DEPELOPING INFORMATION SYSTEMS MANUFACTURER INDUSTRY PT. LAKSANA KARIS INDUSTRI THOUGH SUPPLY CHAIN MANAGEMENT

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ABSTRAK

PT. Like Karis Industries, a company engaged in the production of telecommunications equipment. PT. Like Karis industry in producing its products there is a problem that is on the upstream procurement. PT. Like Karis Industries had difficulty in determining the amount of raw material procurement to suppliers due to uncertainty of the number of purchases of products made by the distributor. In doing distribution, PT Lieu Karis Industries always put distributors who already make full payment, but there are problems when going to the distribution when the number of products much beyond the capacity of the vehicle. Resulting in delays in product shipments. Based on the existing Problems the supply chain needed information systems. The strategy used in PT. Like Karis Industries is a strategy make-to-stock. The method used in determining the amount of raw material needs by using the Single Moving Average forecasting methods derived from sales data for 5 months. As for calculating the inventory security is by using methods Safety Stock.

The results of the testing that has been done among which, functional testing, UAT testing and end user testing it was concluded that the information system using supply chain management approach has been to assist the company in determining the amount of raw material procurement and determining the distribution of products to distributors ..

Keywords: Supply Chain Management, Single Moving Average, Make-to-stock, Safety Stock, SI

1. INTRODUCTION

PT. Like Karis Industries is a company which is located at Jl. Babakan Surabaya No. 40 Ex. Babakan Surabaya district. Kiaracondong Bandung. PT. This industry is like Karis industry engaged in the production of telekominukasi tool that BMF (Back Mount Frame). PT. Like Karis industry in producing products always perform inventories of raw materials and products.

Activities that are on the upstream side by PT. Like Karis Industries is the process of procurement of raw materials to suppliers, receiving raw materials and do the processing of raw materials into finished products. While the activities contained in the downstream conducted by PT. Like Karis Industries is the process of distribution to distributors.

The results of the interview with Mr. H. Adjat Rohijat as head of production and operation states that the section responsible for the production and operation in two respects. The first planning to determine the amount of raw materials for the procurement of raw materials are carried out by production and subsequent operation of the procurement process of raw materials directly to the supplier by the purchasing department. Both the production process to produce a finished product that is conducted by the production and operation. Raw material procurement planning process is done once every month sestiap 1 -5. Raw material procurement planning is done once a month so that in determining the amount of raw material procurement and production operations are not in accordance with product sales. As was the case in the bulla July 2016, when the PT. Like Karis Industries procure raw materials for iron plate so that the inventory in warehouse reaches 50000 50 212 iron plate coupled with the previous month supply. So when demand for the product in July reached 14 005 pcs sehinggan companies

experiencing a shortage of raw ahan 708 iron plate width. Then there is excess product in August 2016 in which sales of the product at that time, reaching only while supplies produkyang 14054 pcs 15240 pcs terdapatpada warehouse so that excess product as much 1186 product. So when demand for the product in July reached 14 005 pcs sehinggan companies experiencing a shortage of raw ahan 708 iron plate width. Then there is excess product in August 2016 in which sales of the product at that time, reaching only while supplies produkyang 14054 pcs 15240 pcs terdapatpada warehouse so that excess product as much 1186 product. So when demand for the product in July reached 14 005 pcs sehinggan companies experiencing a shortage of raw ahan 708 iron plate width. Then there is excess product in August 2016 in which sales of the product at that time, reaching only while supplies produkyang 14054 pcs 15240 pcs terdapatpada warehouse so that excess product as much 1186 product.

The results of the interview with Mr. Widodo as part of the expedition dispatch states that in conducting the distribution section delivery expeditions have 5 cars manifold box 4 and the type of truck 1. PT. Like Karis Industries has eight fixed distributor located in West Java. In conducting the distribution of PT. Like Karis idustri always deliver a product in conformity distributor who first made the payment to the sales department with the keel, but there are cases in July 2016 where distributors order products on July 3, but the delivery occurs on the 5th of July that exceeds the load capacity of the vehicle in because of the amount of product that pretty much.

Based on the problems that exist today in the PT. Like Karis Industries needed a system that can manage information about the supply chain at. Like Karis Industries. Supply chain management into the business process solutions to assist in the PT. Salingnya like Karis industry with the integration between the parts.

Interest by the author in his research are:

a. Help the production and operation in determining the amount of raw material procurement to suppliers
b. Help the expedition ship in scheduling product distribution.

