DEVELOPMENT *SUPPLY CHAIN MANAGEMENT* PT.PACIFIC EASTERN COCONUT UTAMA

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ABSTRACT

PT.Pacific Eastern Coconut Utama is a company engaged in coconut processing, located in the district of Pangandaran. The company produces 4 types of products, namely Coconut Water (Cocoday) is natural coconut water, Coconut Cream (Klatu) is liquid coconut milk, Coconut Cream Powder (Klatu) is flour-shaped coconut milk, and Desiccated Coconut is dried grated coconut meat. The process that occurs is the difficulty in determining the amount of coconut raw material that must be ordered to suppliers to meet the production process in the next period. This has an impact on the receipt of coconut raw material needs from suppliers so much that the stock is piling up. Stacking of raw materials raises the risk of damaged raw materials. Based on the current problems at PT.Pacific Eastern Coconut Utama then needed an *Supply Chain Management* Information System Development. The purpose of this system is to facilitate the determination of the amount of raw materials to be ordered to *suppliers*. The method used for forecasting sales is *Single Exponential Smoothing*. Meanwhile, to determine the safe limit of the safe limit inventory using the *safety stock* method. Based on the results of research and testing it can be concluded that the system built can facilitate the production department in determining the amount of production to meet the needs in the finished product warehouse and determine the amount of raw materials to be ordered to suppliers.

Keywords: *Supply Chain Management, make-to-stock, Single Exponential Smoothing, Safety Stock*

1. INTRODUCTION

PT.Pacific Eastern Coconut Utama is a coconut processing company located in Pangandaran district. PT. Pacific Eastern Coconut Utama uses a make-to-stock strategy that is the existence of the production process prior to ordering. The company carries out a large production process (Mass Product) carried out by PT. Pacific Eastern Coconut Utama to make sufficient stock to anticipate customer product purchase orders. The company produces 4 types of products, namely Coconut Water (Cocoday) is natural coconut water, Coconut Cream (Klatu) is liquid coconut milk, Coconut Cream Powder (Klatu) is flour-shaped coconut milk, and Desiccated Coconut is dried grated coconut meat.

Based on interviews with Mr. Andhika as Logistics Manager it is known that when the amount of coconut raw material stock reaches a minimum, it must determine how much the amount of coconut raw material that must be available in the coming period to a certain extent that can support the company's operational processes. Difficulty in determining the amount of coconut raw material that must be ordered to suppliers to fulfill the production process in the next period. This becomes a problem when the receipt of coconut raw material needs from suppliers is too much so that stockpiles accumulate. Stacking of raw materials raises the risk of damaged raw materials.

Based on an interview with Mr. Jaka HRD at PT. Pacific Eastern Coconut Utama, he revealed that distribution to customers often experiences delivery time mismatches, this is because for each product sent to the customer has constraints in determining which vehicle will be used, therefore when there is a delay in the injured party, the consumer, this can reduce consumer confidence in the company.

Based on the current problems at PT. Pacific Eastern Coconut Utama, we need a Development of Supply Chain Management Information System at PT. Pacific Eastern Coconut Utama.

2. RESEARCH CONTENT

2.1 Research Methodology

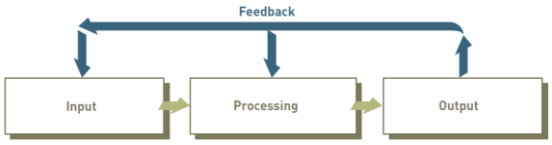
The research methodology section is a process used to solve a logical problem. In making this research a descriptive research method was used which described facts and information systematically, factually, and accurately. The stages of the research are as follows :

Picture 1. Research methodology

2.2 Theoretical basis

2.2.1 Information System

Information system is a set of elements or interconnected components that can collect, input, manipulate, store and distribute data, and react to specific purposes. like profit. Speed up or improve your service. To provide useful information about how to work closely with data and knowledge. [1]



Picture 2. Information system components

From the picture above there are 4 important things namely input, processing, output and feedback. In information systems, input is the activity of collecting and capturing raw data. Processing is transforming data into useful outputs, can involve making calculations, comparing data and taking alternative actions, and storing data for future use. Processing data into useful information is important in managing a business, processing can be done manually or with the help of a computer. Output or also called output, in information systems produces useful information, usually in the form of documents and reports. [1]

