SUPPLY CHAIN MANAGEMENT INFORMATION SYSTEM IN OSCAR 3 BERSAUDARA

Vicky Yanuarizky[1], Anna Dara Andriana[2]

Teknik Informatika – Universitas Komputer Indonesia
Jl. Dipatiukur 112- 114 Bandung
vqjanuarizky8@gmail.com[1], anna.dara.andriana@email.unikom.ac.id[2]

ABSTRACT

Oscar 3 Bersaudara is a company founded in 2010 which is engaged in the trade of snacks. The company produces petek fish food with original flavor, balado, cheese and barbeque. Using the Make-To-Stock strategy in sales, by making inventory of warehouse products. The process of procuring raw materials is only by estimating the amount of raw material to be used based on procurement in the previous period, as a result of the excess or lack of raw material inventory in the warehouse. The shipping process is based on the most number of product orders. The shipping process is adjusted to retail needs. So the procurement department has difficulty in determining the amount of raw material procurement, and the shipping department has difficulty in scheduling delivery of product to retail. a supply chain management system is needed which aims to facilitate procurement in determining the amount of raw material procurement, and facilitate the shipping department in scheduling delivery of product. In determining the amount of raw material procurement using the Linear Regression method.. In Scheduling delivery of product to retail using the Branch And Bound method, because it can minimize the distance between retail shipments. Based on the test results, it can be concluded that the system built facilitates the procurement department in the process of determining the amount of raw material procurement..

Keywords: Supply Chain Management, Make-To-Stock, Regresi Linerar, Branch And Bound

1. PRELIMINARY

Oscar 3 Bersaudara is a company founded in 2010 which is engaged in the trade of snacks. The product produced in the form of petek fish with original flavors, balado, cheese, barbeque. Oscar 3 Bersaudara produces large or continuous every day to make a stock of products in the warehouse and has a series of work begins to buy raw materials and then send the product. Product sales are divided into two types, namely direct sales, namely consumer sales dating to Oscar 3 Brothers and retail sales, namely sales through agents or shops in each region, namely Bandung, Cimahi, Subang, Bogor, Bekasi, Sukabumi, Padalarang, Jakarta, Cirebon, Purwakarta and Cilacap.

The raw materials available at Oscar 3 Brothers cover petek fish, wet seasonings, sugar, salt, flavorings, wheat flour, tapioca flour. The process of buying raw materials is carried out 2 times every month and only increases the amount of raw material to be used by the production department based on buying raw materials in the previous time, so that it will lead to more or less stock of warehouse storage raw materials, if you experience excess raw materials such as fish and wet seasoning will reduce the quality and the raw material is not used, because petek fish and wet seasoning are easily stale. For the problem of raw materials that lack or emptiness the company must buy back to the supplier for the remaining production needs with a waiting time of up to 2 days so that the production time is disrupted and hampered until delays in the delivery of products to retail.

Based on the results of an interview with Oscar 3 Brothers with Mr. Usep Sulaeman as Head of Procurement, Oscar 3 Brothers has raw material inventory data starting from August 2017 to January 2018. Within the 6-month period the raw material supply is quite high in January 2018. There is material raw fish is 814 kg and wet seasoning raw material is 267 kg. This excess of enough raw material causes raw materials that cannot be used because the raw material is easily stale and does not last long.

Based on the results of the interview with Oscar 3 Bersaudara with Ms. Puji Azizah as the Head of Shipping, the delivery process included various regions using 2 box cars with a capacity of 2500 kg. Delivery is made after the order process is made and then received by the retailer. Shipment will be made based on product orders based on the highest number of product orders. The process of sending products to retail every month is uncertain because orders are adjusted to retail needs. Oscar 3 Brothers has booking data and shipping data starting from August 2017 to January 2018. In the 6 month period, orders for January 19 have delayed the delivery of products to retail. Shipment is done on January 20, 2018, namely the Rasa-Rasa Store, which has a small number of product orders. Constraints experienced by the Head of Shipping, if the product ordering process from medium retail is high and the product must have been received after ordering the product, resulting in delays in product delivery to retail.