The research methodology used in this study a descriptive method that aims to create a description, picture or painting in a systematic, factual and accurate information on the facts, nature and the relationship between the phenomenon investigated. The steps that must be done during the study can be seen in Figure 1

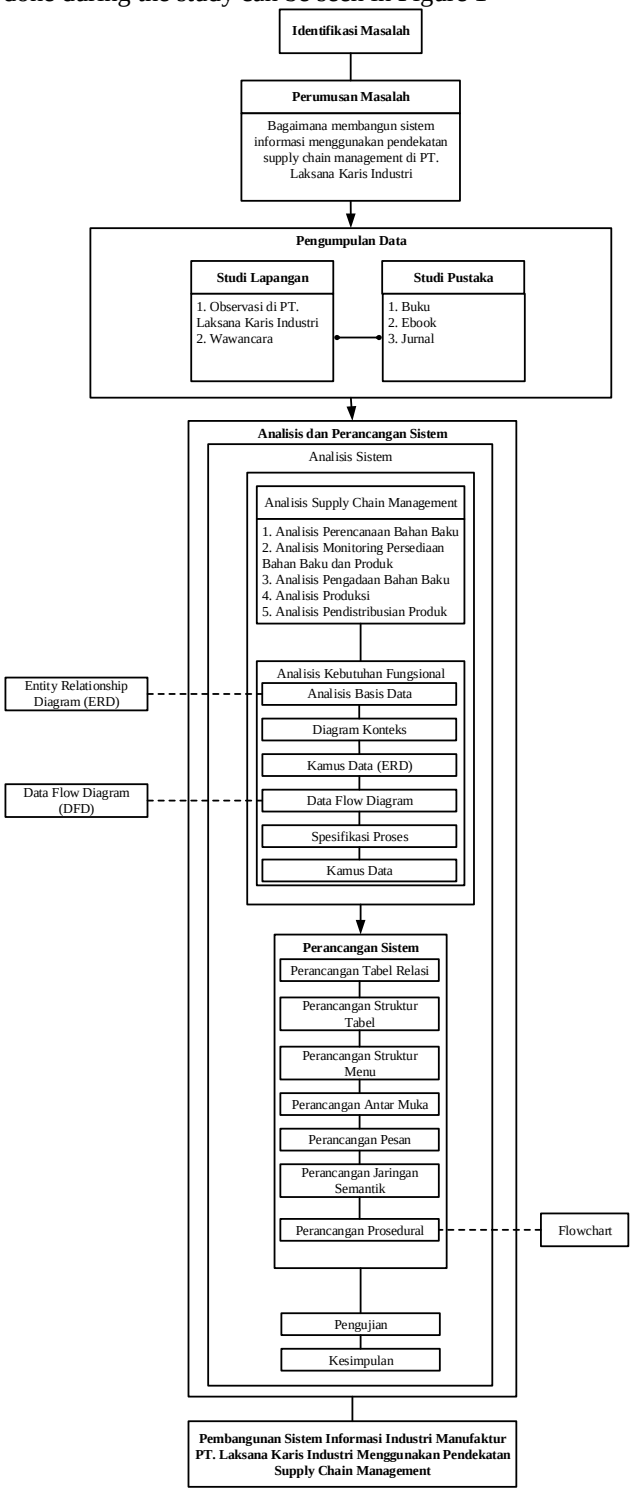


Figure 1 Flow Research Methodology

2. RESEARCH CONTENT

2.1 Supply Chain and Supply Chain Management

*supply chain*is a network of companies which collectively joined together to create and deliver a product into the hands of end users. If the supply chain is a physical network that the companies involved in supplying raw materials, produce goods, and sends it to the sending end. Supply chain management is a method, apparatus or its management approach. Supply Chain Management is not only beroriantasi in the internal affairs of a company, but also external affairs concerning the relationship with the company - the partner company. Because the companies that are in a supply chain there are essentially want the same end customer satisfaction.[1]

2.1.1 Cover Rage Supply Chain Management

*Supply Chain Management*essentially cover the scope of work and responsibilities are vast. When we refer to a manufacturing company, the activities - the main activity is classified as a Supply Chain Management is[1]:

a. The activities of designing new products.
b. Activity obtain raw materials.
c. Production planning and inventory activities.
d. Undertake production activities
e. Perform activities of transmission / distribution
f. Product returns management activities / goods (return).

In this study the author discusses only 3 clarification as mendapatka activity raw material production and inventory plan your activities and events make delivery / distribution.

2.1.2 Decoupling Point Supply Chain

decoupling point is the meeting point of the extent to which an activity can be done on the basis of the forecast (without waiting for requests from customers) and from which activities should be postponed until there is a definite demand from customers. The following is a common process in the decoupling point. Usually the production process can be generally classified into into four main parts:[1]:

1. *Make to Stock* (MTS)
   Make to Stock is a system where the decoupling point is in the final process of sending to the customer. The end product is based on the forecast. Thus, only those activities undertaken after the delivery of customer orders.
2. *Make to Order* (MTO)
   In the following system Make to Order, component fabrication activities can not be done without waiting for orders from customers for each order may require this type of different components.