2.2.2 Data Dictionary

Data dictionary or data dictionary or also called data dictionary system is a catalog of facts about the data and information needs of an information system. Using a data dictionary, system analysis can determine data that fully enters the system. The data dictionary is compiled at the system analysis stage and is used both at the analysis stage and at the system design stage. [11]

2.2.3 Transportation and Distribution Management

Traditionally, distribution networks are often seen as physical facilities such as warehouses and transportation facilities, and the operation of each of these facilities tends to be separate from one another. However, logistics activities not only focus on physical activities such as logistics, but also on logistics network design methods, segmentation or grouping of distribution points, scheduling, route determination, and distribution integration decisions. Also consider. In general, the function of distribution and transportation is basically to deliver products from where they are produced to where they are used. [8]

2.2.4 *Entity Relational Diagram* (ERD)

The Entity-Relationship model contains the components of a series of entities and a series of relationships, each of which is equipped with attributes that represent all the facts of the 'real world' that we observe, can be linked to the use of using

entity Relationship diagrams (ER diagrams). Symbolic notation in the diagram E-R. [10]

2.2.5 *Personal Home Page* (PHP)

PHP is a web-based programming language, as a multipurpose tool that can convert data inputted through HTML Form into a variable, which can be utilized by other systems. To realize this PHP was developed using C language instead of using Perl. [9]

2.2.6 *Supply Chain Management*

Supply Chain is a system where an organization distributes goods and services to its customers. This chain is a network or network of various interconnected organizations pursuing a goal, making the best possible purchase or distribution of goods. [2]

2.2.7 Component *Supply Chain Management*

Supply Chain Management has 3 main components that support the running of a business process as follows [3]:

1. ***Upstream Supply Chain***
   Part of Upstream (upstream), the entire activities of the company with its distribution or relationship between distributors that can be expanded to several levels. The main activity in the Upstream Supply Chain is procurement of goods.
2. ***Internal Supply Chain***
   This part of the Internal Supply Chain is the process of sending goods to the warehouse. The main activities in the Internal Supply Chain are production management and inventory control.
3. ***Downstream Supply Chain***
   Downstream Supply Chain is all activities that involve shipping products to customers. In the downstream Supply Chain is directed at distribution, transportation warehousing and after-sale service.

2.2.8 *Supply Chain Coverage Area*

Supply Chain Management has an important principle that Supply Chain Management is transparency of information and there is collaboration between internal functions in the company or those of parties outside the company within the scope of the Supply Chain. When referring to a manufacturing company, the main activities that fall into the Supply Chain Management classification are [7]:

1. Activities of designing new products (Product Development)
2. Activities to get raw materials (procurement, purchasing, control)
3. Planning and production planning (planning & control)
4. Production activities
5. Activities of sending distribution (distribution)

The five classifications are usually reflected in the form of department or division with activities that are usually carried out. Forms of division and activities that usually exist in manufacturing companies can be seen in the table

Table 1. Coverage *Supply Chain Management*

No	Bagian	Cakupan Kegiatan
1.	Pengembangan produk	Riset pasar, merancang produk baru
2.	Pengadaan	Melakukan pembelian bahan baku, mengavaluasi kinerja supplier, membina dan memelihara hubungan dengan supplier.
3.	Pengendalian dan Perancangan	Peramalan penjualan, perencanaan kapasitas, perancanaan produksi dan persediaan, demand planning.
4.	Produksi / Operasi	Eksekusi produksi, pengendalian kualitas.
5.	Distribusi / Pengiriman	Perencanaan jaringan distribusi, penjadwalan pengiriman, mencari dan memelihara hubungan dengan perusahaan jasa pengiriman, memonitor service level di tiap pusat distribusi.