Based on each of the problems that have been explained, therefore a solution is needed that can deal with problems at the Oscars 3 Brothers, so the Supply Chian Management Information System is needed at the Oscars 3 Brothers.

2. RESEARCH CONTENT

2.1 Theoretical Basis

The theoretical basis is theories that are mutually relevant and are used to describe a variable in a study, as a basis for giving temporary answers to the formulation of problems or problems at the Oscar 3 Brothers and the preparation of instruments in the study. [1]

2.1.1 Information System

Information Systems are defined by Robert A. Leitch and K. Roscoe Davis, namely information systems defined by systems that exist in an organization that are managerial and for strategic activities in an organization that provides the necessary reports. [2]

2.1.2 Supply Chain Management

Supply Chain is a network of companies that work together to channel a finished product to the end user. Companies including suppliers, factories or retailers, as well as companies that support such companies in the field of logistics services. In the supply chain there is a flow that the management. One is the flow of an item that flows from the process of buying raw materials (upstream) to sending products (downstream). [3]

2.1.3 Inventory

The supply of each supply chain must have a broad impact on the performance of a financial company. The total money in the form of inventory is usually very large so that the stock is one of the largest assets in the supply chain. [3]

2.1.3.1 Safety Stock

Safety Stock is an anticipation with uncertainty of demand for products and supplies. A company sometimes keeps more stock in the warehouse than is needed during the period so that later high demand can be needed no longer waiting. To predict the stock of raw materials that must be in the company. The following is the Safety Stock formula: [3]

Sdl = √ ((d ^ 2 x 〖sl〗 ^ 2 + l x 〖sd〗 ^ 2))

Safety Stock = Z x Sdl

Description: L: Lead Time

Z: Data Validation Calculation Results

Sd: Standard Deviation

2.1.4 Forecasting Theory

Forecasting is an estimate of something that hasn't happened yet. Forecasting implementation is done by using data from the past which is analyzed using certain methods that can produce a forecast that is close to its accuracy. [4]

2.1.4.1 Linear Regression

Linear Regression is a method that aims to mutually know causal relationships or interplay between independent variables (Xi) with the dependent variable (Yi). Like the least squares method that we know in advance. [5]

Y '= a + b.X

Information:

Y ': Calculates the value of the non-dependent variable measured

a: Y shortcut, (value of Y 'if X = 0)

b: The slope of the regression line (increase or decrease Y 'for each change in one-unit X) or regression coefficient, measuring the magnitude of the effect of X on Y if X goes up one uni

X: A value of the independent variable

$$a = \frac{(\sum Y(t).\sum t(\sum t)^2) - (\sum t.\sum tY(t))}{((t.\sum t^2) - (\sum t)^2)}$$

$$b = \frac{t.\sum tY(t) - \sum Y(t).\sum t}{t.\sum t^2 - (\sum t)^2}$$

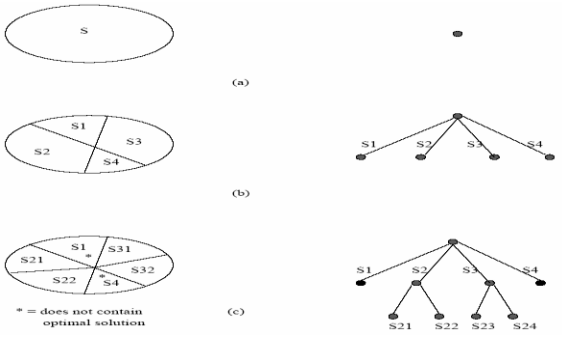
Information:
Y (t): Demand value (Previous data)
∑t: Number of periods based on demand data

2.1.5 Branch And Bound

One of the operational decisions in a shipping management is determining the delivery schedule and delivery routes from one destination to another. [6]

