP system that has been implemented is not removed correctly.	2	Possible	3	Major

After there is a value of both, it will be averaged so that there will be values on the average likelihood and average impact. Both of these averages have levels for later to be mapped into the risk level matrix. The results of the average likelihood that has been done, the level of risk is at the level possible (sometimes) and unlikely (rare).

The average impact that has been done, the level of risk is in the level of severe (quite large), major (large), worst case (very large). After obtaining the level of likelihood and the impact of each risk, then risk mapping will be carried out into the risk matrix described in Figure 4.14. The risk level matrix consists of two, namely the x axis which is the level of impact and the y axis which is the level of likelihood. Meanwhile the matrix has five levels of risk which are divided into five colors, namely very low, low, medium, high, and extreme. The higher the level of risk in the matrix, the more need for extra attention and countermeasures.

4.13 GAP/FIT Analysis

Gap analysis is an analysis of the gaps that arise between the processes in PT SJM and the processes that exist in Open ERP. In this gap analysis is determined the extent to which differences and needs can be met, and what solutions are made to resolve these differences. Gap analysis results are shown in Table 4.5. As for information on fulfillment in the GAP analysis, including:

   a. N (Non), meaning that Odoo's business process does not meet the user at all.

P (Partial), meaning that Odoo's business processes only fulfill some of the user's needs.

F (Full), meaning that Odoo's business process has fulfilled the user's full needs.

Figure 10. Results of Mapping Impacts and Possibilities to Occur

488

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

Table 6. GAP Analysis of Corporate Warehouse Business Processes with ERP Business Processes

No.	Present condition	Needs	Fulfillment			Information	Solution
			N	P	F		
BUSINESS PROCESS OF PURCHASE AND ACCEPTANCE OF GOODS							
1	Planning scheduling is carried out by the purchase function at the operation outlet section.	Only warehouse manager who can do planning scheduling (procurement) as well as making requests for a draft PO		v		Currently: Planning done by outlet section operation Open ERP: Scheduling procurement performed on warehouse management without making request draft PO	Change access rights for manager warehouse with add object purchase order on part settings
2	Goods still received recorded manually	Recording goods be accepted do automatic	v			Currently: After goods accepted then recorded again in the book Manually OpenERP: Item be accepted directly automatic recorded on in the application through the module warehouse management.	In the Warehouse Management module, click receive on the incoming shipment / product, then the item is automatically recorded in the database.

