INFORMATION SYSTEM DEVELOPMENT BY USING SUPPLY CHAIN MANAGEMENT METHOD IN SENTRA SUSU CIPAGERAN

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ABSTRACT

Sentra Susu Cipageran is one of cooperation that be in motion on cow ranch through cimahi town goverment is local economic development. Products that had produced until now such as pure milk, pasteurization milk, yoghurt, caramel, milk dodol, milk kerupuk, milk shop, kefir, and milk comring.

Sentra Susu Cipageran in supplying raw materials to the supplier often face the difficulty because uncertainty product request from the customer. Another problem that arise is not a program yet to send product to the customer along with information about availabling transportation. To hendle that problem, so obliged to built supply chain management information system in cipageran milk sentra. The purpose is to determine the total of raw materials purchasing to supplier in order to production activity still procced and can list the product sending to the customer. Supply chain strategy that use is push supply chain, because to determine the products that produced in warehouse or it can call make to stock. Prediction method that use for guess at total of product request is single exponetial smoothing method. Prediction calculation of availablity raw materials and product in warehouse by safety stock protecting.

Base on the result of blackbox test, user acceptance test, and a test of the last user after implementing in cooperation enviroment can be conclude that this system has help the cooperation on guess at the total order of raw materials that must be bought to supplier and help to determine the schedule sending along with the transportation that used.

Keyword: supply chain management, single exponetian smoothing, push supply chai, safety stock.

1. INTRODUCTION

Sentra Susu Cipageran is one of a cooperative engaged in the field of dairy farms with the Government program through the Cimahi i.e. the development of the local economy.

In determining the amount of raw materials should be purchased by the procurement section to the supplier still have difficulty because of the uncertainty of customer bookings made. More Cipageran Milk centers recommend the stock of raw materials in large quantities from stock shortages should be on raw materials that can lead to production activities at a standstill. This caused when the raw materials warehouse then empty in the production process of the manufacture of the product are forced to stop.

1.1 Formulation Of The Problem

Based on the background issues that are raised, then the problems occurred in the center of the milk Cipageran is how to build information systems by using Supply Chain Management method in Sentra Susu Cipageran.

1.2 Intent and Aim

As for the intent of this research is to build an information system with Supply Chain Management approach in Senta Milk Cipageran. As for the goal that will be achieved in this research are:

1. Facilitate the Chief of procurement in determining the amount of raw material to be bought so that the production process is ongoing and is running smoothly.
2. Simplify the shipping section head in the process of shipping by doing scheduling product delivery to the place of the customer.

1.3 Limit Problem

As for the limitations problem in the development of this information system to make it more directional and achieve the objectives that have been determined as follows:

1. Strategies used are push-based supply chain, because the Central Milk Cipageran will determine the products that are produced in advance prior to the order being made to create a

stock of products in warehouse or can be called make to stock.

2. Data-data collected include data supplier, employee data, customer data, product data, data on raw materials, and the data of the vehicle.
3. Types of products processed i.e. 1.5 liter bottled pasteurized milk because booking a product that performed each month has sales at most.
4. Raw materials used in producing the product of pure milk that is pasteurized milk and plastic 20x35.
5. the System is built to Cipageran Milk Centers working to deal with the following processes:

a. Forecasting (Forecasting) Purchase of raw materials
   Based on the results of the analysis of the inventory data from January to August of 2016, it can be concluded that forecasting methods used are Single Exponetial Smoothing motion pattern due to the resulting data show the Trend patterns. Forecasting is done to predict how many raw materials have to be booked in the next period.
b. Monitoring and inventory control of raw materials
   Monitoring is done by determining how the limit supplies of raw materials should be available in the warehouse. Determination of the limit of the preparation is done using methods of safeguarding inventory (safety stock), because of the waiting time (lead time) at a time when the process of acceptance of raw materials from suppliers.
c. Procurement of raw materials
   Procurement is done by looking at the results of the forecasting of the raw material and the company will order raw materials to the supplier in accordance with the value of the forecasting results.
d. Monitoring Product Inventory
   Monitoring is done by displaying the number of existing product inventory in the warehouse, in order to know the number of the inventory of products in the warehouse.
e. order acceptance products from Customers
   Cooperatives will manage orders from customers who order products and will do the scheduling delivery and confirm the order data products from taking action against the customer.
f. product delivery to the customer
   This form of delivery scheduling delivery order product by determining which order will be sent, when the delivery time, the type of vehicles used, amount of products shipped, shipping destinations, as well as doing monitoring shipments be checked against delivery status that had been scheduled earlier. The marketing area to date i.e. Cimahi, Bandung, Surabaya, and Jakarta.