2.1.5 Branch and Bound Components

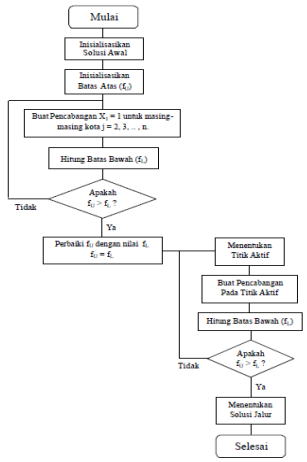
The following are the components found in Branch And Bound. [6]



Picture 1. Branch and Bound component

2.1.6 Solving Branch And Bound And Flowchar Branch And Bound

The following is the flowchart for Branch And Bound as follows. [6]



Picture 2. Flowchart Meotde Branch And Bound

The steps in solving the problem by using the Branch And Bound alogirtma are as follows:

1. The first step is to do the initial analysis as determining a problem. Determination of the solution must be a complete journey. Make the upper limit (Upper Bound) on the minimum value of the objective function by looking for various possible trips. This limit is denoted by (fU).
2. The second step after that makes the initial branching by setting x1 = 1 for each retail j = 2.3, 4, ..., n (except if cij = M because it is an impossible route). Then calculate the lowest limit (fL) on the minimum value of the objective function at each point by means, in the initial data delete the 1st row and the column to j. Then set cj1 = + M, solve the result of the specified problem and add price (f) to c1j to get fL, then fL = cj1 + f. If fL> fU, measure the point and proceed to the next step.
3. The third step if there is no active point, the best solution at this time is optimal. If not, select a point with the smallest fL value and create a new branch by setting Xjk = 1 for each city that hasn't been visited before on some trips.
4. The fourth step is to make the fL boundary at each point by deleting the j and column k lines from the problem solving pda at the current point above the existing point, set cjk = n and add the value f to cjk and all previous values in part of the trip. [6]

2.2 Problem Analysis

The problem analysis is the limitation of a problem that will be explained in a data processing procedure for the development of Supply Chain Management Information System software at the Oscar 3 Brothers. Analysis of the problem at the Oscar 3 Brothers with the current system, namely:

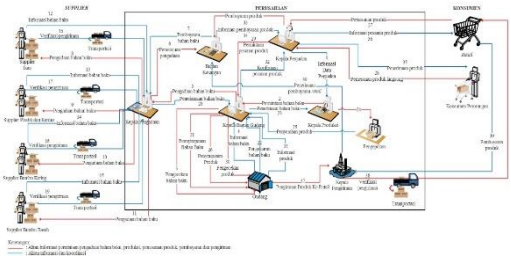
1. The Procurement Head has difficulty in determining the amount of raw material purchase and monitoring the supply of products and raw materials.
2. The Head of Delivery has difficulty in scheduling the delivery of products that are ready to be sent to retail.

2.3 Supply Chain Management Analysis

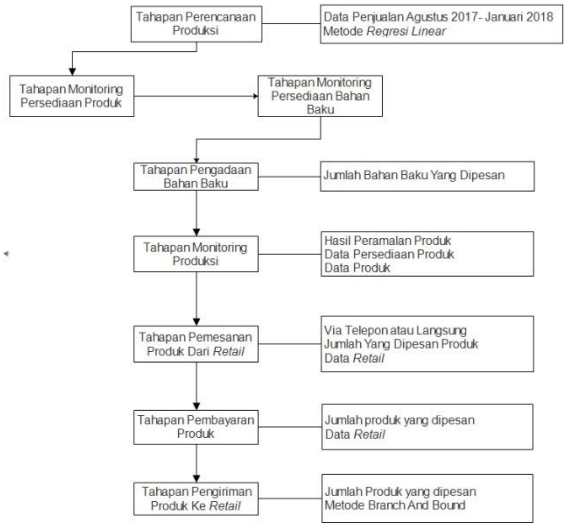
The application of a supply chain approach at the Oscar 3 Brothers by analyzing the supply chain management to be built

2.3.1 Supply Chain Models at Oscars 3 Brothers

The supply chain model is used as an illustration of the flow of the entire process of activities starting from buying raw materials to sending products to retail at the Oscar 3 Brothers. The following is a supply chain model that is found at the Oscars 3 Brothers.