4.14 Baseline Configuration

In the baseline configuration, the form on Odoo was carried out. In the product form, customization is done is to eliminate fields that are not needed. namely removing the EAN13 Barcode field. Field removal is done because the company does not use barcodes on each product.
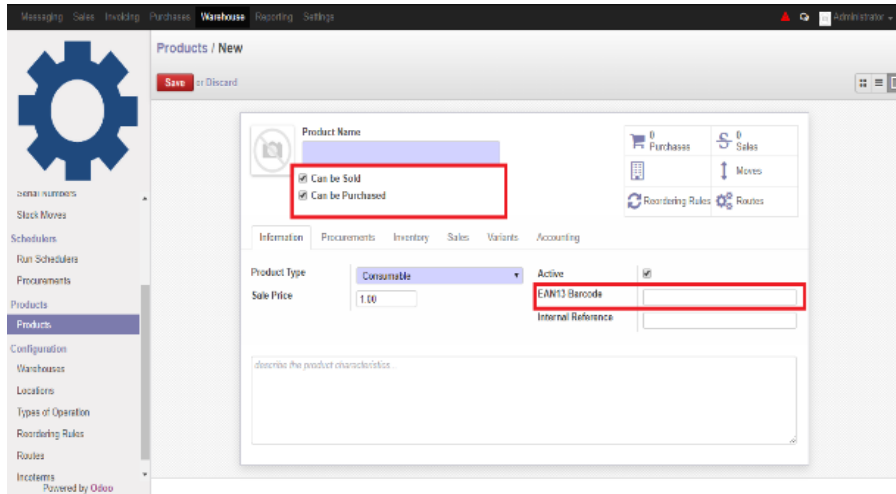
Figure 11. Product Customization Form
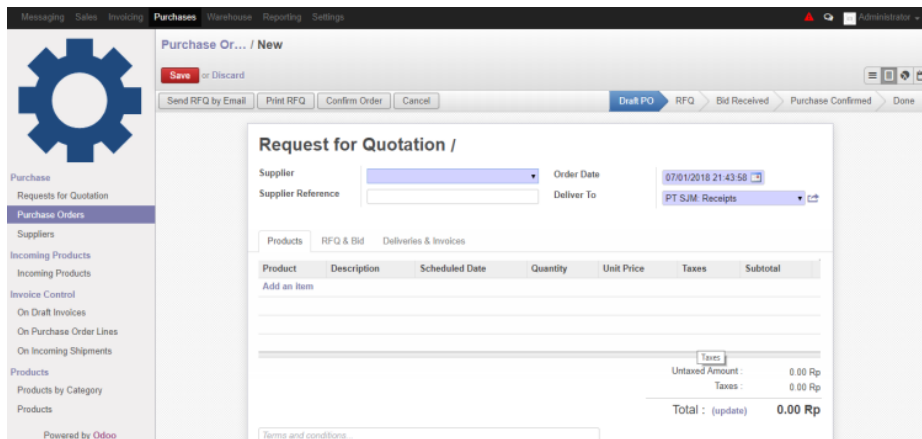
Figure 12. Proposed Order Purchase Design
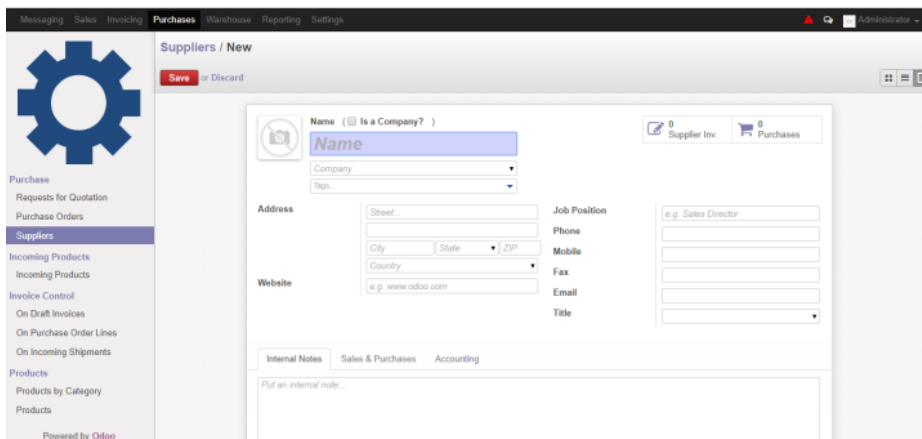
Figure 13. Proposed Supplier Data Design

Then setting user access rights in developer mode by changing Edit Form View in the Receive Invoice name field, add This is intended so that the intended button can only be accessed by this user so that the intended button can only be accessed by the Warehouse Manager user so that it will not appears on the menu accessed by the user.

490

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

Figure 14. Adjustment of Order Purchase Form

4.15 Final Configuration

Final Configuration is an adjustment and refinement (fine-tune) to ensure the results of the analysis and design that have been carried out in the previous stages run according to the business needs of the company. In final configuration the application installation, configuration, application adjustment or customization of the module and module operation procedures are the purchase and warehouse modules.

4.16 User Setting

To operate the Odoo system a user is made according to the company's needs. In Odoo's default settings, only existing users are administrators. Therefore, it is necessary to create a new user and access rights settings. Users needed in the Warehouse module are Manager and Warehouse Staff.

Table 7. List of Users in a Warehousing System

No.	User	Access Level	Information
1	Manager Warehouse	Manager	Users have the highest access rights to the Warehousing system
2	Staff Warehouse	User	Users have limited access rights to the Warehousing system

4.17 Companies Setting

In the company's configuration, the company data required by the system is filled out. The default company name on Odoo is your company.

Therefore it is necessary to change the company data. The data needed is the company name, company logo, and general information from the company.

Figure 15. Setting Companies

4.18 Master Setup Setting

The use of the Warehouse and Purchase Modules required configuration according to the needs of the company. The following is a table about the choices and description of each setting. Following are the steps of the Warehouse and Purchase Module configuration.

Table 8. Warehouse and Purchase Module Settings

No.	Setting	Used	Information
Traceability			
1	Track lots or serial numbers	✓	Used to assign many serial numbers to the results of moving goods. This makes it possible to find out the lot number of the item sent to a particular client
Logistic			
2	Generate procurement in real time	✓	Used for calculating Just in Time for procurement orders. All purchase orders will be processed immediately.
Product			
3	Manage different units of measure for products	✓	Used to allow selecting and maintaining different measurement units for products.
Additional Features			
4	Allow claim on deliveries	✓	Used to add claim links to shipping orders.
Purchase Order			
5	Manage different units of measure for products	✓	Used to select and maintain different measurement units for products.

