INFORMATION SYSTEMS THE WAREHOUSE FINISHED PRODUCTS IN ROTI RIKI BANDUNG USING APPROACH TO SUPPLY CHAIN MANAGEMENT (SCM)

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ABSTRACT

Roti Riki Bandung is a company in Bandung which produce flour-based product, for example sweet bread and pia. The processes that occurs are the increasing of demand from agents and distributors to the company. The increase of the demand means that the company have to make sure that the raw material is adequate. This process will become a problem when the raw material is inadequate, this problem will results the decline of production and the prodcution process will be obstructed. Thus makes production department cannot determine the amount of raw materials will be needed to fulfill the demands by final product warehouse.

A solution needed to prevent this current problem that can be occur in the future is a system based on supply chain management. The purpose of this system is to facilitate the determination of the amount of product to be produced and the determination of the amount of raw material that will be needed by the supplier. The method useds to forecast raw material needed is single moving average. While the method used to determine safe amount of aviability of the raw material is safety stock.

The conclusion based on this research and testing is that a system will be built, can help production department to determine the amount of production to fulfill demands by final product warehouse and also determine raw materials will be needed by production department to the supplier.

Keyword : Supply Chain Management, make-to-stock, single moving average, Safety Stok

1. INTRODUCTION

Roti Riki Bandung is a company that focused on bakery that located in Bandung. This. Roti Riki Bandung, founded in 1990 by H. Sudiarto. This company produce breads with many flavour, they are mocha, chocolate, combination, kopyor, chocolate pia, and sweet bread, each piece of bread priced Rp2.000,00. Roti Riki Bandung needed 30-35 sacks of flour a day to produce 30.000-45.000 pieces of breads and pias.

Based on observation and interview with Kasman as a marketing department said that marketing process in Roti Riki Bandung is by distributed them throught distributors and agents. Demands and marketing is done by distributor take from the warehouse. The two types of distributor are with motorcycles and cars. Each distributors have different amount of bread to be distributed, the motorcycles can carry up to 600-1.800 packs of bread and pia while the cars can carry up to 2.000-18.000. At first the agents usually order the demand by phone to the marketing department and the products will be delivered a day after the order by company's vehicles. Marketing agents are located in Kopo, Cianjur, Garut and Cilacap. The amount of product ordered is between 12.600-21.350 packs of bread and pia. The consument also can buy the products directly to the factory with smallest number of 10 packs.

Based on data from nine weeks the demand for finished products from each of the agents and resellers (Appendix E). Based on fact within that period, demand of product is fluctuated. Thus affect the availabilty of raw materials on the warehouse department which means the production process is not going well because each stage of production is delayed or stopped. The increasing demand can be a problem for the production department in a way to fullfill demand of the warehouse department so that the warehouse will not run out of supply. Riki Roti Bandung has 2 policy to solve the problem when the supply does not meet certain demand, firstly the consuments are asked wether or not to change the order left in the warehouse or secondly the consuments are asked to wait until the production can meet the demand. Hence the negative effects to the company. Similar problem also can occur when the supply was higher than demand, this problem can result overproduction and the supply will be stacked in the warehouse.

Supply Chain Management (SCM) is a complete cycle chain management ranging from the suppliers, company's operational activity, to distributors and the consuments as terminal process[2]. Based on this definition the problem Roti Riki Bandung faced can be solved by this system where Roti Riki Bandung can work hand-in-hand with other business partners because of general function of this system is to make

sure that business process can be integrated from the supplier to the consument. The purpose of this system is to make sure the information flow from consument's order, raw material procurement, distribution and order delivery is synchronized and consistent.

Based on the problem above, Roti Riki Bandung need a final product warehouse information system with Supply Chain Management (SCM) approach.

The purposes of this reasearch are:

a. To ease production department to determine amount of production to fulfill demands of final product warehouse
b. To ease production department to determine amount of raw material ordered to the supplier.

2. CONTENTS RESEARCH

2.1. Base Theory

The basic theory of this thesis outlines the process system analysis as well as support the development process of information system in final product warehouse of Roti Riki Bandung using supply chain management approach.

2.2. Information System

The system is an order (integrity) that consists a number of functional components (functions/units with special tasks) which are interconnected and simultaneously aiming to satisfy a process/specific job. [1]

Generally the information is data that has been processed into a form that is more meaningful and useful to the recipients that will be used to decide the present nor the future. The function of information is to reduce uncertainty in the decision making process regarding a State.