Picture 3. Supply Chain Models



Picture 4. Stages of Supply Chain management

Supply Chain information contained in the Supply Chain model at the Oscar 3 Brothers is as follows:

Oscar 3 Brothers has 5 categories of suppliers of raw materials in its production activities, 5 of these supplier categories include:

a. Raw Material Supplier for Fish Petek

Supplier of raw material for Petek Fish consists of 3 suppliers, including suppliers:

Bu Yuyun from Cimahi as the main supplier, Pa Galih from Cimahi as the second supplier and Pa Dodon as the third supplier from Cianjur.

b. Suppliers of Wet & Dry Raw Materials

Suppliers of wet & dry seasonings (salt, sugar, flavorings) consist of 3 suppliers, including suppliers:

CV. Sari Rezeki from the market above cimahi as the main supplier, Mrs. Neni from the market above cimahi as the second supplier and Pa Djumandi as the third supplier of Buah Batu.

c. Dry Raw Material Supplier

Supplier of dry seasoning ingredients (tapioca flour, wheat flour) consisting of 3 suppliers, including suppliers:

PT. The Global Indo Caliph from Jakarta as the main supplier, Toko Bebeng from Bekasi as the second supplier and Pa Agus as the third supplier from Indramayu.

2.4 Stages of Supply Chain Management at Oscar 3 Brothers

The strategy information system is used in Supply Chain Management (SCM) which will be built at the Oscar 3 Brothers as in the following stages.

1. Product Planning Stages

At this stage involved the Head of Production, product forecasting based on the actual data on the sale of the original 100 petek fish of the previous period.

Table 1. Original Sales Data 100 gr

Month	Sales Data
Agustus 2017	236
September 2017	194
Oktober 2017	219
November 2017	255
Desember 2017	205
Januari 2018	428
Total Sales	1537

. Following is the calculation of permalan for the Original 100 gr Petek Fish product as follows.

Table 2. Linear Regression Calculations

Bulan	(t)	Y(t)	t .Y(t)	t^2
Agustus 2017	1	236	236	1
September 2017	2	194	388	4
Oktober 2017	3	219	657	9
November 2017	4	255	1020	16
Desember 2017	5	205	1025	25
Januari 2018	6	428	2568	36
Jumlah	21	1537	5894	91

Determining forecasting for the next 6 months period, using the formula:

$$b = \frac{t.\sum tY(t) - \sum Y(t).\sum t}{t.\sum t^2 - (\sum t)^2}$$

$$b = \frac{6(5894) - (1537)21}{6.91 - (21)^2}$$

$$b = \frac{35364 - 32277}{546 - 441}$$

$$b = \frac{3087}{105}$$

$$b = 29{,}4$$

$$a = \frac{(\sum Y(t).\sum t(\sum t)^2) - (\sum t..\sum tY(t))}{((t.\sum t^2) - (\sum t)^2)}$$

$$a = \frac{((1537\,.91) - (21\,.5894))}{((6.91) - (21^2))}$$

$$a = \frac{139867 - 123774}{546 - 441}$$

$$a = \frac{16093}{105}$$

$$a = 153{,}267$$

After calculating the value of a and the value of b, then to determine the results of the forecasting period for the next 6 months can be used the formula:

$$Y(t) = 153{,}267 + (29{,}4\,.t)$$

Following is the calculation of forecasting results for the next 6 months as follows.

Table 3. Forecasting Results

Bulan	Periode	Peramalan (dus)
Februari 2018	7	359,1
Maret 2018	8	388,5
April 2018	9	417,9
Mei 2018	10	447,3
Juni 2018	11	476,7
Juli 2018	12	506,1

2. Product Inventory Monitoring Stages

Monitoring product inventory to determine whether or not available in warehouse storage. Determine the safe limit of stock in the warehouse using Safety Stock to avoid product vacancies.