4.19 Setting User Access Rights

Each user has different rights depending on his position and duties in the company. Therefore, it is necessary to have settings and adjustments to user access rights. User access rights are set in the User Group menu. Warehouse Manager is included in the Warehouse / Manager Groups, while the Warehouse Staff is included in the Warehouse / User Groups.

Table 9. Warehouse and Purchase Module User Access Rights

No.	User	Access Level	Object	Access Right				Information
				Read	Write	Create	Delete	
1	Manager Warehouse	Manager	Product	✓	✓	✓	✓	Management of product data
			Inventory	✓	✓	✓	✓	Manage inventory data
			Purchase Order	✓	✓	✓	✓	Management of purchase order data

No.	User	Access Level	Object	Access Right				Information
				Read	Write	Create	Delete	
			Scheduler	✓	✓	✓	✓	Data management scheduler
			Stock Move	✓	✓	✓	✓	Management of stock move data
			Journal	✓	✓	✓	✓	Journal data management
2	Staff Warehouse	User	Product	✓	✓	-	-	Management of product data
			Inventory	✓	✓	✓	-	Manage inventory data
			Purchase Order	✓	✓	✓	✓	Management of purchase order data
			Schedulers	✓	-	-	-	*Data management scheduler*
			Stock Move	✓	-	-	-	*Management of stock move data*
			Journal	✓	-	-	-	*Journal data management*

4.20 Adjustments to the Product Form

Adjustments made to the product form include removing barcodes.

Figure 16. Adjustment of Product Form

493

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020
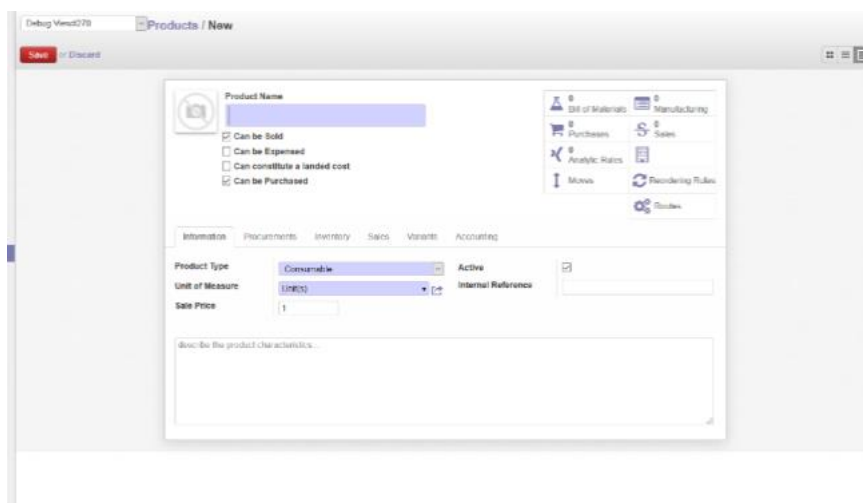
4.21 Supply Chain Management in SMEs

Setting user access rights in developer mode by changing Edit Form View in the Receive Invoice name field, add comment groups = "warehouse. group_warehouse_manager". This is so that the intended button can only be accessed by the Warehouse Manager user so that it will not appear on the menu accessed by the user. In the Receive Product name field, add comment groups = "warehouse. group_warehouse_user". This is made so that Purchase cannot confirm product receipt, because that is the task of the user warehouse.

