INFORMATION SYSTEM DEVELOPMENT SUPPLY CHAIN MANAGEMENT (SCM) IN CV. DAFIQU COLLECTION

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ABSTRACT

CV. Dafiqu Collection is a company engaged in convection that produces clothing products for Dress and Khimar. This company is located in Cimaung Village, South Bandung Regency. In determining the amount of inventory of materials for the production process, problems often occur. The process of procuring the number of materials based on the products sold from the previous period. Products that are sold from each month are always erratic (up and down), so that the material procurement section has difficulty in determining the material quantity for the next period.

CV. Dafiqu Collection manufactures products before order from consumers (make-to-stock), uses a Push-based-supply chain strategy. The process starts from the upstream to the downstream. In the supply chain management information system the author uses the Tsukamoto fuzzy forecasting method for making a decision. The results of the forecasting are obtained for July 2018 for 210 pcs of the Queena Dress that must be produced. For materials, 653 yards of Amunzan fabric are needed.

Based on the problems found in the CV. Dafiqu Collection, it requires an information system of supply light management to support production planning and the amount of material needed for the production of products in order to avoid product hoarding and also the emptiness of finished products in the warehouse.

Keywords*: supply chain management, push-based supply, make-to-stock, fuzzy tsukamoto, safety stock, fuzzy logic.*

1. INTRODUCTION

CV. Dafiqu Collection is an industrial company engaged in the production and distribution of clothing for women located in Cimaung Village, Cimaung District, South Bandung Regency. This company has been established since 2014 as an individual company. This company starts the production process before get the orders from consumers.

Based on the results of interviews with Mr. Ujang Rusmaya as the owner of the company, explained that the process of procurement of materials done by ordering the materials to suppliers who have collaborated with the company. Ordering materials done every month and produces according to the materials that available in the warehouse. Production activities are carried out from the process of ordering materials to suppliers when the materials are used up. Ordering the amount of material for the next period based on the number of product sales in the previous period. From the data, the head of production staff calculates the amount of material that must be ordered to the supplier. The head of production staff must determine the amount of material based on each type of product, because to produce several types of products there need different materials. So that the head of production staff will face the difficulty in calculating the amount of materials that must be ordered in order to minimize the lack of stock and over stock in the warehouse. Based on data of ordering material in January 2018, for the production of all types products is approximately 3957 yards of basic fabrics. The material can produce as many as 1319 pcs of the products. In the previous month there were 187 pcs of dress in the warehouse, then the total product in January was 1506 pcs of dress. While the number of sales in January 2018 was 1323 pcs, so at that period the products are over stock in the warehouse as many as 183 pcs of dress.

Based on the interview with Mr. Andri as part of the distribution staff, explained that the process of distributing or shipping products to consumers will be carried out if the customer has paid off the payment. When the consumers order the product at the same time, he makes a delivery schedule based on the payment and repayment date. He explained that there were still frequent mistakes in determining delivery schedules and transport vehicles. When in one day there are several consumers who order products that are in the area of Bandung regency, the errors are often occure and products must be carried out for several times, delays in sending producs, and lost the consumer confidence.

CV. Dafiqu Collection has problem in calculating material requirements. Because the amount of material will affect the production process that will run. Based on the problems that have been described, the company needs a system that can monitor the availability of materials, and facilitate the scheduling of product distribution to consumers.

Then a supply chain management information system is needed to solve these problems because the function of supply chain management (SCM) itself is to integrate business processes from the procurement of materials to the last user.
Identification of problems, there are:

1. The process of procurement of materials often has difficulty in determining the amount of materials to meet production needs in the next period.
2. The distribution product system to consumers is not effective with the delivery schedule.

The aims and objectives are:

1. Facilitate the head of production staff in making a decision of product needs for the next period.
2. Facilitate the distribution staff in determining the schedule of product distribution throughout the consumer.

3. RESEARCH CONTENT

2.1. Theoretical basis

This theory explain the theories that support the development of supply chain management information systems at CV. Dafiqu Collection.