Table 4. Inventory of Fish Petek Products 100

Nama Produk	Stok di Gudang	*Safety Stock*
Original 100 gr	53 dus	9 dus

3. Stages for Monitoring Raw Material Inventories

Monitoring the supply of raw materials to determine the availability of raw materials contained in warehouse storage. Determine the safe limit of raw material stock in the warehouse using Safety Stock to avoid raw material vacancies.

Table 5. Raw Material Supplies

Bahan Baku	Stok (Kg)	Safety Stock (Kg)
Ikan Petek	814 Kg	4,5 Kg
Gula	109 Kg	1,35 Kg
Garam	85 Kg	0,9 Kg
Bumbu Basah	267 Kg	1,8 Kg
Penyedap Rasa	10 Kg	0,11 Kg
Tepung Terigu	162 Kg	4,5 Kg
Tepung Tapioka	79 Kg	9 Kg

4. Stages of Procurement of Raw Materials

At this stage, those involved in the procurement stage of raw materials are the Procurement Head at the Oscars 3 Brothers.

Table 6. Procurement of Raw Materials

Nama Bahan Baku	**Supplier**	**Pengadaan**
Ikan Petek	Bu Yuuyun	383 Kg
Gula	CV. Sari Rezeki	-

Nama Bahan Baku	Supplier	Pengadaan
Garam	CV. Sari Rezeki	-
Bumbu Basah	CV. Sari Rezeki	-
Penyedap Rasa	CV. Sari Rezeki	-
Tepung Terigu	PT. Khalifah Global Indo	-
Tepung Tapioka	PT. Khalifah Global Indo	119 Kg

5. Production Monitoring Stages

The process of monitoring production by making a production plan every day to meet product demand requirements.

Table 7. Production Raw Materials

Rencana Produksi	Nama Bahan Baku	Hasil (Kg)
16 (dus)	Ikan Petek	80
	Gula	2,4
	Garam	1,6
	Bumbu Basah	3,2
	Penyedap Rasa	0,176
	Tepung Terigu	8
	Tepung Tapioka	16

6. Stages of Ordering Products from Retail

Product ordering process by retail there are 2 ways of ordering, namely via telephone or bias directly to Oscar 3 Bersaudara, then check the availability of products in the Warehouse Section if the product requested is available, then the Sales Department will receive product orders from Retail along with the number of products, orders requested. If the product is not available in the warehouse, the Sales Department will confirm to the retail.

Table 8. Ordering January 19 2018

Nama Retail	Nama Produk	Satuan (dus)
Carrefour (PVJ)	1. Original 2. Keju 3. Balado 4. Barbeque	15 5 10 7
Toko Sari Manis	1. Original 2. Keju 3. Balado	15 10 5
Toko Cita Rasa	1. Original 2. Keju 3. Balado	15 5 5
Toko Rasa- rasa	1. Original 2. Balado	17 5
Cisaranten Mart	1. Original 2. Barbeque	20 7

7. Payment Stages

Activities in making product payments to calculate the amount of each finished product during the order by retail multiplied by the price of each product per carton. Repayment Payment of the product is done after the product is sent by the Shipping Department and received by the retailer.

Table 9. Pay January 19, 2018

Nama Produk	Harga (Rp)	Satuan (dus)	Total (Rp)
1. Original 2. Keju 3. Balado 4. Barbeque	200.000 220.000 220.000 220.000	15 5 10 7	7.840.000
1. Original 2. Keju 3. Balado	200.000 220.000 220.000	15 10 5	6.300.000
1. Original 2. Keju 3. Balado	200.000 220.000 220.000	15 5 5	5.200.000
1. Original 2. Balado	200.000 220.000	17 5	4.500.000
1. Original 2. Barbeque	220.000 220.000	20 7	5.540.000