6. a web-based System built.
7. at the central information system of milk Cipageran is built using the PHP programming language and uses MySQL as a Database Management System (DBMS).
8. Model analysis software used is structured analysis and modeling tool/tools used is the Business Process Modeling Notation (BPMN), Entity Relationship Diagram (ERD) and Data Flow Diagram (DFD).

1.4 Research methodology

Research methodology is the process of study, understand, analyze, and solve problems based on the phenomenon that exists and is also a series of long process and related systematically. Methods used in this research is descriptive method. The descriptive method is a method in researching the status of a group of humans, an object, a set of conditions, a system of thought or a current events class. Where the purpose of the descriptive method is to make the description, picture or painting in a systematic, factual and accurate regarding the facts, properties and relationships between phenomena investigated.

The steps undertaken in this research into a Groove as can be seen in Figure 1.

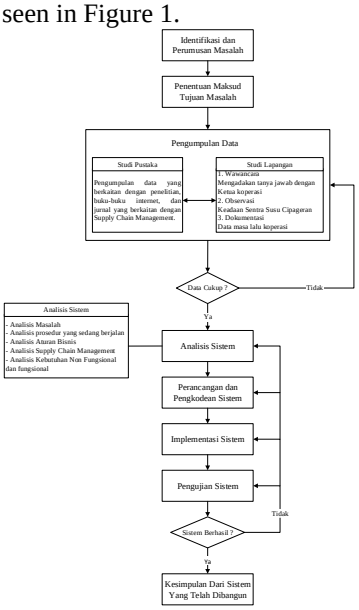


Figure 1 Stages Of Research Methodology

The following is a description of the stages of the research contained in Figure 1 above:

1. The identification and formulation of the problem
   This stage is the initial stage in the process of research, which in this stage is done by searching the input to the problem that in carefully through observation. Researchers conducting the formulation on the issue at hand, where the production process occurs, treatment against raw materials is in the warehouse, handling stock and procurement of raw materials, the relationship with suppliers that send raw materials to the company and the agents or booking products.

2. determination of the intent and purpose of the Research
   This stage is carried out for the establishment of the intent and purpose to focus some of the problems with the final results in the form of a final report. As for the intent and purpose of the research is as described in the discussion of the purpose and goal, and the goal of this research is expected can be beneficial for Dairy Cipageran Centers.
3. Data collection
   The stage of data collection is based on the stages that have been done before, where the process of data collection is done in the following way:

a. Studies Library
   At this stage of the study process is carried out by means of a library studying, researching and studying the various literature-literature from the library were sourced from books, texts and readings that have to do with the topic of research.
b. Field Study
   This stage is done to conduct research on the place of observation, namely the Central Milk Cipageran and collect the data needed to solve the problems faced by the company.

4. System analysis
   This stage is the stage to perform an analysis of the system. The analysis undertaken consisted of an analysis of the problems faced by Milky Cipageran Center, Supply Chain analysis of Managament at 5th in Milk Centers Cipageran (forecasting analysis using Single Exponential Smoothing forecasting method, analysis of monitoring against the inventory of raw materials and products that are in the warehouse, an analysis of the security of supply by using the techniques of Safety Stock, analysis of distribution Centers that occur in Milk Cipageran) , and functional analysis and analysis of the non functional.
5. The design of the system and the coding
   The system design stage is the stage to do the manufacturing design software programs including data structures, software architecture, representation of the interface (user interface) and procedure coding. The design of the system is done with the model analysis of structured data model diagram created using an ERD (Entity Relationship Diagrams) and to describe the process of using DFD (Data Flow Diagram). Tools used to design databases and SQLyog is for the process of designing the interface using the Microsoft Visio application called 2016.
6. System implementation
   This implementation phase is the phase is done after the process of designing and coding has been completed. The process is happening at this stage is to conduct the implementation of design into the form of source code. The construction of this system is created by using the programming language PHP (HyperText Preprocessor) is a scripting language that can be embedded or pasted into the HTML (Hyper Text Markup Language), and to the use of databases on the system are using MySQL. Software Tools used in the process of building systems is a Macromedia Dreamweaver 8.
7. System Testing
   Testing phase the system is a step that is carried out to find out whether the system or the software that has been created can overcome problems that occur. The testing process is also done in order to minimize an error (error) and ensure that the resulting output as desired. This stage is done in the following way:

a. testing of Black Box, this test is done to find out the functional requirements of the software. This test is done to find the following errors:
   1) functions are incorrect or missing.
   2) error on the interface.
   3) error on data structures.
   4) error or process performance.
b. Testing User Acceptance Testing, this testing was done to confirm that the system under test can meet business needs to provide confidence that the tested system is working properly and can be used before it was officially given to the end user.
c. end user acceptance Testing after applied in an environment of cooperation, this testing is done using interviews. This interview was conducted by providing some direct questions to the user the system later which is in Sentra Susu Cipageran.

8. The Conclusions Of The System That Has Been Built
   This stage is the final stage in which the researcher will withdraw the conclusion of development software that contains about the development of the software has been successfully macapai tujuanya and whether the software created has overcome the problems that exist in the formulation of the problem.

2. THE CONTENT OF RESEARCH

2.1 The Cornerstone of The Theory

The cornerstone of the theory is a collection of definitions and concepts from a variety of sources. The cornerstone of this theory became a solid foundation is a foundation of research, then some theories that explained the theory of support is the Foundation for the development of information systems by using supply chain management approach at the center of the milk Cipageran. The theory will be discussed regarding the theory of information system, BPMN (Business Process Modeling Notation), Supply Chain Management, control (monitoring), inventory (inventory), safety

inventory (safety stock), forecasting (forecasting) and on management's response to the transport and distribution.

2.1.1 Information System

Defines the system there are two groups of systems approach, i.e. a system that put more emphasis on procedures and relationships. The procedure is defined as a sequence of stages of instructions that describes what must be done, who is working on, when to do and how to do it. Based on the approach of an element is the system as parts of interlinked operating together to achieve some goal or intention. [3]

So it can be concluded that the information system can be defined as a set of components that are interconnected and work together to collect, process, store and distribute relevant information to support the decision-making process, coordination and control that exists therein. As for the purpose of the system is to provide information and mensistemastikkan information from the entire events or activities that are needed to control the operations of an organization. The activities referred to in this information system including pick up, manipulate, store and convey the information required within the organization operates all activities concerned.

2.1.2 BPMN (Business Process Modeling Notation*)*

BPMN stands for Business Process Modeling Notation, a new methodology was developed by Business Process Modeling Initiative as a new standard on business process modeling, and also as a design tool in complex systems such as e-Business system based message (message-based). The main objective of BPMN is a notation that provides easy to use and understandable by everyone involved in the business, including business analysts to model a business process, the developer of the technique that builds systems that carry out business, and many levels of management should be able to read and understand the process diagrams quickly so that it can help in decision making. [4]

2.1.3 Supply Chain Management

Supply Chain Management is the method or integrative approach to managing the flow of products, information, and integrated money involving parties ranging from upstream to downstream. Important principle in SCM is the transparency of information and collaboration among internal corporate functions as well as with the parties concerned with throughout the supply chain. Supply Chain is a physical network, i.e. the companies involved in the supply of raw materials, manufacture goods, or deliver it to the end user. These companies usually include suppliers, manufacturers, distributors, agents and supporting companies such as logistics service companies.

The term Supply Chain Management was first propounded by Oliver & Weber in 1982. So the SCM is not only oriented to the internal affairs of a company, but also a ekternal affair that concerns the relationship with partner companies. Because the companies that are on a supply chain in essence want to satisfy the consumers the same end, they must work together to make a cheap product, deliver it on time, and with good quality. Idelnya, relations between parties in a supply chain lasts long term. Long-term relationship allows all parties to create the trust as well as creating a better efficiency. Efficiency can be created due to a long term relationship means reducing fees to get the company's new partner. [5]

2.1.4 Inventory

Based on the coverage area on supply chain management showed that the existence of the process of inventory control of either raw material supplies or finished goods, then every company always requires the existence of inventory, in the absence of inventory the company will be exposed to the risk of not be able to meet the needs of the customers in.