A differentiated analysis of the goals of SMEs shows that cooperating SMEs seldom possess one consistent strategy. In addition if individual SMEs do have a SCM-strategy, they often do not derivate their individual objectives from this strategy. Their concentration on core competences interferes with strategic and policy. It also explains the multiplicity of varying SCM-objectives. Most of those objectives focus on operational functions. Those operational objectives may be structured by the SCOR processes source, make and deliver. Out of all objectives the logistical objectives can be consolidated to the logistical objectives of supply chains. These are short delivery time, high service level, even machine utilization and low work in progress and stock. Therefore they are looking for simple but effective and efficient methods or concepts to conduct the vitally important SCM-functions, which shall improve their logistic performance.
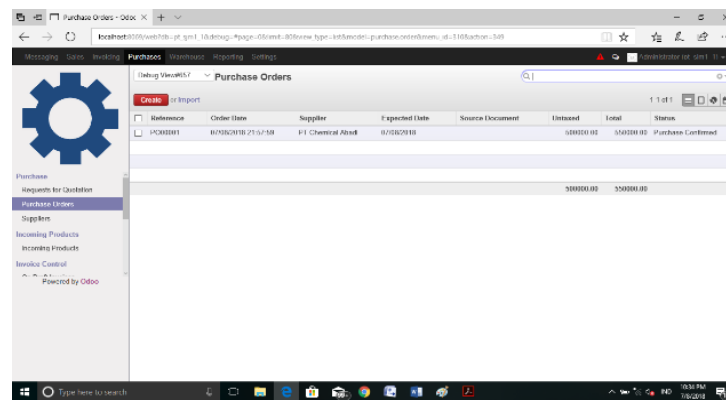
Figure 17. Adjustment to the Purchase Order Form.

4.21.1 Integration Testing

Integration testing is carried out with the intention to see how the combination of several functions in the system can run correctly and ensure that the data entered by the user does not change when the system runs in accordance with existing business processes.

Table 10. Integration Testing

No	Process	Scenario	Test Case	Expected Result	Result
1	Create data Product	Making product data that will be used	Product manufacturing data: Car Oil One, product type, unit of measure, internal reference	Data product : Oli Mobil One	✓
2	Create Purchase Order	Making Purchase Order data	Making Purchase Order PO 00001 data: Car Oil One data, quantity, price, product unit of measure	Data Purchase Order PO00001: data Oli Mobil One,	✓
3	Create Reordering Rules	Making Reordering Rules	Data on making Reordering Rules OP / 00001: One Car Oil, Minimum Quantity, Maximum Quantity and Multiple Quantity.	Data Reordering Rules OP/00001: Oli Mobil One	✓
4	Create Incoming Product	Making Incoming Product data	Data making Incoming Product: Car Oil One, product, quantity, location, Lot, Incoming date, Inventory value	Data Incoming Product: Oli Mobil One	✓

494

Int. J Sup. Chain. Mgt   Vol. 9, No. 3, June 2020

No	Process	Scenario	Test Case	Expected Result	Result
5	Create Stock Moves	Making data items out	Data making stock moves: Car Oil One, product, quantity, date, source location, destination location	Data out of goods: Car One Oil	✓
6	Create Reporting	Purchase Analysis data creation	Data for making Purchase Analysis in July 2018	Data Purchase Analysis in July 2018: Car One Oil	✓
		Stock Valuation, Stock Inventories and Moves	Data for making report of Stock Amount During July 2018	Data making report of Stock Amount During July 2018: Car One Oil	✓

4.22 User Acceptance Test (UAT)

User Acceptance Test (UAT) is a test carried out by the user of the system to ensure that the functions in the system are running properly and in accordance with user needs. This time the UAT testing is carried out by carrying out general testing, user test form, company form tests, product form testing, purchase order form testing, incoming product form testing, reordering rules form testing, and purchase and warehouse report testing. Following are the results of the tests that have been carried out. Can be seen in the attachment to UAT.

4.23 Data Migration

The last stage in this study is the data migration stage. Data migration that can be done is Master Data or Primary Data that supports the overall activities in this application system. In this study, what is considered as master data is product data, supplier data, and data reordering rule. The technical mechanism can use special applications ETL (Extract, Transform, Load) which is usually designed with ease of use of graphical interfaces and supports file formats that exist in the Odoo system database.

4.24 After applying SCM the system analysis

After the implementation of the work process system in the Warehouse division are as follows:

Table 11. Process Flow Map

PETA ALIRAN PROSES

			KEGIATAN	Jml	Durasi	Jarak	PELAKU	
Nama proses :		SUMMARY	OPERASI	8	73	2	Admin Gudang (AG)	
Proses Pemesanan Barang			TRANSPORTASI	0	0	0	Manager (M)	
AKTUAL ☐ USULAN ■			MENUNGGU	0	0	0		
Di petakan oleh : Fajar Budi Utomo			INSPEKSI	1	15	0		
Tanggal : 25 Januari 2018			MENYIMPAN	1	1	0		
			TOTAL	10	89	2	TOTAL	2