2.1.3 Management of Procurement

Procurement management is a major component of the supply chain management. The task of procurement management is to provide input, in the form of goods or services that are needed in production activities and other activities within the company. In manufacturing, the goods to be purchased by the procurement section could be clarified in general into raw materials and components for production needs.[1],

2.1.4 Inventory

Inventory may appear because it is planned or the result of ignorance of the information. Uncertainty has also been experienced by many firms operating systems make to stock. uncertainty on the supply chain just emerged from the demand but also on the direction of supply and internal operations. Uncertainty delivery and raw material prices caused the factory to hoard supplies of raw materials. Uncertainty shipment from the factory led to the distributor must keep a backup supply (safety stock)[1],

2.1.5 Safety Stock Technique

Security or safety stock inventory serves to protect the error in predicting the demand during the lead time. Inventories of security work when actual demand is greater than the average value of them. The formula to find the value of safety stock. Here is the formula in determining Safety stock can be seen in equation 2.1 and 2.2 [1].

$$Safety\ Stock = \text{Z x Sdl}$$

Information :
Z = Service Level
sdl =Demand uncertainty and uncertainty Lead Time.

reorder point or reorder point is when the supplies reached the point that needs to be done reordering. Here is the formula to determine reoder point can be seen in equation 2.2.

$$\text{sdl} = \sqrt{(d^2 \text{ x } sl^2 + l \text{ x } sd^2)} \quad (2.2)$$

Information :
d = The average consumption

sl = Standard Deviation Lead Time
l = *Lead Time*
sd = Standard Deviation The average consumption

2.1.6 Method of Single Moving Average

Method moving average single-use amount of actual data to generate new demand forecast values for future demand. This method would be effectively implemented if the data series showed a seasonal trend or median value as the forecast is not appropriate. [2].

Historically within a certain period, the longer moving averages will produce increasingly fine moving average, systematically moving average can be calculated using equation 2.8.

$$S_{t+1} = \frac{x_t + x_t - 1 + \cdots + x_t - n + 1}{n} \quad (2.8)$$

Information:
St + 1 = Forecast for the period to t + 1.
xt = Data in period t.
n = Duration of Moving Averages

2.1.7. Forecasting Error Measurement

Measurement of forecasting error is using the Mean Square Error, because the method of forecasting it is the single moving average where median values are in use as a forecasting tool then, MSE is very suitable for the average error forecasting squared and can be seen in equation 2.9 [3].

$$MSE = \frac{\sum(X_t - F_t)}{n} \quad (2.9)$$

Information:
X_t = The actual data in period t
F_t = Data predictions of the model used in period t
n = Many prediction result data in case error.

2.1. Objective Monitoring

Monitoring will enable us to determine whether we have sufficient resources and have been used well and become a useful basis for evaluation and determine the capacity we have proper and sufficient.

The purpose of monitoring is as follows [4]:

1. Assess whether the activities carried out in accordance with the plan
2. Identify problems that arise can be addressed in order to direct
3. Assess whether the work patterns and management used was appropriate to achieve the objectives of the activity.
4. Knowing the connection between the events in order to obtain a measure of progress.
5. Adjust to the changing environment activities, without deviating from the goal.

2.1 Problem analysis

A problem analysis was conducted to obtain the definition of the problem and an exact idea of what will be done by the system. The information system manufacturing industry PT. Karis like Bandung Industrial Supply Chain Management approach. Analysis of problems of the current system at this time is as follows:

1. Parts Production and Operations difficulty in determining the amount of raw materials to be ordered to the supplier because of course no amount of product purchase. If the purchase of the distributor increases then what will happen is the company is a shortage of raw materials for the production process, while if the purchase goes down then the occurrence of an excess amount of raw immortal causing excess raw materials in the warehouse.
2. Expedition Section Delivery difficulty in determining the scheduling of product deliveries to distributors because the number of products that exceed the capacity of the vehicle. The impact that occurs from these problems is the loss of confidence in ordering products distributor to the company so that the serious consequences that would happen is causing the company to lose distributor.

2.1.1 *Supply Chain Management Model*

The following are the results of the analysis model of supply chain management at PT. Like Karis Industries viewable pad Figure 2 (Appendix A).