The inventory is a number of materials, parts and materials provided in the process contained in the company to the production process, as well as goods or products that are provided to meet the demand from the consumer or retail any time.

2.1.5 Forecasting

Forecasting is very diverse in the time horizon of forecasting, the factors that determine the actual result, type pattern and a variety of other aspects. To deal with such extensive use, several techniques have been developed. One of the techniques in forecasting that is Smotthing Methode [8]

2.1.5.1 Smoothing Method

Worn condition where the weighting of the data from the one different from the data in the previous period and formed the Exponential function might be called Exponential Smoothing. [8]

In smoothing this historical values, random errors in Align-Align to produce a forecast of "smooth" that seem to work well in certain circumstances.

$$F_{t+1} = aX_t + (1 - a) F_t \quad (2.1)$$

Description :

F_{t+1} = The results of the forecast the period t +1

a = smooth constant

X_t = Actual demand data for the period t

F_t = Forecast in period t

Exponential smoothing method in the value of α can be determined freely, meaning that there is not a way that's sure to get the optimal value α. Then α value selection done by trial and error. The magnitude of α is between 0 to 1. [8]

2.1.5.2 Calculate Fault Forecasting

The accuracy or thoroughness of performance criteria to test is a method of forecasting. To test the performance of forecast error size needed will be used for forecasting. The best forecasting method is a method that gives a very small error rate compared to other methods. There are many models for forecasting errors doing the calculations.

Mean Squared Error (MSE) that is the average of the squared forecasting errors and can be seen in Equation 2.2.

$$MSE = \frac{\sum(|X_t - F_t|)^2}{n} \quad (2.2)$$

Description :

MSE = The value of the Mean Square Error

X_t = Actual data for the period t

F_t = Forecast data from the model used in the period t

n = A lot of data results forecast

2.1.6 Transport Management And Distribution

Distribution and transportation management is the management of the activities for the movement against a product from one location to another where the movement usually form or generates a network. On most products, the role of the distribution network and transportation is absolutely vital. Transportation and distribution network enables the product moved from the location where they are produced to the consumers/users are often limited by a great distance. The ability to deliver the product to consumers in a timely, appropriate amounts and in very good condition to determine whether such products will eventually be competitive in the market. The ability to manage the distribution network this adult is one component of a very important competitive advantage for most of the industry. [5]

2.2 System Analysis

System analysis is a step that contains a description of the systems examined i.e. Supply Chain Management in the centers of Cipageran Milk. It is intended to identify and evaluate problem-permasalan faced as well as the needs that are required so that the picture can be found the solution.

2.2.1 Model Supply Chain in Sentra Susu Cipageran

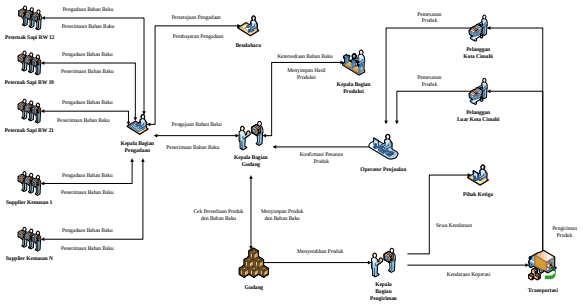


Figure 2 Model Supply Chain Management in Sentra Susu Cipageran

A description of the perpetrator of the Supply Chain that is found in Figure 2. Supply Chain Management model in Dairy Cipageran Centers are as follows:

Sentry Milk Cipageran have 2 categories of suppliers of raw materials for its production activities. As for the two categories of suppliers include:

a. Pure Milk raw material Suppliers
   Pure milk raw material suppliers are the cattle farmers in the village cipageran.
b. the Suppliers of raw materials Packaging
   Suppliers of raw materials packaging is the supplier of raw materials for plastic 20x35.