No.	URAIAN KEGIATAN	OPERASI	TRANSPORTASI	MENUNGGU	INSPEKSI	MENYIMPAN	Durasi (Menit)	Jarak (Mtr)	AG	M	KETERANGAN
1	Membuat pemesanan barang (purchase order)	◯	⇨	▷	☐	▽	15		x		Dengan sistem Odoo
2	Melakukan approval PO (purchase order) ke Manager	◯	⇨	▷	☐	▽	3			x	Dengan sistem Odoo
3	Mengirim purchase Order	◯	⇨	▷	☐	▽	3		x		Mengirim Po menggunakan Email
4	Menerima dan mengecek barang pesanan	◯	⇨	▷	☐	▽	15		x		Apabila barang tidak sesuai akan dikembalikan
5	Tanda tangan surat jalan	◯	⇨	▷	☐	▽	2		x		Tanda tangan surat jalan sebagai bukti barang tersebut sesuai pesanan
6	Membuat surat tanda terima dan cap stampel	◯	⇨	▷	☐	▽	10		x		
7	Menempatkan barang	◯	⇨	▷	☐	▽	25	2	x		
8	Input data barang	◯	⇨	▷	☐	▽	15		x		Input stock barang dengan sistem
9	Membuat laporan bulanan barang	◯	⇨	▷	☐	▽	3		x		sistem ERP pada odoo juga membuat report yang
10	Arsip Laporan	◯	⇨	▷	☐	▽	1		x		

5.   Conclusion

Based on the SCM in enterprise system, the conclusions obtained are as follows. Previous problems that occur in the company are that the documents cannot be accessed in real time. By using the ERP concept that applies the Odoo application, all data regarding the product, supplier list and total stock of goods can be accessed in real time. The process of integration between parts of the warehouse and purchase begins when the warehouse part lacks stock of goods for the service process. Then with the purchase module will make a purchase order according to the number of items that are requested for the warehouse. After getting the purchase order, then the direct purchase section purchases the item. After the raw material is purchased and sent though SCM, by the supplier, the warehouse will provide raw materials to the mechanic and service directly can be done according to the work order made.

References

[1]   Y. Yuliawan, "Development Of Information Systems Of The Church Administration Advent Day Seventh Seventh Conference Of East Java Area," vol. 2, no. 2, 2013.

[2]   A. S. Hidayat, R. D. R. Saedudin, and R. W. Witjaksono, "System planning ERP with Module Purchasing and Inventory Farm ERP System Design on Purchasing and Inventory Module Odoo 9 Based With ASAP Methodology At PT Aretha Nusantara Farm," vol. 3, no. 2, pp. 3483–3490, 2016.

[3]   A. W. Pradhana, S. Fajar, S. Gumilang, and R. W. Witjaksono, "Development of Information Systems Based Enterprise Resource Planning Modul Sales Management Pada Odoo Dengan Metode Rapid Application Development Di Pt . Brodo Ganesha Indonesia Information System Development Based Enterprise Resource Planning Module Sales," vol. 3, no. 2, pp. 3551–3556, 2016.

[4]   R. Akbar and J. Juliastrioza, "Penerapan Enterprise Resource Planning (ERP) for Purchasing, Inventory and Sales Information System for Goods in Stores EMI GROSIR and RETAIL," Journal of technology and systems. Inf., vol. 1, no. 1, p. 7, Oct. 2015.

[5]   A. Terminanto, R. Hidayat, and A. N. N. Hidayanto, "Implementation of enterprise resource planning using Odoo module sales and CRM. Case study: PT Ecosains Hayati," in IOP Conference Series: Materials Science and Engineering, vol. 277, no. 1, p. 012034, 2017.

[6]   A. Mustafri, "Pengembangan Odoo Modul Warehouse in the warehouse PT Tarumatex Using Method RAD," vol. 3, no. 2, pp. 3171–3178, 2016.

[7]   Abayeva, G. Modern teacher role for increasing the students' competence in pedagogical specialty. Opción, 34(85-2), 415-440, 2018.

[8]   Siagian, M. V., Saragih, S., & Sinaga, B. Development of Learning Materials Oriented on Problem-Based Learning Model to Improve Students' Mathematical Problem Solving Ability and Metacognition Ability. International Electronic Journal of Mathematics Education, 14(2), 331-340, 2019. https://doi.org/10.29333/iejme/5717