2.1.2 Supply Chain Management Analysis

Analysis of supply chain management is made to describe the information system will be built at PT. Like Karis Industries using supply chain management approach. The following is the analysis of supply chain management at PT. Like Karis Industries can be seen in Figure 3

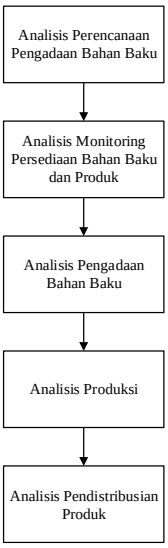


Figure 3 Analysis*Supply Chain Management in PT. Like Karis Industry*

1. Material Procurement Planning Analysis

Forecasting demand for raw materials based on previous sales data. The data will be used as a sample of the product sales data BMF 2 Way 4 cm sheen is seen in Table 1.

Table 1 Product Sales Data

No.	Period	Data Aktural BMF Sales Shine 2 Way 4 CM
1	July	1574 pcs
2	August	1700 pcs
3	September	1805 pcs
4	October	1443 pcs
5	November	1832 pcs
6	December	1742 pcs

Thus the data can be graphed to determine the method to be used in forecasting in accordance with the pattern of the resulting data. Below is a graph of data BMF product sales 2 Way 4 CM Gloss can be seen in Figure 3

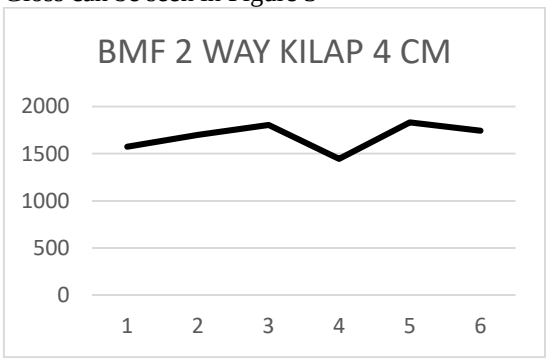


Figure 4 Graph 2 Way BMF Products Shine

The term of the moving average value is used yatu period of 3 months, and 5 months. As a forecasting calculation is as follows:

a. Calculations for n = 3

$$St_{Januari} = \frac{Xt_{Oktober} + Xt_{November} + Xt_{Desember}}{n}$$

$$= \frac{1443+1832+1742}{3}$$

= 1672 (the result of rounding)

b. Calculations for n = 5

$$St_{Januari} = \frac{Xt_{Agustus} + Xt_{Sep} + Xt_{Okt} + Xt_{Nov} + Xt_{Des}}{n}$$

$$= \frac{1700+1805+1443+1832+1742}{5}$$

$$= 1704$$

Table 2 Results of Sales Forecasting

No.	Period	Sales Data	3 Monthly	5 monthly
1	July	1572	-	-
2	August	1700	-	-
3	September	1805	-	-
4	October	1443	1591	-
5	November	1832	1548	-
6	December	1742	1672	1631
Forecasting results for January			1672	1704

***2.* Material Stock Monitoring Analiysis**

Monitoring analysis stage supplies of raw materials and products is to determine the safe limits of raw materials and products that should be available in the warehouse in order to avoid shortages or emptiness of raw materials or products at the warehouse using methods Safety Stock.

Safety Stock Calculation

Total forecasting in January 2017 = 1704 pcs

The number of working days in a month = 26 days

Lead Time procurement to suppliers (l) = 3 Days

The average procurement in a month (d) = 1704/26 = 65.53

Standard Deviation Lead Time (sl) = 0.3

Booking a standard deviation (sd) = 2.6

Service Level 95% (Z) = 1.64

safety Stock = Z x Sdl

sdl = $\sqrt{65.53^2 \text{ x } 0.3^2 + 3 \text{ x } 2.6^2}$

sdl = $\sqrt{406.75}$

Sdl = 20.1680

safety Stock = 1.64 x 20.1680
safety Stock = 33.07552
safety Stock = 34 (the result of rounding)

3. Material Procurement Analysis

In the analysis of this raw material procurement, field book purchase of raw materials based on the submission of raw materials from the production and operation. Then the company should be ordered raw materials in accordance with the amount of raw materials ordered can be seen in Table 3

Table 3 Raw Material Procurement

4. Production analysis

Parts production of raw material inventory checks to see whether the amount of the available raw materials sufficient for daily production activities. Here are the results of the analysis of the production

Total forecasting in December 2016 = 1704 pcs
The number of working days in a month = 20 days
Total production = 1704/20
= 85.2
= 85 (the result of rounding)

5. Distribution Analysis

In the analysis of distribution of this product is the amount of cargo transportation and shipping products to do the monitoring process so that companies know for sure the product is up to the hands of distributors. Can be seen in Table 4