External relations conducted cooperative with, among others, third party suppliers and customers. Sentry Milk Cipageran use third party in shipping products through third parties. Customers who will be ordering the product to Sentra Susu Cipageran can come directly to the center of the milk Cipageran or reservations via phone. The booking process is handled directly by the Operator product sales.

Sentra Susu Cipageran using the strategy of make-to-stock, namely to determine the products that are produced in advance prior to the orders made by customers. Hence the need for planning purchases of raw materials in order to make the production process remains running in the absence of a shortage of raw materials. Ordering raw material planning can be done with forecasting raw material needs to be used in the period to come.

2.2.2 Analysis *Supply Chain* in Sentra Susu Cipageran

Supply chain analysis conducted to describe the supply chain management process that will be built in the Centre of the Dairy Cipageran based on supply chain in Figure 3.5. As for the stages of the supply chain in the dairy Sentry Cipageran can be seen in Figure 3.

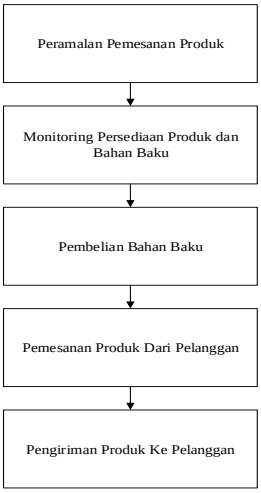


Figure 3 Stages *Supply Chain* in Sentra Susu Cipageran

Sentra Susu Cipageran using the strategy of make-to-stock production process i.e., tend to be influenced by the presence of supplies of raw materials in warehouses and Sentra Susu Cipageran determine the products that are produced in advance prior to the order being made to create a stock of products in the warehouse. On information systems strategy of Supply Chain Management in Sentra Susu Cipageran that will be built, the applied stages as follows:

1. Stages of Product demand forecasting

Based on Figure 3 principals involved in the forecasting stages of the booking of the internal parts of the product is a cooperative that is the head of the Procurement Section. Head of Section Pengadaaan will be predicted the ordering products for the next period.

Forecasting calculations needed data products ordering some of the earlier period. The data that will be used as examples i.e. products with sales at most of the period of January-August 2016 i.e. product type pasteurized milk. Recap of the pasteurized milk products booking period of January-August 2016 is described in table 1.

Table 1 Recap of the pasteurized milk products booking period of January-August 2016

No	Periode	Pemesanan
1	Januari	3024
2	Februari	3648
3	Maret	4205
4	April	4073
5	Mei	3780
6	Juni	2860
7	Juli	4505
8	Agustus	4650

Based on the data that has been elaborated to produce a chart to figure out the pattern of the data product ordering. It aims to find out the methods that will be used in accordance with the pattern of the data produced. Graphs from data ordering products can be seen in Figure 4.



Figure 4 Grafik pemesanan produk susu pasteurisasi

2. The stages of Monitoring Product Inventory and raw materials

Based on Figure 3 principals involved in monitoring the supplies of raw materials is part of a cooperative that is the head of the internal Part of the warehouse. After a stage of forecasting, the cooperative will conduct monitoring of supplies of raw materials in warehouses and determine how the limits of safe products that should be available in the warehouse to avoid shortage or void the stock in the warehouse by using the method of safety stock. If the stock is less than the limit of the safe, then the company will contact the supplier to order raw materials needed.

3. The purchase of raw materials

Based on Figure 3 principals involved in the stages of procurement of raw materials is the internal part of the cooperative that is the head of the procurement section in the center of the milk Cipageran. The head of the procurement section will calculate the procurement of raw materials from forecasting data obtained, safety stock and the number of existing stock.

4. Ordering products from Customers

Based on Figure 3 principals involved in the ordering of products by the customer is part of a cooperative that is the internal Operator sales. The operator will receive sales orders from customers along with product amount, the requested packaging and address customers who will continue to process the delivery of products.

5. Delivery of products to Customers

Based on Figure 3 principals involved in the delivery of the products to the customer is the company's internal and external part namely head of shipping and third parties. Head of delivery will make product delivery schedule and specify the

types of vehicles that will be used based on the vehicles that are available from third-party adapted to the time availability of the vehicle and the vehicle's capacity to deliver the product to the place of the customer. Provision of vehicles available from third parties based on the business rules of the cooperative.