So the notion of information system is 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 within.

2.3. 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. An important principle of SCM is the transparency of information and collaboration among internal corporate functions as well as with the parties concerned with throughout the supply chain. Spply Chain is 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, retail as well as supporting companies such as logistics service company.

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 external affairs that concern 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. [2]

2.2.1. Supply Chain Management Proccess

Supply chain management process is a process of processing of products from raw material still start, semi-finished products to finished product is obtained and then sold through a wide range of facilities which are connected by chains along the flow of products and materials. When depicted in the form of a chart will appear as the following:



Picture 1 Process supply chain and 3 kinds of managed stream [2]

Picture 1 shows that the supply chain management is the coordination of materials, information and financial flows among the companies participating.

a. The flow of the material involves physical product flow from suppliers to the consumer through a chain, as well as feedback from returns a product, service, recycling and disposal.
b. Information flows include forecast demand, transmission of orders and order status report.
c. Financial flows include credit card information, credit terms, payment schedules, assignment of ownership and delivery.

2.2.2. Component Supply Chain Management

Supply Chain Management has three main components that support the operation of a business process as follows [2]:

1. Upstream Supply Chain

The upstream section (upper) supply chain covering activities of a manufacturing company with the penyalurnya (which may be manufacturers,

assemblers, or both) and their connection to the retailer (the second-tier supplier). The supplier relationship can be extended to multiple strata, all the way from the origin of the material (e.g., ore mines, plant growth). In the upstream supply chain, the main activity is the provision of.

2. Internal Supply Chain

Part of the internal supply chain encompasses all process inhouse used in transforming input from the retailer into the output of the organization. It extends from the time of input into the organization. In the internal supply chain, the main concern is the management of the production, fabrication and inventory control.

3. Downstream Supply Chain

Downstream (downstream) supply chain encompasses all activities that involve product delivery to the customer end. In the downstream supply chain, attention is directed to the transport, warehousing and distribution before and after-sale service.

2.2.3. Area Coverage Supply Chain Management

SCM has the important principle i.e. SCM are information transparency and collaboration between existing internal functions inside or on the parties that exist outside the company in the scope of the supply Chain. When referring to a manufacturing company, the major activities that fall into the classification of SCM is [2]:

1. The activity of designing new products (Product Development)
2. The activities of getting raw materials (proceurement, purchasing, control)
3. Production and supply planning Activities (planning & control)
4. The activity of doing production (production)
5. delivery/distribution (distribution)

The fifth classification is usually reflected in the form of a division of the department or Division with activities that are usually done. Distribution and forms of activities that normally exists at manufacturing companies can be seen in table 1.

Table 1 Top Five Part Area Coverage (SCM)

.Section	The scope of activities, among others
Product development	Doing market research, designing new products, involve suppliers in new product design
Procurement	Choose a supplier, mengavaluasi supplier performance, purchase of raw materials and components, monitors the supply risk, build and maintain relationships with suppliers
Planning & Control	Demand planning, demand forecasting, capacity planning, production planning and inventory
Operation/Production	The execution of the production, quality control
Delivery/Distribution	Distribution network planning, scheduling deliveries, find and nurture relationships with corporate service delivery, monitor service level in each distribution center

2.2.4. Push and Pull Supply Chain

Pull supply chain is a strategy of production make-to-order "that the main benefit is avoiding waste or inventory is a strategy the company mainly manufacturing companies where new production done always after the market demand and actually done at the request of customers.

Push the Supply Chain is a strategy of production Make-to-Stock. The push system is essentially a system of planning and controlling production-based material requirments planning (MRP). The pull strategy more popular compared to the production system because the pull system based upon forecasting or forecasting and generating large amounts of output that would later go into inventory before it is transmitted to the customer. [4]

2.2.5. Types of Forecast Forecasting

The forecast forecasts usually classified over coverage duration or time horizon in the future. The next time horizon generally distinguished top three categories :

a. Short-term forecasts Forecasts

Include intervals of three instead of up to one year. Short term forecast forecast is used in the preparation of the plan of purchasing, scheduling or job scheduling, task assignment level labor or workforce levels, administering tasks (job assigments), and the level of production (production levels).

b. Medium-term forecast Forecast

These forecasts are generally covers the time period from one year up to three years. Medium-term forecasts were used in the preparation of plans for the sale, production planning, and budgeting or budgeting that includes cash, budget and analysis of various production plan.

c. Long term forecast Forecast

Generally forecast forecast covers a period of three years or more. This long term forecast forecast in use for prencanaan new products, capital expenditures budget or capital expenditure, prencanaan location of facilities expansion pack, and research (Research Development & & Development).