8. Stages of Product Delivery to Retail

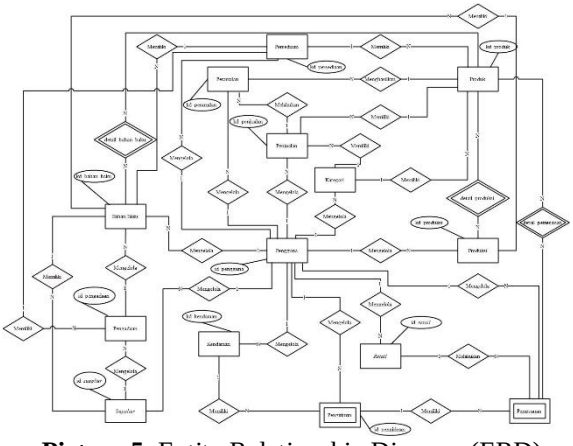
Delivery process, will make a product delivery schedule and is adjusted to the time, nearest distance and vehicle capacity, so that the shipment is in accordance with the company rules until it reaches Retail.

Tabel 10 Jadwal Kirim Tanggal 19 Januari 2018

Kendaraan	Nama Retail	**Total Jarak Tempuh (Km)**
1 Unit Mobil Box GranMax	Carrefour (PVJ)	375
	Toko Rasa- rasa	
	Toko Sari Manis	
	Toko Cita Rasa	
	Cisaranten Mart	

2.5 Database Analysis

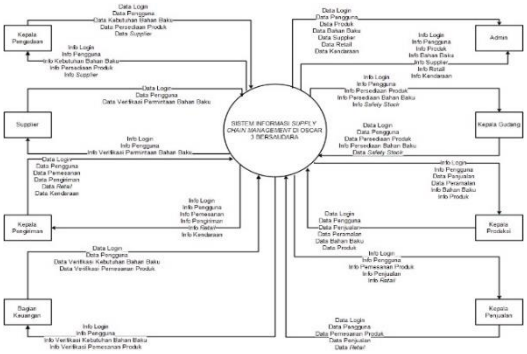
The application of database analysis in the form of data that is ready to be used in the development of Supply Chain Management Information System at Oscar 3 Brothers by using Entity Relationship Diagram (ERD).



Picture 5. Entity Relationship Diagram (ERD)

2.6 Context Diagram

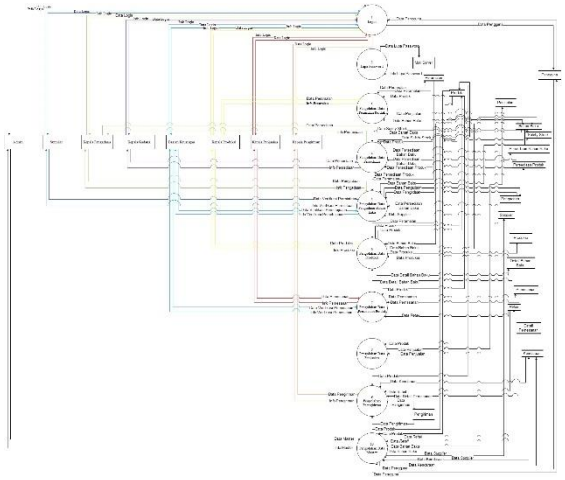
Context diagram is a model that describes a data used and transformed to function for a process and describe the flow of a data into and out of the system.



Picture 6. Context Diagram

2.7 Data Flow Diagram (DFD) Level 1

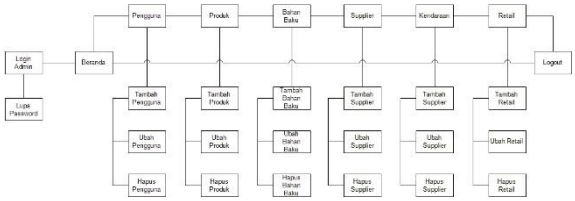
Data Flow Diagrams (DFD) explain how a data flow describes the processes that occur in the application of a system to a more detailed process.