2.3 Analysis Of The Coding

The code is a form of presentation of data by classifying data for easy data entry in the process (inputs) into the system. Usually the code used to classify the data, so the code carry a message or have different meanings, symbols of the code used on almost all of the process that has to do with the data. On information systems, there are some encoding that will be used include:

1. Coding Products

The format of the product coding consists of 5 digits that can be seen in Figure 5.

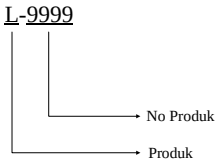


Figure 5 Format Pengkodean Produk

Coding of products can be seen in Figure 6.

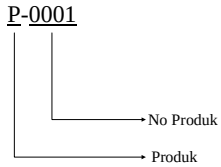


Figure 6 Pengkodean Produk

Example: P-0001 it means P is products and 0001 is the product code.

2.4 Database Analysis

Data base analysis on the infornasi system will be built using the ERD (Entity Relationship Diagram). ERD is a data model that uses some notation to describe the data in the context of the entities and relationships in the data described by the. As for the chart depicted in Figure 7.

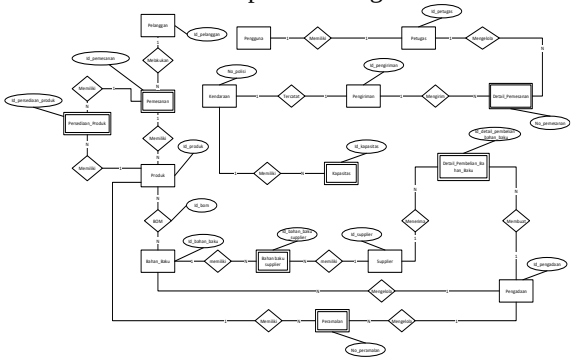


Figure 7 ERD Information System Supply Chain Management in Sentra Susu Cipageran

2.5 Context Diagram

Context diagram is a model to explain how data is used globally and is transformed to the process or describe the flow of data into and out of the system. This system context diagrams can be seen in Figure 8.

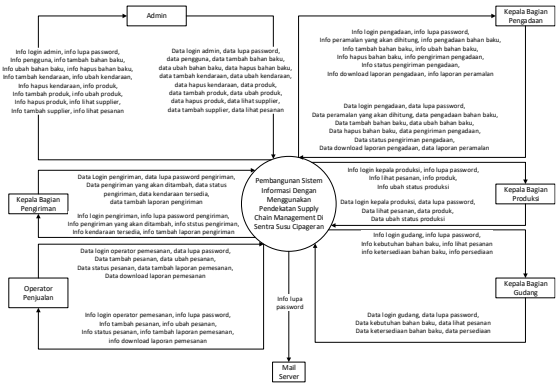


Figure 8 Context Diagram

2.6 DFD Level 1 SCM in Sentra Susu Cipageran

DFD Level 1 Supply Chain Management in the Central Milk Cipageran in Figure 9 describes in general terms the process of just about anything that can be done on the system.

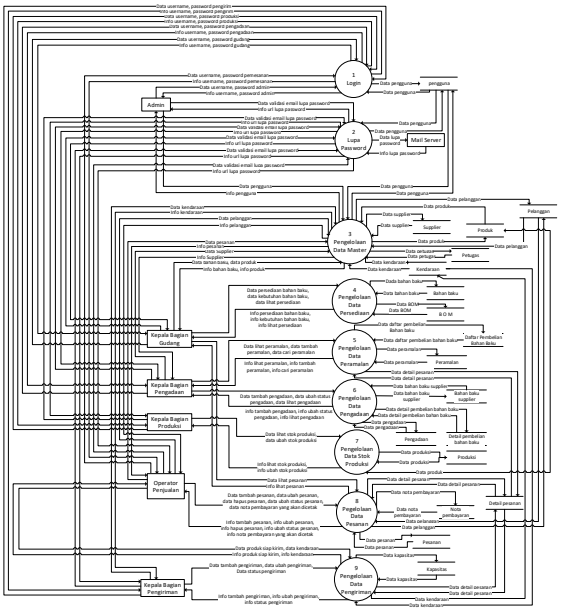


Figure 9 DFD Level 1 SCM in Sentra Susu Cipageran

2.7 Design Of The Interface of The Login Page

The design of the interface of the login used by the admin, Operator sales, head of warehouse, customer, head of section, head of procurement and shipping section head at the time of going into the system, the user login interface design can be seen in Figure 10.