2.2.6. Classification Forecasting

A noteworthy forecasting stages that must exist in the process of forecasting. There are six phases in the forecasting process, namely:

1. Determine the purpose of prophecy

How to forecast will be used and when the forecast will be needed? This step will give an indication of the level of detail required in the forecast, the number of resources (employees, time, computer, and cost) which can be justified, as well as the degree of accuracy required.\

2. Setting a time span

Forecast must indicate the time frame, given that accuracy decreases when a span is increased.

3. Select the forecasting technique

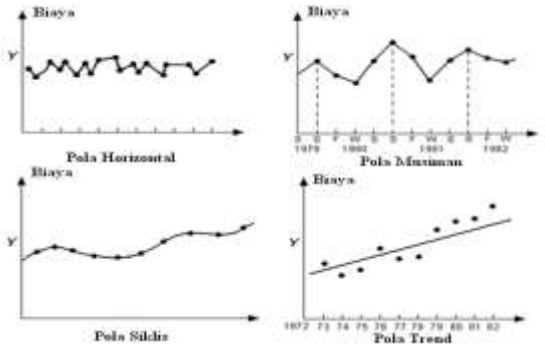
Acquire, cleanse, and analyze the data. Obtain the data can include a significant effort. After acquiring the data may need to be "cleaned up" in order to remove foreign objects and data that are clearly not true before analysis.

4. Make a prediction

Monitor the forecast. The forecast should be monitored to determine whether the prediction is done in a way that is satisfactory. If not, check back method of forecasting, assumptions, data validity, and others. Then, change it according to your needs and prepare a forecast revision.

An important step in choosing a method of periodic sequence (time series) for proper forecasting is by considering the type of pattern data, so that the most appropriate method with the pattern can be tested. The pattern data can be differentiated into four types, namely:

5. The pattern of Horizontal (H) occurs when data values fluctuate around the average value of that constant. Series such as these is the stationer's response to the average value. Horizontal pattern can be seen in Picture 2.
6. The seasonal Pattern (S) occurs when a series is affected by seasonal factors, such as the quarter of the year, months, or days of the day on Sunday. The seasonal patterns can be seen in Picture 2.
7. cyclical Pattern (C) occurs when the data is affected by long-term economic fluctuations such as related to the business cycle. Cyclical pattern can be seen in Picture 2.
8. Pattern Trend (T) occurs when there is an increase or decrease in long-term secular in the data. The pattern of the trend can be seen in Picture 2.



Picture 2 Horizontal Patterns, Seasonality Patterns, Cyclical Patterns and pattern Trend

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 a method of Smoothing. [6]

2.2.7. Single Moving Average Forecasting Method

Single moving average method uses an average of all forecasting data. The moving average is more used to predict the next period. The formula for singlet moving average can be seen in the following equation.

$$S_{t+1} = \frac{Xt + Xt-1 + \ldots + Xt-n+1}{n} \quad (1)$$

Description :

S_{t+1} = the value of forecasting for the next period
X_t = true value/actual period t
n = period moving average

2.2.8. Mean Square Error (MSE)

Counting errors of forecasting used to know the accuracy of forecasting results that have been made against actual data. There are many models for forecasting errors doing the calculations. The method used to calculate the fault forecasting (forecast error) is a method of MSE (Mean Squared Error). MSE is the average of the difference in the squares of the values predicted with observed [2]. MSE is used by generating an existing error indicates how large the difference results estimation with the destinations. This makes it different due to the randomness in the data or because it does not contain a more accurate estimation. The formula for the MSE can be seen in equation 2.

$$MSE = \frac{\sum(At - Ft)^2}{n} \quad (2)$$

Description,

A_t = The actual demand in the period t
F_t = Demand forecasting in the period t

n = the number of forecasting period involved

2.2.9. Monitoring

Monitoring is monitoring that can be described as awareness (awareness) of what is like to note, containing high-level monitoring carried out in order to make the measurement through time that shows movement towards or away from it. Monitoring will provide information on the status and trends of that measurement and evaluation is completed repeating from time to time. [4]