2.2.9 *Safety Stock*

Based on the inventory classification previously explained, the authors use the Safety Stock technique to accommodate the uncertainty of demand that affects inventory. Safety Stock serves to protect errors in predicting requests during Lead Time. Lead Time is the time taken between the raw materials ordered to arrive at the company. The value of the Safety Stock depends on the uncertainty of supply and demand. Following is the formula in determining Safety Stock can be seen in the equation

SS= average usage
Previous period × LT
Information :
SS = *Safety Stock*
LT= *Lead Time* [6]

2.2.10 *Single Exponential Smoothing*

Forecasting based on exponential smoothing method is generally used to estimate individual product sales. This method is often considered better than the previous two methods, namely simple average and single moving average because of its ability to use past data by weighting based on the present data. More data is now given greater weight compared to previous data. The assumption is that more current data always has a stronger influence on forecasting results compared to more obsolete data [6]. The formula for single exponential smoothing can be seen in the equation

$$Ft + 1 = aX_t + (1 - a)_t$$

Where :
$Ft + 1$ = forecasting result for the periode of t-1

2.2.11 Counting Forecasting Mistakes

Calculating errors is usually used Mean Absolute Error Square or Mean Square.

Mean Squares Error (MSE)

Mean Squared Error (MSE) is the average of forecasting errors squared and can be seen in the equation

$$MSE = \frac{\sum(|Xt - Ft|)\,2}{n}$$

Information :

MSE = value *mean squeres error*

Xt = data actual time period

Ft = data forecast from the model used in the time period

n = Lots of data forecasting

Calculating forecasting errors is used to determine the accuracy of forecasting results made on the correct data. There are many models for calculating forecast errors. The method used to calculate forecast errors (forecast error) is the MSE (Mean Squared Error) method. MSE is the average of the difference between the squares of the predicted value and the observed one [4].

MSE is used to produce an error that shows how much difference the estimated results with the destination. This makes it different because of randomness in the data or because it does not contain more accurate estimates. The formula for MSE can be seen in the equation

$$MSE = (A_{t-1} - F_{t-1})^2$$

A_{t-1} = Forecasting the previous period

F_{t-1} = Actual sales of the previous period

2.2.12 Testing

2.2.12.1 Black Box Testing

The Black-Box testing method focuses on the functional needs of the software, therefore black-box allows software developers to create a set of input conditions that will be the entire functional requirements of a program. Black-Box testing is not a complementary approach to finding other mistakes. Some categories of black-box testing to find errors, among others. [5]

1. Incorrect or missing functions.
2. Errors in initialization and termination.
3. Error in data structures or external database access.
4. Error in Interface.
5. Errors in performance.

Using a black-box test, it is expected to produce a set of test cases that meet the following criteria:

1. A reduced test case, if the amount is more than 1, then the sum of the additional case test should be designed to achieve a reasonably reasoned trial.
2. A test case that gives something about the existence or absence of a type of error from a fault connected with only a specific trial.

2.2.11.2 Beta Testing

Beta testing is an objective test that is conducted in the test directly to where the system is implemented. The Beta tests on user satisfaction with the content of the points fulfillment of the needs of the system's initial development and interface display. Beta testing is conducted through a data retrieval technique, either through interviews or questionnaires to the parties involved, who will later use the software system built, as an evaluation reference material by the developer Software. [5]

2.3 System Analysis

2.3.1 Raw Material Forecasting Analysis

Cocoday Products in July 2017 are as much as 436415 and the results of the July forecast (Ft) = 43641, because the month of July 2017 can not be calculated so immediately calculate the next month which is August by retrieving forecasting data in January. The calculation results are below:

FAgu = (0,1 *436415) + (1- 0,1) * 436415

= (43641,5) + (392773,5)

= 436415 Pcs

For the calculation of the next month which is September judging by the number of products of the previous month which is August (Xt) = 809911 and forecasting in August obtained (Ft) = 436415, so that the example of calculation as below:

FSept = (0,1 *809911) + (1- 0,1) * 436415

= (80991,1) + (392773,5)

= 473765 pcs

Table 2. Hasil Peramalan

Periode	Cocoday	Nilai Alpha	
		0,1	0,2
Juli	436415		
Agustus	809911	436415	436415
Sep	899960	473764,6	511114,2
Oktober	505484	516384,14	588883,36

2.3.2 Calculation of MSE on the outcome of practices

Based on the calculation of MSE, the smallest error gained from forecasting with Alpha 0.1 to 0.9 indicates that for Cocoday forecasting in the next period January 2018 is forecasting using Alpha 0.9 with error values 86554402501.