2.1.1. Information Systems

Understanding of information itself is a set of interconnected components, collecting or obtaining, processing, storing and distributing information to support making decision and supervision in an organization. (Kenneth C. Laudon. Jane P. Laudon: 2007; 15). [1]

Jogiyanto H.M (2010) said that "an information system is a system within an organization that brings together daily transaction processing needs, supports operations, is managerial & strategic activities of an organization and provides certain external parties with necessary reports". [1]

2.1.2. *Supply Chain Management (SCM)*

Supply Chain Management is an integrative method / approach for managing the flow of products, information & money in an integrated manner involving parties from upstream to downstream consisting of suppliers, factories, distribution networks and logistics services. The important principle in SCM is information transparency & collaboration between the company's internal functions and those outside the company. [2]

2.1.3. FuzzyMethod

Fuzzy is interpreted as vague. In fuzzy, it is known the degree of membership that has a range of values from 0 to 1. Different from the set that has a value of 1 or 0. While fuzzy logic is a proper way to map an input space into an output space, it has a continuous value. Fuzzy is expressed in the degree of a membership & the degree of truth. Therefore something can be said to be partially true and partly wrong at the same time.

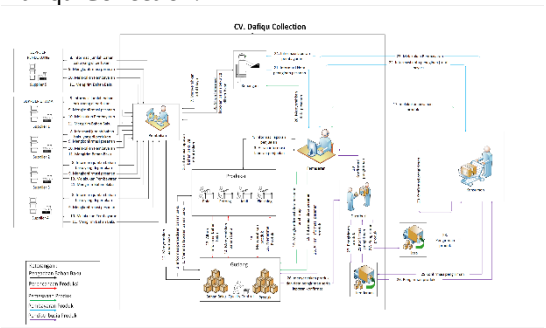
2.1.4. Tsukamoto Method

The Tsukamoto method, every consequence of an IF-THEN rule must be represented by a fuzzy set with the watch membership function. As a result, the output of the inference of each inference of each rule is given explicitly (crisp) based on α-predicate (fire strength). To obtain the crisp value obtained by changing the input value which is a fuzzy set obtained from the composition of fuzzy rules into numbers in fuzzy set domains. [5]

2.2. Supply Chain Management ((SCM) Analysis

CV. Dafiqu Collection in carrying out its production activities is carried out every day according to working hours without having to wait for orders in advance from consumers (make-to-stock). There are two streams, namely: The flow of material is in the form of raw material flow that comes from the supplier and the flow of products sent to consumers. While the flow of information that includes information ordering products by consumers, information on procurement of materials from suppliers to the warehouse, production status information from processing materials to finished the products that ready for the market, and information on product delivery from the distribution to consumers.

The following below is an SCM model on CV. Dafiqu Collection:



Picture 1 Supply Chain Management at CV. Dafiqu Collection Model

There are stages in the information system with the SCM strategy that will be built on the CV. Dafiqu Collection as follows:

Picture 2 *Supply Chain Management* Analysist

2.2.1. Production Planning Analysist

Production planning is done using Tsukamoto fuzzy calculations. There are several stages in production forecasting:

a. Collection of previous sales data.
b. Forecast calculations using fuzzy tsukamoto.
c. Assume the number of sales in July 2018
d. Determine R1, R2, R3, R4 for the fuzzy tsukamoto rules.
e. Determine the rule base of sales, inventory and production data.

The following below is a calculation using fuzzy tsukamoto:

Data collection

The data used are sales, inventory, and production data. The following below are the data needed:

Tabel 1 Data Needs

Months	Sales	Stocks	Total Production
July	235	50	240
August	240	60	250
September	226	50	240
October	217	40	200
November	197	50	180
December	249	55	220
January	242	60	200
February	380	35	240
March	230	60	250
April	150	95	240
May	200	50	200
Juny	220	60	240

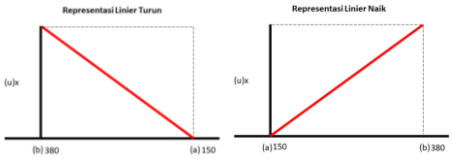
In the last data, which was June 2018, the last number of participants was 60 pcs of Queena Dress. It is assumed that the demand for July 2018 is 230 pcs, the assumption value is used as a value (x) in the calculation of Fuzzy sukamoto. The value of x = 230 pcs of requests is taken based on random values, based on the data in table 3.3 the value of the assumptions used for forecasting in July 2018 is the largest number of sales or demand minus the smallest number of requests for a period of one year. The biggest value on demand is in February 2018 as many as 380 pcs and the smallest demand in April is 150 pcs, so it can be assumed that the value of x is 230 pcs.