So the Monitoring activity is an activity monitor or supervise the whole activity is performed by a person. The activities of this Monitoring can be done in two ways, namely directly or indirectly. Monitoring directly by way of the review directly against the ongoing activities such as the review of incoming goods, goods that come out and others. While the indirect Monitoring is done through activities see the written reports, oral reports or observe the interviewing one of the few people involved in an activity

2.2.10. Inventory Control Methods

A method of inventory control is done based on mathematics, statistics and optimization as the main tool to answer quantitative issues that occur on a system of inventory (inventory). This method is in fact trying to find the optimal answer in determining inventory policy, i.e. a policy relating to the determination of economical order lot size (Economic Order Quantity), while order (Reoder Point), as well as in the backup safety inventory (Safety Stock) is required. The approach used mathematical modeling is doing against the alternative answer to the problem so that the optimal answer can be determined analytically. [2]

2.2.11. Engineering Safety Stock

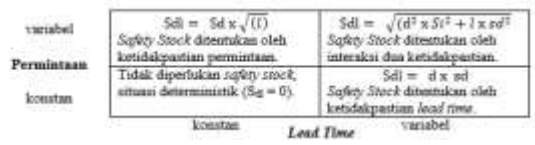
Security or safety stock inventory serves to protect the errors in predicting demand during lead time. Inventory security will function when the actual request is greater than the average value of [5]. To get an idea of how uncertain demand during lead time, companies need to collect data to get distribution. The formula for finding the value of safety stock can be seen in Equation 3.

$$\text{Safety Stock} = Z \times S_{dl} \qquad (3)$$

Description,

Z = Service Level (The company's ability to service requests or translated from management decision)

S_{dl} = Determined from the request with conditions of uncertainty can be seen in Picture 3.



Picture 3 the interaction of demand and lead time on penenuan safety stock

2.4. Analysis Problem

Analysis of the problem is an assumption of the problem which will be outlined in the procedures of data processing in information systems development program finished product Warehouse in Roti Riki Bandung using Supply Chain Management approach. Analysis of the problems of the system are running at this time are:

1. Part of the production difficulties in determining the amount of raw material that will be booked to the supplier, due to increased demand for production activities so as to increase the production capacity of that impact the reduced raw material.
2. the production difficulties of difficulties in determining the amount of production to meet the needs of digudang finished product, because of the uncertain demand, making it difficult to determine the demand for the next period.

2.5. Analysis Supply Chain Management

Analysis of supply chain management is used to work on components of the information system will be built. Supply chain management has a framework that is a component of the development for the system.

2.6. Supply Chain Management model in Roti Riki Bandung

Based on the analysis of SCM are described in the previous section, as for the model of supply chain in Roti Riki Bandung can be seen in Picture 4

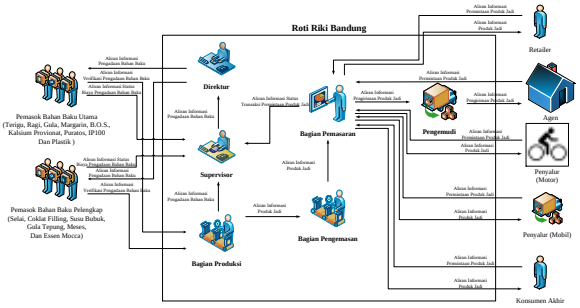


Figure 4 Model of Supply Chain Management at Roti Riki Bandung

2.5.1. Analysis Forecasting Products

These stages are stages in analyzing the forecasting products. At this stage, the products will be foreseen is the product of pia green beans.

2.5.2. Determining Composition Analysis Products

This stage is the stage of determining the rate of the composition of the raw materials will be multiplied with the forecasting results.

2.5.3. Inventory Analysis by Using Safety stock

This step is monitoring preparations for the monitor and control inventories of products and raw materials in the warehouse. Inventory control for monitoring that is by looking at the inventory history data every week. Function monitoring in order to avoid the occurrence of the vacancy and the shortage of stock of products and raw materials in the warehouse. Monitoring inventory control requires an indicator to determine how the limits of safe products and raw materials should be available in the warehouse by using the method of safety stock.

Application of the method of safety stock calculation process, namely the preparation of safe limits that must be available in the warehouse for the following period.

2.5.4. Inventory Monitoring Analysis

These stages are stages in the preparation of raw materials and monitor the product in the warehouse that will display the status of the safe or unsafe.