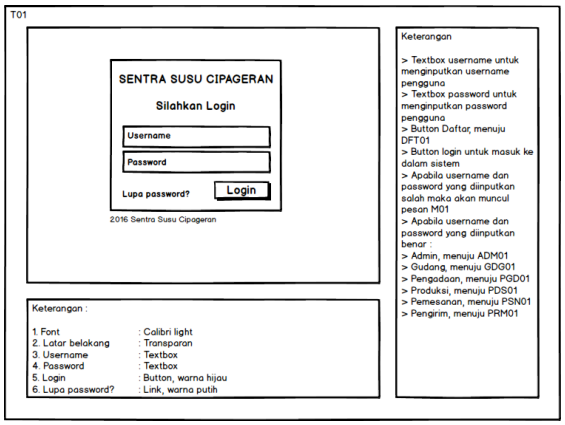


Figure 10 Design of The Interface of The Login Page

2.8 Design of The Interface of The Forgot Password Page

If you can't log in into the system due to a forgotten password then it can go directly on the design of a forgotten password can be seen in Figure 11.

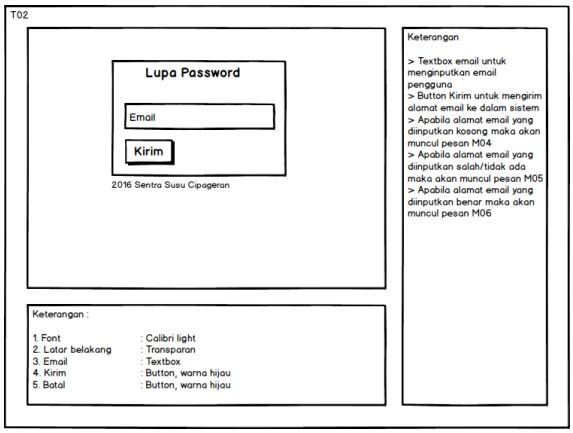


Figure 11 Design of The Interface of The Forgot Password Page

2.9 Design of The Interface of The Admin Page

The design of the admin interface used by employees who have the right level as the administrator responsible for managing master data i.e. user data. The design of the admin interface can be seen in Figure 12.

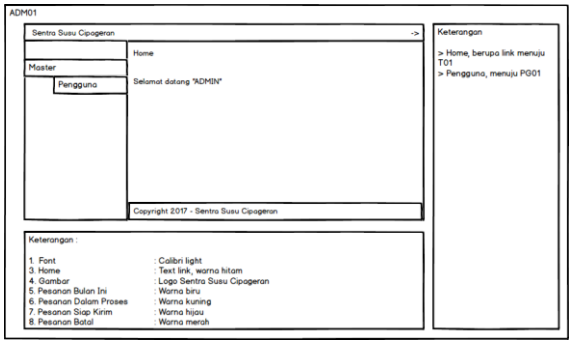


Figure 12 Design of The Interface of The Admin Page

2.10 Implementation Interface Login Page

Implementation of the interface of the login used by the admin, Operator sales, head of warehouse, customer, head of section, head of procurement and shipping section head at the time of going into Supply Chain Management information system of the Sentra Susu Cipageran, designing the user login interface can be seen in Figure 13.

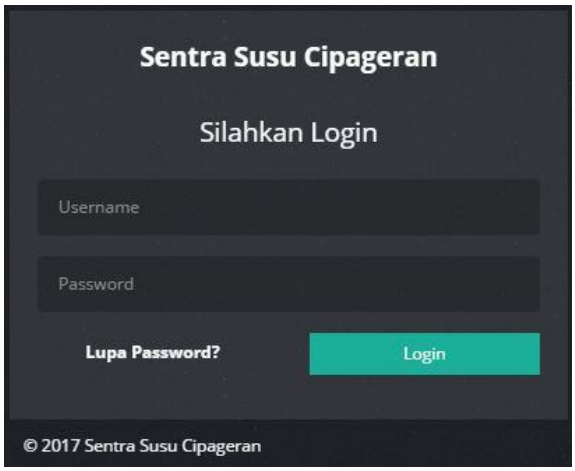


Figure 13 Implementation Interface Login Page

2.11 Implementation Interface Forgot Password Page

Forgot password interface implementation describing if you can't log in into the system due to a forgotten password then it can go directly on the design of a forgotten password can be seen in Figure 14.