To be able to start Fuzzy logic calculations is to make fuzzy rules, the following steps are used:

1. R1 = IF THE SALES ARE DOWN AND MANY INVENTIONS THEN THE PRODUCTION IS REDUCED
2. R2 = IF THE SALES ARE DOWN AND A LITTLE COMPETITION THEN THE LOWERING PRODUCTION
3. R3 = IF SALES RISE AND A LOT OF COMPANIES THEN ADDED PRODUCTION
4. R4 = IF SALES RISE AND A LITTLE COMPETITION THEN ADDED PRODUCTION

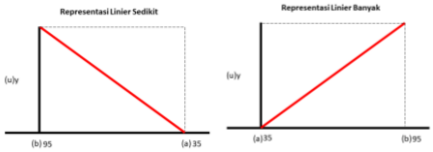
After determining fuzzy rules, then determine inferences based on up and down representations based on sales tables, and multiple representations based on inventory tables. The following below is the inference of each representation:

a. Inference from representation Up - Down based on sales table
The following below is an inference from fluctuating representations based on the product sales table:



Picture 3 Significant-Slightly Linear Representation

b. Inference from many representations - A little based on availability.
The following below is an inference from multiple-representation based on inventory table:



Picture 4 Excessively-Slightly Linear Representation

After determining these inferences then determine the fuzzy variables. There are 3 fuzzy variables that will be modeled. Including the following :

1. Sales:

Consisting of 2 sets, namely: Up and Down.
Conditions:
b = Biggest Sales Amount (Right Limit)
a = Smallest Sales Amount (Left Limit)
x = Assumption value (230)

Tabel 2 Selling Table

Permintaan	Batas Kiri (a)	Batas Kanan (b)
	150	380

Linear Down

$$\frac{b-x}{b-a} = \frac{380-230}{380-150} = \frac{200}{230} = 0{,}65$$

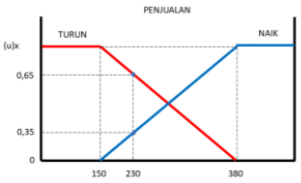
Then the value of the calculation results from linear down for sales is 0.65.

Linear Up

$$\frac{x-a}{b-a} = \frac{230-150}{380-150} = \frac{30}{230} = 0{,}35$$

Then the value of the calculation results obtained from linear rise for sales is 0.35.

After getting the value from each linear, then determine the sales variable membership function. The following below is a variable sales membership function with the results of linear calculations up and down:



Picture 5 Sales Variable Membership Function

1. **Inventory:**

   Consists of 2 fuzzy sets, namely: Many and Few (3.12)

   Conditions:

   b = Biggest Inventory Amount

   a = Smallest Inventory Amount

   x = Existing inventory value = 60

Tabel 3 Stock Table

Persediaan	Batas Kiri (a)	Batas Kanan (b)
	35	95

Slight Linear

$$\frac{b-x}{b-a} = \frac{95-60}{95-35} = \frac{35}{60} = 0{,}58$$

Then the value of the calculation results obtained from a linear little for inventory is 0.58.

Linear Excessively

$$\frac{x-a}{b-a} = \frac{60-35}{95-35} = \frac{25}{60} = 0{,}42$$

Then the value of the calculation results obtained from multiple linear for inventory is 0.42.

After getting the value from each linear, then determine the inventory variable membership function. The following below is an inventory variable membership function with many and few linear calculation results:

Picture 6 Variable Membership Function Inventory

2. **Production:**

   Consisting of 2 sets, namely: Less and Add (Figure 3.13)

Conditions:

b = Biggest Production Amount

a = Smallest Production Amount

Tabel 4 Production Tables

Produksi	Batas Kiri (a)	Batas Kanan (b)
	180	250

Slight Linear

$$\frac{b-x}{b-a} = \frac{250-x}{250-180} = \frac{250-x}{70}$$

Linear Many

$$\frac{x-a}{b-a} = \frac{x-180}{250-180} = \frac{x-180}{70}$$

The following below is the membership function of the production variable:

Picture 7 Production Variable Membership Functions

After determining the inference and membership functions of each variable, then look for Alpha-Predicates and Z (n). Alpha-Predicate is a calculation to find a possible reference value that will be used in the process of determining the final calculation value (Z). Z (n) is a possible comparison reference value used to determine the final calculation value (Z). So to determine alpha-predicates and Z (n) can be determined in the following way using fuzzy rules:

Fuzzy Rules

R1 = IF THE SALES ARE DOWN AND MANY INVENTORY THEN THE PRODUCTION IS REDUCED

α - predicate-1 = μ Sales Decrease AND μ Many Supplies

= 0.65 (sales down) and 0.42 (lots of inventory)= 0,42 (Minimum Values)

α – predicate-1 = 0,42

$$z1 = \frac{b-x}{b-a} = \frac{250-x}{70} = 0{,}42$$

$$z1 = 250 - x = 0{,}42 * 70$$

$$z1 = 250 - x = 29{,}17$$

$$z1 = 250 - 29{,}17$$

$$Z1 = 220{,}83$$

So for the value of Z1 on the rule base1 is 220.83.