2.5.5. Specifies The Ordering Of Materials To Supplier

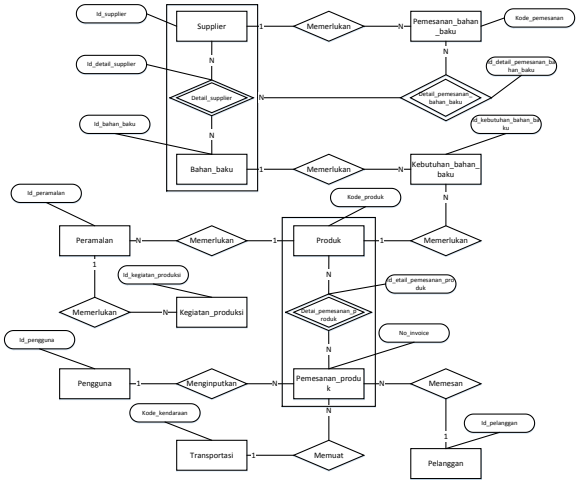
These stages are stages in booking the raw materials to the supplier in accordance with the status of the inventory at the warehouse.

2.5.6. Analysis of Product Delivery

These stages are stages in monitor shipping status and the capacity of the vehicles that will be used in shipping. Monitoring the delivery of the product was done so that up to the agents at the time and the right place and know the shipping status.

2.7. Analysis Database

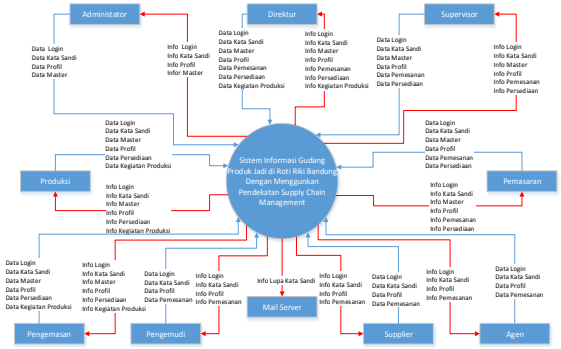
The analysis database on the system will be built using Entity Relationship Diagrams (ERD), the ERD is a data model that uses some notation to describe the data in the context of the entities and relationships that exist in the described by that data. Following an ERD from the system to be in the wake of this can be seen in Picture 5



Picture 5 Entity Relationship Diagrams (ERD) in Information systems the warehouse finished products in Bread Riki Bandung Using approach to Supply Chain Management (SCM)

2.8. Context Diagram

The diagram is one of the models to explain how data is used globally and in transformasikan for the process or describe the flow of data into and out of the system. This system context diagrams can be seen in Picture 6.

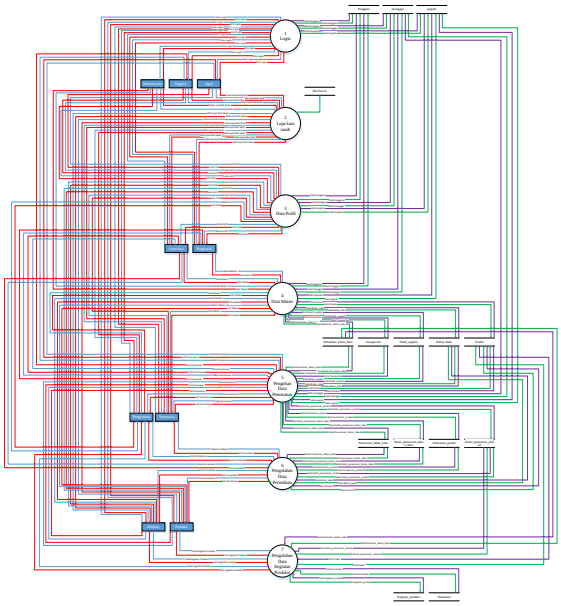


Picture 6 Context Diagram in Information systems the warehouse finished products in Bread Riki Bandung Using approach to Supply Chain Management (SCM)

2.9. Data Flow Diagram

Data Flow Diagram shows how data flow outlines the processes that occur in the system until the process in more detail. In the diagram context as Picture 6 can be decomposed into several DFD can be seen in picture 7.