Table 4 Distribution of Products

Name of Raw Materials	Forecasting Results	Stock Warehouse	*safety Stock*	Total Requirements	Min. Purchase of Raw Materials	Number to Order
Artic 1.0 MM	3408 pcs	1000 pcs	68 pcs	2476 pcs	6 pcs	2476 pcs
Iron Plat 3.0 MM X 4 X 8	6816 pcs	495 pcs	136 pcs	6457 pcs	6 pcs	6457 pcs
As Copper	3408 pcs	235 pcs	68 pcs	3241 pcs	6 pcs	3241 pcs
Hex Nut M 10	3408 pcs	543 pcs	68 pcs	2933 pcs	6 pcs	2933 pcs
Callington Nozzle Dip Gel	3408 pcs	78 pcs	68 pcs	3398 pcs	6 pcs	3398 pcs
Bon Month December	10224 pcs	752 pcs	204 pcs	9676 pcs	6 pcs	9676 pcs

date Booking	number Booking	date Delivery	Address	Payment	Status
07/07/2016 09:01:20 pm	350 pcs	07/07/2016 10:00:10 pm	Endah sand, Edge Berung, Bandung, West Java	keel	Submit
07/07/2016 09:30:20 pm	200 pcs	07/07/2016 09:01:20 pm	Jl. Cibadak, Astanaanyar, Bandung	keel	Submit
07/07/2016 13:30:20 pm	300 pcs	07/07/2016 14:00:20 pm	Jl. Mangga Dua, Mangga Dua Mall. Lt 2. No. 19A. Jakarta	keel	Submit

The table above shows the delivery of the product to distributors due to limitations in the form of a table is not sufficient then the author shorten the table form. So here I will explain those distributions. There are hours of booking date 07/07/2016 9:01:20 PM, product names BMF way luster 4 cm, the number of 350 pcs ordering, delivery date, 07/07/2016 10:00:20 hours GMT, addressEndah sand, Edge Berung, Bandung, West Java, payment of vehicle types dikirm status Daihatsu Grand Max D 2271 MZ with a capacity of 500 pcs.

2.4 Database Analysis

Analysis of the data on the basis of management information systems procurement of raw materials to be built using Entity Relationship Diagram (ERD). The diagram is depicted in Figure 4 (Appendix A).

2.5 Context Diagram

Diagram context is a global model to explain how the data are used and transformed to the process or describe the flow of data into and out of the system. Diagram context information system manufacturing industry PT. Like Karis Industrial use of supply chain management approach can be seen in Figure 5.

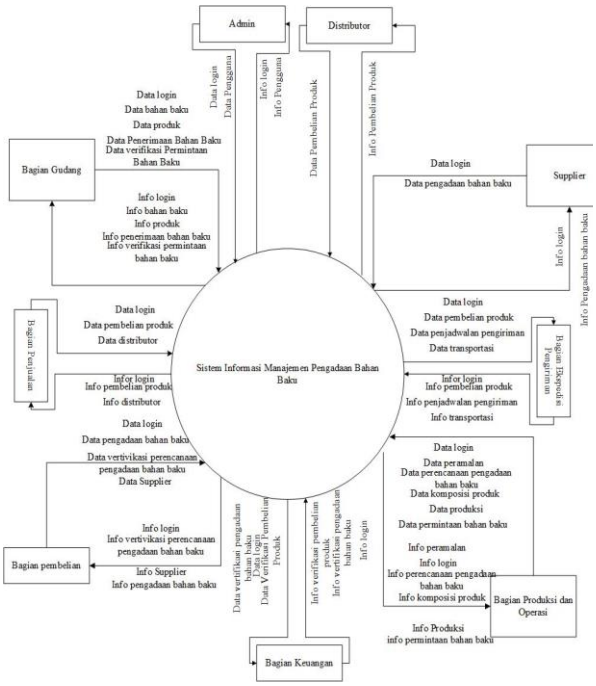


Figure 5 Diagram Context

2.6 Relation scheme

Relation schema describes the relationships among the data, meaning data and limits. The process of relations between attributes is a combination between the attributes that have the same primary key, so that these attributes into a single unit which is connected by the key fields. Can be seen in Figure 6 (Appendix A).

2.7 Interface design

The design of the interface is made to describe the look of the program that will be used by the user to interact with the system to be built. Planning interface in manufacturing information systems PT. Karis like Industr use of supply chain management approach can be seen in Figure 7.