R2 = IF THE SALES ARE DOWN AND A LITTLE SITUATION THEN THE PRODUCTION IS REDUCED

α - predicate-2 = μ Sales Decrease AND μSmall Availability

= 0.65 (sales down) and 0.58 (little inventory)

= 0,58 (Minimum Values)

α – predikat-2 = 0,58

$$Z2 = \frac{b-x}{b-a} = \frac{250-x}{70} = 0{,}58$$

$$Z2 = 250 - x = 0{,}58 * 70$$

$$Z2 = 250 - x = 40{,}83$$

$$Z2 = 250 - 40{,}83$$

$$Z2 = 209{,}17$$

So for the value of Z2 on rule base 2 is 209.17.

R3 = IF SALES RISE AND MANY COMPETITIONS THEN ADDED PRODUCTION

α - predicate-3 = μ Sales Up AND μ Many Supplies = 0.35 (Up sales) and 0.42 (Lots of Inventory)= 0,35 (Minimum Values)

α – predicate-3 = 0,35

$Z3 = \frac{x-a}{b-a} = \frac{x-180}{70} = 0,35$

Z3 = x – 180 = 0,35 * 70

Z3 = x – 180 = 24,35

Z3 = 24,35+ 180

Z3 = 204,35

So for Z3 in the rule base 3 is 204,35.

R4 = IF THE SALES UP AND STOCKS ARE LESS SO THE PRODUCTIONS ARE INCREASE

α – predicate-4 = μ sales is up AND μ stocks is less = 0,35 (sales up) and 0,58 (less stocks)= 0,35 (Minimum Values)

α – predicate-4 = 0,35

$Z4 = \frac{x-a}{b-a} = \frac{x-180}{70} = 0,35$

Z4 = x – 180 = 0,35 * 70

Z4 = x – 180 = 24,35

Z4 = 24,35+ 180

Z4 = 204,35

So for the value of Z4 on rule base 4 is 204.35.

After the value of α - predicate and the value of Z_ (1-4) are known, then the next step is to calculate the final Z value using the following formula:

$$Z = \frac{(\alpha pred_1.Z_1)+(\alpha pred_2.Z_2)+(\alpha pred_3.Z_3)+(\alpha pred_4.Z_4)}{\alpha pred_1+ \alpha pred_2+ \alpha pred_3+ \alpha pred_4}$$

$$Z = \frac{(0,42 * 220,83)+(0,58 *209,17)+(0,13 *189,13)+(0,13 *189,13)}{0,42+ 0,58+ 0,35+ 0,35}$$

$$Z = \frac{(92,01)+(122,01)+(71,08)+(71,08)}{1,70}$$

$$Z = \frac{(356,18)}{1,70}$$

Z = 210 (pcs)

2.2.2. Analysis of Monitoring of Raw Products and Materials

The safe limit for products that must be available in the warehouse to avoid the stock void in the warehouse has been determined by the company, which is 12 pcs (1 dozen). The following is the safe limit for the raw material:

Tabel 5Safe Limits of Raw Materials

Nama Bahan Baku	Stok Persediaan	Batas Aman	Status
Kain Amunzen	13 Yard	36 yard	Tidak Aman
Kain keras	240 cm	480 cm	Tidak Aman
Kancing bungkus	100 butir	24 butir	Aman
Benang jahit	12 Roll	3 roll	Aman
Sleting	2 pak (40 biji)	12 biji	Aman
Benang Obrass	8 Roll	12 roll	Tidak Aman
Plastik Kemas	24 Biji	12 Biji	Aman

2.2.3. Raw Material Procurement Analysis

In the standard procurement process, supplier selection is based on a cooperation contract with the company, based on price and location. The following below is the supplier selection table:

Tabel 6 Supplier Selection

Bahan Baku	Nama Supplier	Min Pembelian	Harga Bahan Baku
Kain Amunzen	ID Textile	1 Yard	Rp. 17.000
Kain Keras	Rahmi	1 Meter	Rp. 20.000
Kancing Bungkus	Toko Romi	1 Lusin	Rp. 1.500
Benang Jahit	Toko Romi	1 Roll	Rp. 5.500
Sleting	Toko Romi	1 Buah	Rp. 1.500
Benang Obras	Toko Romi	1 Roll	Rp. 7.500
Plastik Kemas	Toko Jaya Abadi	1 Pak (20 biji)	Rp. 7.500

2.2.4. Analysis of Ordering Products

In the analysis of ordering products from consumers this is used to calculate the number of orders ordered by consumers to determine the transportation that will be used at the time of delivery. Deliveries will be made when the administrative process has been completed.