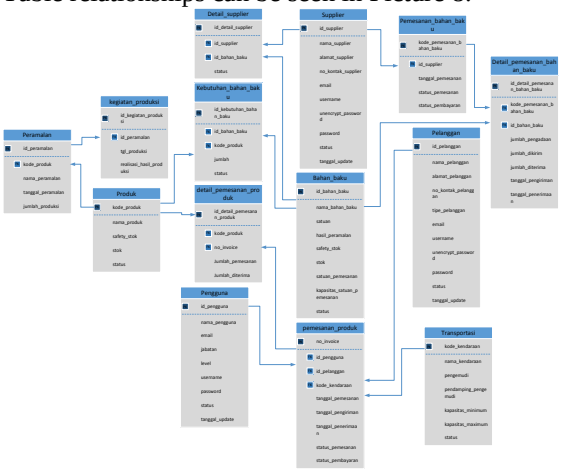
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Picture 7 DFD Level 1 di Information systems the warehouse finished products in Bread Riki Bandung Using approach to Supply Chain Management (SCM)

2.10. Relation Table

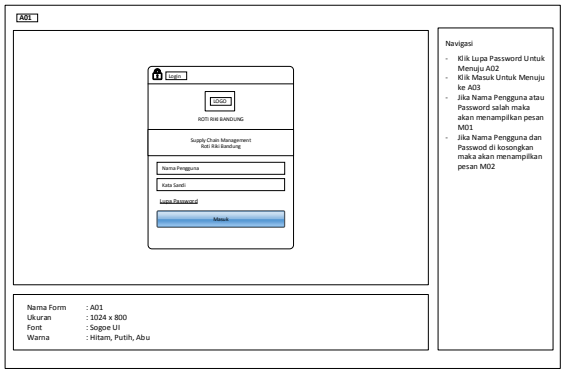
Table relation describes the relationship of data, meaning data atar and their boundaries. Process between attributes is a combination between an attribute that has the same primary key, so that these attributes into a unity it has connected by key fields. Table relationships can be seen in Picture 8.



Picture 8 Relation Table di Information systems the warehouse finished products in Bread Riki Bandung Using approach to Supply Chain Management (SCM)

2.11. Design Interface

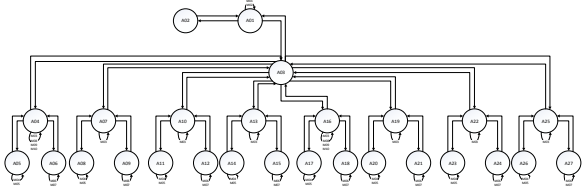
The design of the interface was created to illustrate the appearance of the program that will be used by the user to interact with the system are made. The design is based on the input and output to be generated when the application is implemented. Here is a sample login interface design which can be seen in Picture 9.



Picture 9 Design of Login Interface

2.12. Semantic Network Design

The design of the semantic network is a representation of the design of the interface that indicates where each interface is connected. The design of semantic networks in the information system of the warehouse finished products on Roti Riki Bandung can be seen in Picture 10.



Picture 10 Semantic Network Semantic

2.13. Testing

System testing is the most important thing that aims to find errors or deficiencies in the information system tested. Testing intends to find out the information system created has met the performance according to the purpose of design.

2.11.1. Black Box Test Results

Based on the results of testing against each process contained in the software are built with sample test was done, delivering results in the form of conclusions that any process on the software that had been built in accordance with the filtering functionality, the error in the form of granting the error message to any process that happens is already good and was enough of a maximum, as well as the output (output) are produced in accordance with the expectations.

2.11.2. Beta Testing Results

Based on beta testing done before, it can be concluded that:

1. the finished product warehouse System built is already able to facilitate production in determining the amount of raw material that will be booked to the supplier to meet the production needs
2. finished product warehouse System that can facilitate this already built part production in determining the amount of product to be

produced to meet the needs of digudang finished products.

3. CLOSING

This section will explain about the conclusions of research based on the results obtained after the analysis, design, and implementation of the design of systems that were built as well as suggestions that will provide an important record of and possible improvements that need to be done for the development of the system.

3.1 Conclusion

Based on the results of the implementation and the testing that has been done in the penulisaan final project, the conclusion can be drawn as follows:

1. the finished product warehouse System built is already able to facilitate production in determining the amount of raw material that will be booked to the supplier to meet the needs of production.
2. finished product warehouse System that can facilitate this already built part production in determining the amount of product to be produced to meet the needs of digudang finished products.

3.2 Suggestion

As for suggestions for the development of the information system of the warehouse finished product in Roti Riki Bandung using approach to supply chain management (SCM) is as follows:

1. the finished product warehouse information system is need for the development of the side view of the interface to make it more attractive and easy to use.
2. finished product warehouse information system built is need for development in the management of staffing and kaeuangan, because of the existing financial system built is still not complete and not to the existence of the staffing system in the system being built.

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