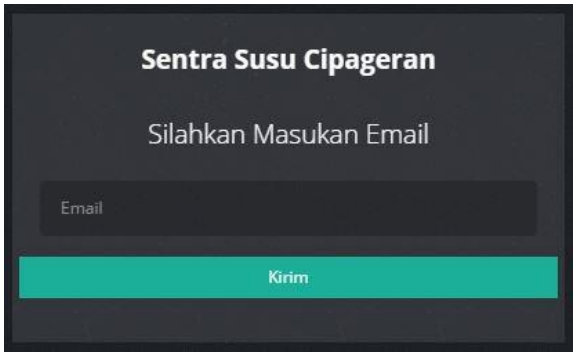


Figure 14 Implementation Interface Forgot Password Page

2.12 Implementation Interface Admin Page

Implementation admin interface used by employees who have the right level as the administrator responsible for managing master data i.e. user data. The design of the admin interface can be seen in Figure 15.



Gambar 15 Implementation Interface Admin Page

2.13 The Conclusion Of The Beta Test

Based on the results of testing on the test case that has been done then it can be concluded that in general the supply chain management information system in the dairy Sentry Cipageran can run in accordance with the expected output.

2.14 The Conclusion of UAT

Based on end user acceptance testing has been conducted with the Chairman of the cooperative against information systems supply chain management in the centers of Cipageran Milk, it can be concluded that the system had already been accepted by the user in the center of the milk Cipageran of them Admins, head of procurement, head of warehouse, production Chief, and head of the shipping. Admin can manage the user data such as the add user, change user, and delete users as well as the results obtained is in compliance with the expected results. Head of procurement can already manage data forecasting and supplier such as add, change, and cancellation as well as the results obtained is in compliance with the expected results. Head of warehouse can already manage data raw material and product data such as add, change, and delete as well as the results obtained is in compliance with the expected results. Head of production can already manage data bombs such as add, change, and delete as well as the results obtained is in compliance with the expected results. Head of delivery can already manage data vehicles such as add, change, and delete as well as the results obtained is in compliance with the expected results. Based on the conclusions of the UAT then can proceed to the testing phase the receiver end users after the system was implemented in an environment of cooperation.

2.15 Conclusion End User Testing After The System Is Applied In The Company

Based on the results of the interviews are done to the user's level consisting of the Chairman of the cooperative, operator sales, head of procurement, head of the warehouse, head of production, and the head of the shipping section of the meyatakan that the supply chain management information system built on the calculation of the purchase of raw materials is already quite correctly and in accordance with required. For the delivery of the product itself is already quite helpful in making the delivery schedule of the product to the customer. As for the look of the built system is already quite interesting and suggestions for the future the system must be built more additional features.

3 CLOSING

Describes the conclusion containing the results obtained after the analysis, design, and implementation of the design of software built and have been developed as well as suggestions that will provide an important record of and possible improvements that need to be done for the development of the software before.

3.1 Conclusion

Based on the results obtained from the black box testing, user acceptance testing (user acceptance test), and end user acceptance testing after the system is implemented in a cooperative environment then the conclusion can be drawn as follows:

1. Information systems supply chain managemet in Sentra Susu Cipageran can help Chief Procurement in determining the amount of raw materials must be purchased in order to continue production and running smoothly.
2. Information systems supply chain managemet in Sentra Susu Cipageran can help the head part in the process of shipping delivery by doing scheduling product delivery to the place of the customer.pelanggan.

3.2 Suggestion

Suggestions for the development of information systems there are a few suggestions that may be made, inter alia:

1. further Research is expected to perform a combination of information system in supply chain management with customer relationship management information system in managing relationships with customers.
2. Create a page for a customer, such as e-commerce in marketing its products so that customers can buy products or transactions via the internet requires only internet access and its interface using a web browser.browser.

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