Tabel 7 Ordering Products

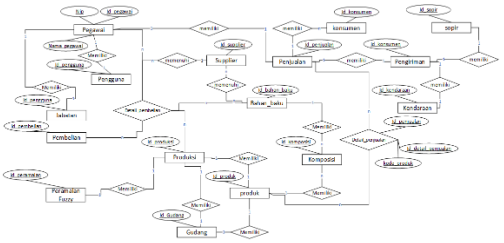
Tgl Pesan	Nama Konsumen	Alamat	Deskripsi Produk	QTY
02 Mei 2018	Indri	Desa Rancamanyar Kec. Bale endah	Queena Dress	15
02 Mei 2018	Umi	Bale Endah permai 3, Kec. Bale endah	Soft Jeans	10
02 Mei 2018	Tati	Dayeuh Kolot	Woalpeach Aisyah	20
02 Mei 2018	Dendi	Pasirmulya, Banjaran	Queena Dress	20
02 Mei 2018	Neneng	Kiangroke, Banjaran	Soft Jeans	17
02 Mei 2018	Nina	Jl. Raya Subang No. 3 (belakang pujasera), subang	Hasna Set	5

2.2.5. Product Distribution Analysis

In product distribution activities include delivery scheduling and type of shipping service. The delivery scheduling calculation is the same as the calculation when the production is finished. The delivery process will not be carried out if the customer has not paid off the payment.

2.3. Database Analysis

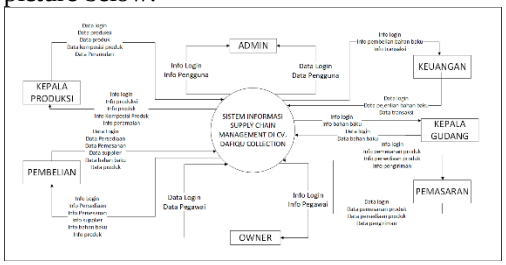
Database analysis on information systems supply chain management will be built using the Entity Relationship Diagram (ERD). The following is an ERD that has been described:



Picture 8 Entity Relationship Diagram

2.4. Diagram Contexts

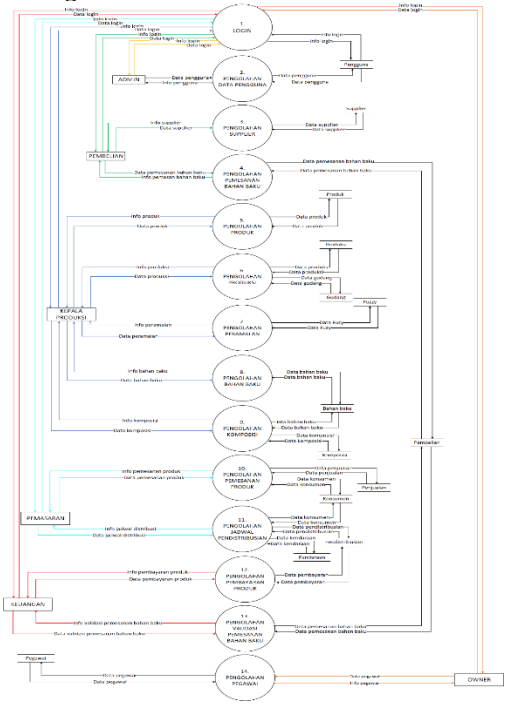
Context diagram explains how data is used and transformed for processes in the form of data flow into or out supply chain management information system at CV. Dafiqu Collection as a whole. The context diagram on the buffer system is seen in the picture below:



Picture 9 Diagram Konteks

2.5. Data Flow Diagram (DFD)

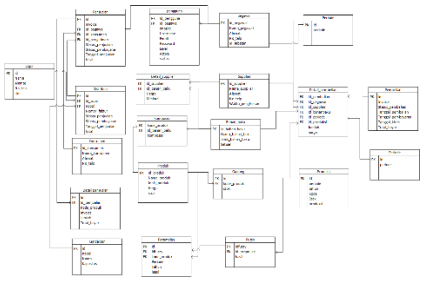
DFD level 1 information system supply light management on CV. Dafiqu Collection explains in general the processes that can be done. The following below is a level 1 DFD:



Picture 10 Data Flow Diagram (DFD)

2.6. Relationship Scheme

The following below is a relation scheme table:

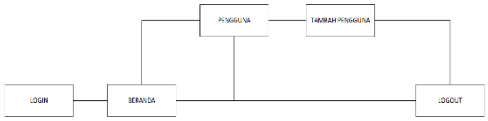


Picture 11 Relationship Scheme

2.7. Menu Structure

a. Admin Menu

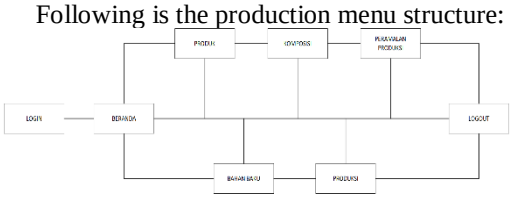
The following below is the admin menu structure:



Picture 12 Structure menu

b. Head of Production Menu

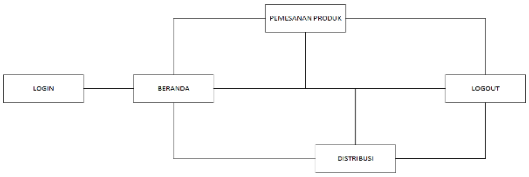
Following is the production menu structure:



Picture 13 Production Head Menu Structure

c. Marketing Menu

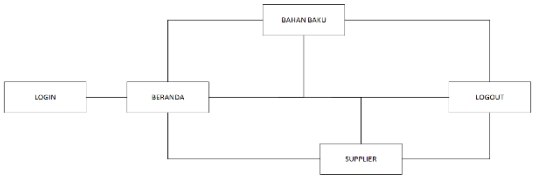
The following below is the marketing menu structure:



Picture 14 Marketing Menu Structure

d. Purchase Menu

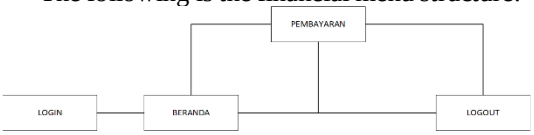
The following below is the purchasing menu structure:



Picture 15 Purchase Menu Structure

e. Finance Menu

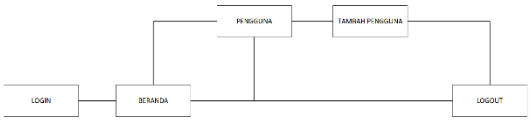
The following is the financial menu structure:



Picture 16 Financial Menu Structure

f. Owner Menu

The following below is the menu structure of the owner:



Picture 17 Owner Menu Structure

2.8. System Testing

Testing to test the system is by using the black box testing method. Black box testing is focused on testing functional requirements in information systems.

1. Black Box Testing

Filtering process errors in the form of a message page display direction is quite maximal. Functionally the test system can produce the expected output.

2. Testing UAT

Based on the results of user acceptance test testing with cases of test samples that have been conducted, that the test produces conclusions on all processes functioning properly. Functionally, the system can produce the expected output or output.

3. Beta Testing

Based on the beta testing above, it can be concluded that:

1. The system built can facilitate the head of production in planning the amount of production to be carried out.
2. The system built can facilitate the purchasing department in determining the amount of raw material to be purchased.
3. The system built can help the marketing department in determining the product delivery schedule.
4. The system built is quite easy to use by its users.
5. The system built has a display that is quite interesting and easy to understand by the user.
6. The use of language in the system is quite good and easy to understand

e. CLOSING

In this chapter will explain the conclusions that contain the results obtained from each analysis, design and implementation of the system design that has been built and has developed and suggestions that will be given important notes and possible improvements that need to be done for the development of the system previous.

Conclusion

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

1. Supply Chain Management Information Systems can help the process of procurement of raw materials, facilitate the head of production to determine the amount of production in calculating the amount of raw material needs that must be ordered to suppliers to meet production needs in the next period.
2. Supply Chain Management information systems can facilitate the marketing department in determining the schedule of product distribution to consumers.

Suggestion

Supply Chain Management information systems at CV. This Dafiqu Collection still needs to be further developed with better system specifications and maximum performance. There are a number of suggestions, including the following:

1. The appearance of this system still needs to be improved to make it more attractive to its users.
2. Suppliers and consumers should be involved in the system to facilitate transactions.

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