Picture 7. Level 1 DFD

2.8 Menu Structure Design

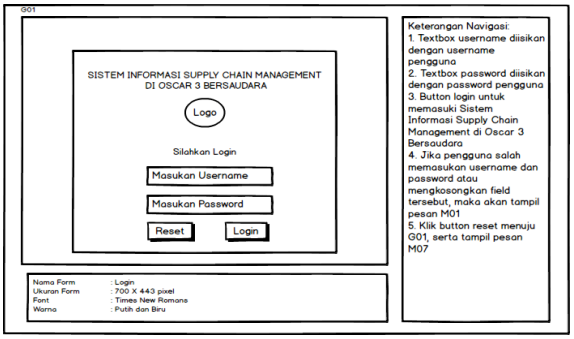
The design of the Administrator menu structure is a menu structure designed according to the assignment rights as the Administrator.



Picture 8. Administrator Menu Structure

2.9 Designing a Login Interface

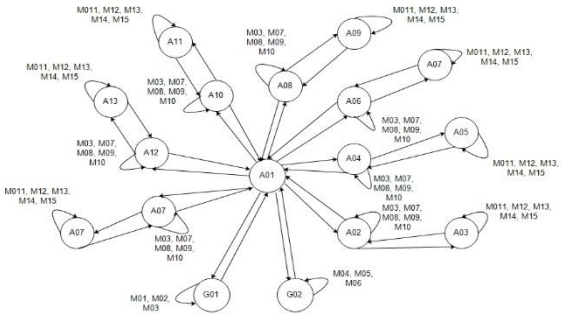
Designing a login interface for Supply Chain Management Information Systems at the Oscar 3 Brothers as follows.



Picture 9. Designing a Login Interface

2.10 Administrator Semantic Network Design

Linking network design between menus that can be done in the system by the Administrator with an error message for errors in each process.



Picture 21. Flowchart Login Process

2.12 System Testing

The stage in testing the system is a process that is reasonable and important intended for the development of software that has the aim to find errors (errors) and deficiencies in a system that is the software tested and whether the input data is in accordance with the purpose of the software development.

2.12.1 Black Box Testing

Testing with Black Box is, testing by means of software from the perception of the specification of functional success and does not have to be tested for design and coding or source cod programs.

2.12.2 Beta Testing

Beta testing of the system is carried out with the aim to be aware of the quality of the software being built, by questioning whether it is appropriate or not.

3 CLOSING

This chapter describes the results of the research that has been analyzed, design, implemented, conclusions and suggestions from the design of a system built at Oscar 3 Brothers.

3.1 Conclusions

After the Black Box testing phase is carried out by the user, a conclusion is obtained as follows:

1. A supply chain management information system has been developed that can be carried out in accordance with the objectives, including facilitating the head of the management in determining the amount of raw material purchase and monitoring the supply of products and raw materials.
2. This supply chain management information system can facilitate the delivery head in determining product delivery schedules to retail.

3.2 Suggestions

The suggestions obtained after conducting interviews with system users. Following are suggestions for Supply Chain Management information systems at the Oscar 3 Brothers:

1. It is necessary to develop an interface to make it look more attractive and easy to use.
2. It is necessary to develop and add order data processing systems that are connected with retail.
3. Need to be developed for processing shipping data using routes.

BIBLIOGRAPHY

[1] Kadir Abdul, Introduction to the Revised Edition Information System, Yogyakarta: Andi, 2014

[2] Widianti, U. D. (2012). Development of Asset Information Systems at PT. Indonesian Web-Based Telecommunications Industry (Persero). Journal of Computer Science and Information Technology (KOMPUTA), vol. I. no. 2, pp. 57-62, 2012

[3] Pujawan. Nyoman. I and ER. Mahendrawathi, Second Edition Supply Chain Management, Surabaya: Guna Widya, 2010.

[4] Sutrisno Ryanka Venezia, Forecasting Analysis of Sales Data Using Simple Moving Average (SMA) and Single Exponential Smooting (SES) Methods, Jakarta: Fasilkom, 2013.

[5] Siagian. M. Yolanda, Supply Chain Management Application in the business world, Jakarta: Grasindo, 2009.

[6] Baroto Teguh, Production Planning and Control, Jakarta: Ghalia Indonesia, 2012.