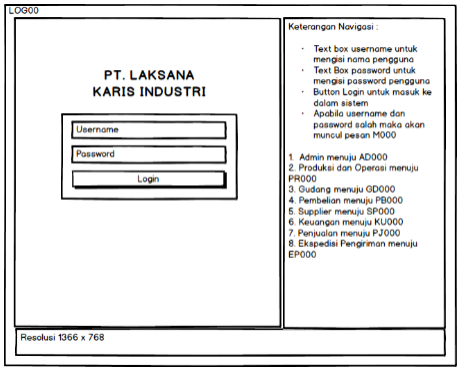


Figure 7 Interface Design Login

2.11 System implementation

Once the system is analyzed and designed the implementation phase will be conducted. Implementation of the system is a stage of application of the results of the analysis and system design. Here are some examples of implementation of the system such as Figure 8 and 10.

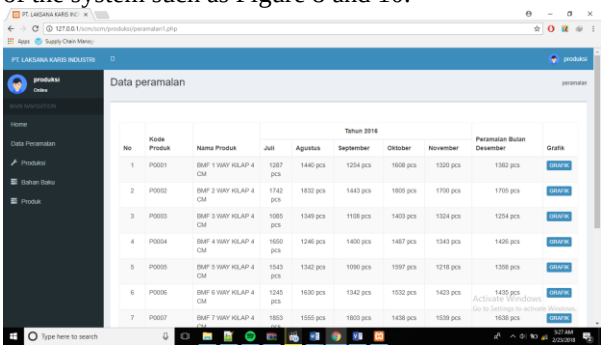


Figure 8 Implementation of Forecasting

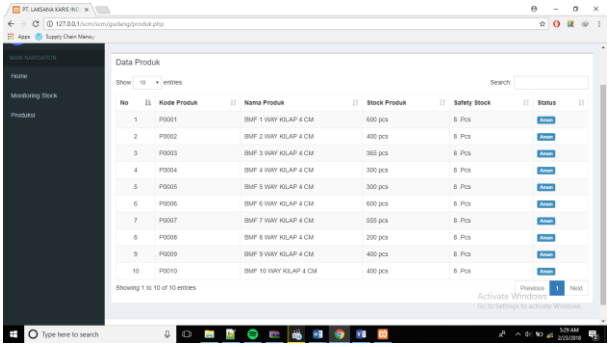


Figure 9 Implementation Monitoring Stock

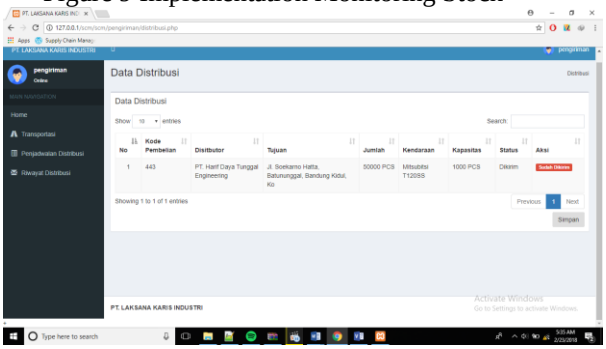


Figure 10 Implementation of Distribution

2:13 System Testing

Testing of the system is the cornerstone that aims to find errors or deficiencies in the system tested. Testing intended to determine the use of information systems supply chain management approach that is prepared to comply with the performance in accordance with the design objectives.

2.13.1 Functional testing

The first functional testing (black box), which focused on testing the functional requirements of information system is built. Functional testing covers how well the system is performing its functions, including the use of commands, data manipulation, search and business processes, user screens and integration. Can be seen in Table 5.

Table 5 Testing Black Box

class Test	Test Item	types of Tests
Login	user Login	*Black Box*
Managing User Data	View Users	*Black Box*
	Remove User	
	Change Password	
	Add User	
monitoring Stock	Stock Monitoring Products	*Black Box*
	Acceptance of Raw Materials	
	Monitoring Stock Raw Materials	
Managing Data Production	Production planning	*Black Box*

2.13.2 User Acceptance Test

The purpose of the user acceptance test is to confirm that the system is in the testing can meet the business needs to provide assurance that the test system is working properly and can be used before it was officially to end users. Can be seen in Table 6.

table 6 Testing User Acceptance Test

class Test	Testing procedure
Login	1. Access to the site www.scm.laksanakaris.com 2. Enter your username and password 3. Press enter
Testing See Users	1. Press the menu
Testing Delete User	1. Press the Delete button 2. Press Delete on the pop-up that appears
Testing Change Password	1. Press button Change 2. Enter the new password 3. Press the button Save

2.13.3 Beta Testing

Beta test is a test that is directly in the actual environment. Users make an assessment of the software using interviews. Here is a Beta Testing can be seen in Table 7.

Table 7 Results of Admin User Interview

Question	answer
Is this system already manage user data properly?	The system is already good at managing user data
Does the existence of this system can help you manage user data degan good?	This system can help in the management of user data. User management will be better if the system can manage employee data as well

3. CONCLUSIONS AND SUGGESTIONS

In this section the authors will become clear right things with the outcome of the results of the analysis of the implementation and design of the software that has been built by the author. Suggestions suggestions that will provide important records as well as the improvements to be made to develop software better.

2.2 Conclusion

Based on the results obtained in this thesis, it can be concluded as follows:

1. Information system development using supply chain management approach which has been built at PT. Karis like this industry can help production and operation in determining the amount of raw materials to conduct the procurement to the supplier.
2. Using the information system
   This approach to supply chain management can facilitate the distribution part in making scheduling the distribution of products to distributor.

2.3 Suggestion

Suggestions for using the information system developer supply chain management approach are some suggestions that can be done, among others:

1. The addition of user data management would be better if there is a special system to manage employees so that the user can be selected directly from the system.

2. Development of supply chain information system should be developed in many more to see better results again.

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APPENDIX A

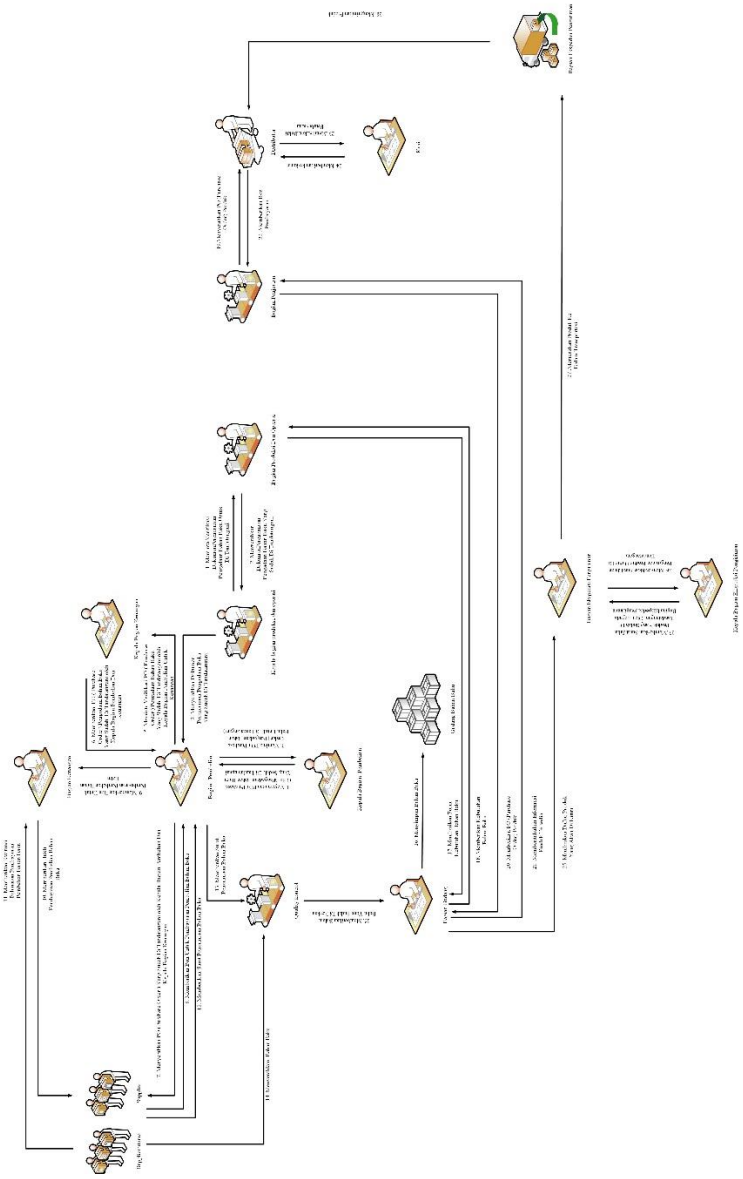


Figure 2 Model of Supply Chain Management at PT. Like Karis Industry

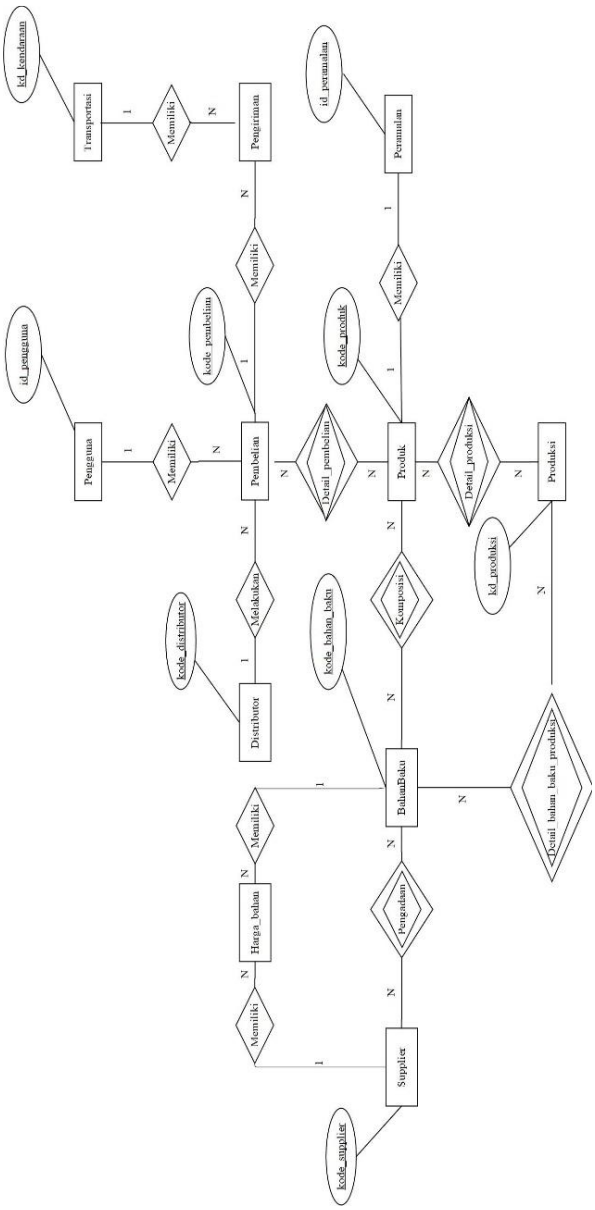


Figure 4 ERD At PT. Like Karis Industry

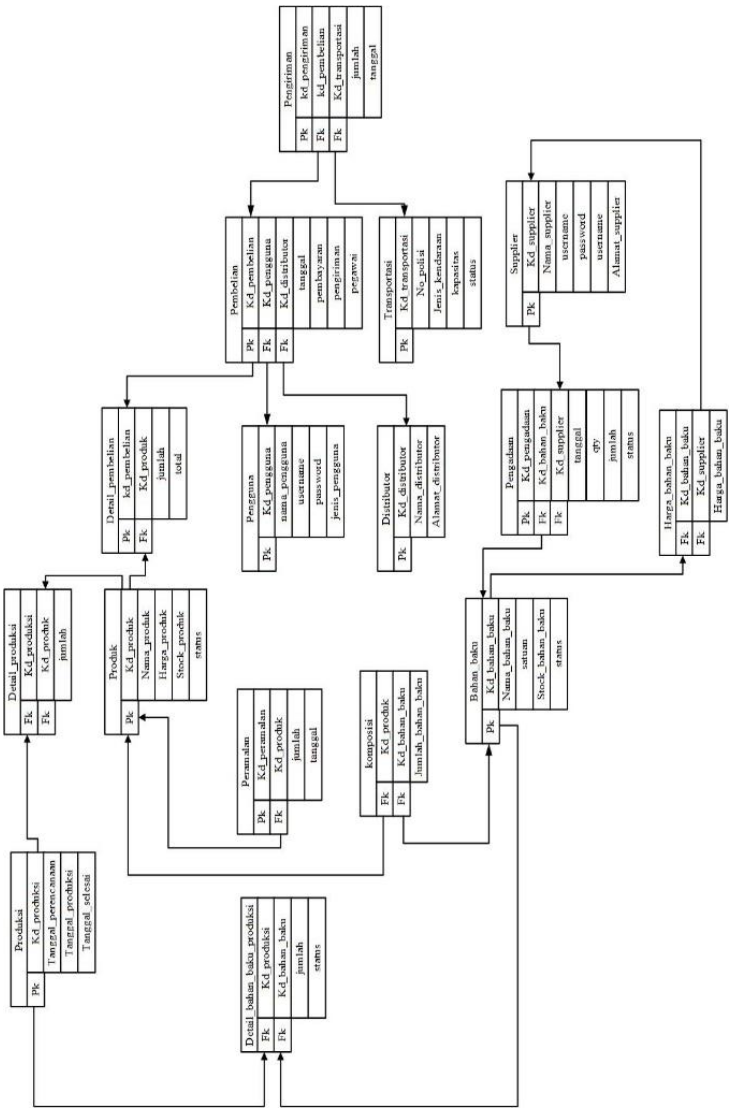


Figure 6 Relation Scheme in PT. Like Karis Industry