The smaller Error indicates that the accuracy of the forecasting results is high. Then the forecasting of determination of the production amount of Cocoday

products for the next period using the value of α = 0.9, then the company is recommended to do. Production of Cocoday products in the next period is January 2018 with the amount Derived from the calculation result:

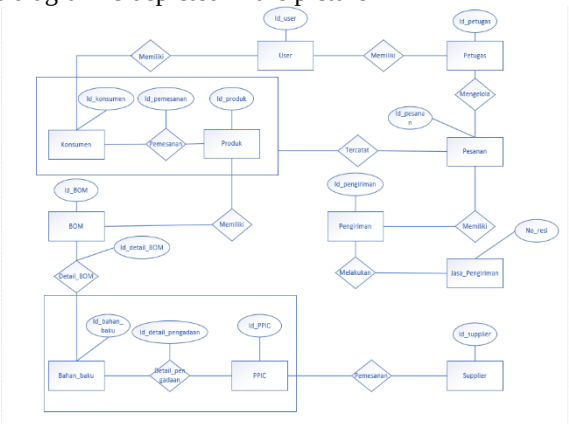
FJanuari = (0,9 *166744) + (1- 0,9) * 528745,8614
= 150069,6 + 52874,58614
= 202944 pcs

Table 3. MSE

Periode	Nilai Alpha	
	0,8	0,9
Juli		
Agustus	1,39499E+11	1,39499E+11
September	1,81643E+11	16230403282
Oktober	95627472691	1,45722E+11
November	1619449470	274518969,9
Desember	1,35714E+11	1,31045E+11
MSE	1,1082E+11	86554402501

2.4 Database Analysis

Analysis of databases on information systems at PT. The Pacific Eastern Coconut Utama will be built using the Entity Relationship Diagram (ERD). ERD is a data model that uses several notations to describe data in the context of the entities and relationships described by the data. The diagram is depicted in the picture



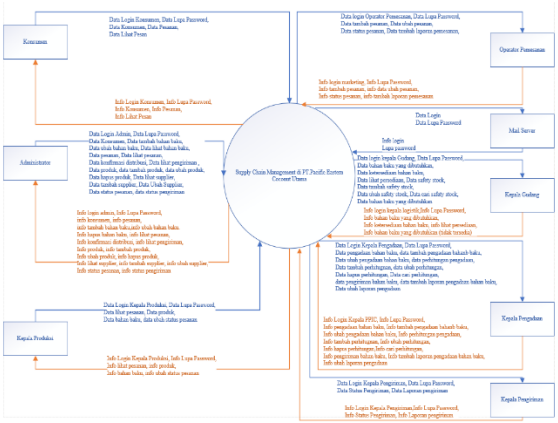
Picture 3. ERD

2.5 Non Functional Needs analysis

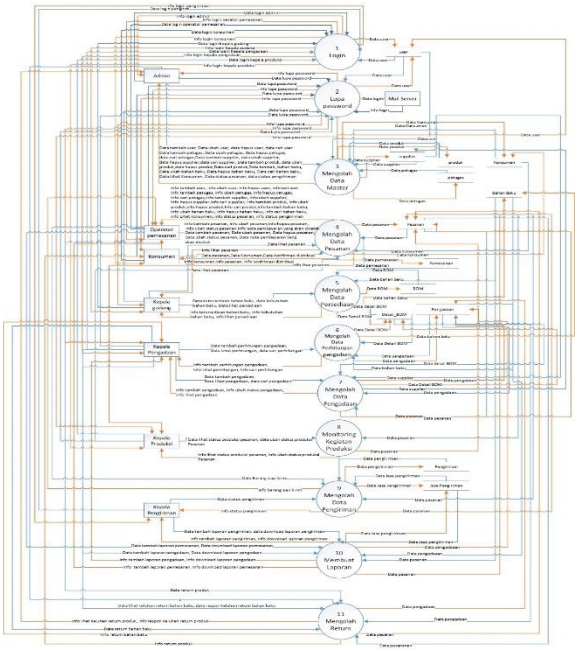
The analysis of non-functional needs is done to know what specifications are related to the system in progress and the system to be built. Analysis of non-functional needs includes hardware requirement analysis, software requirement analysis, user or Users analysis and coding analysis. Here is the explanation of each of the non-functional needs analysis that exists on the system.

2.6 Functional Needs Analysis

The analysis of functional needs is an analysis describing the flow of data or information that includes the design, planning, and creation of sketches or the arrangement of various elements consisting of a separate unit into one complete unity and Works in the process of creating software to be built.



Picture 4. Diagram Konteks



Picture 5. DFD Level 0

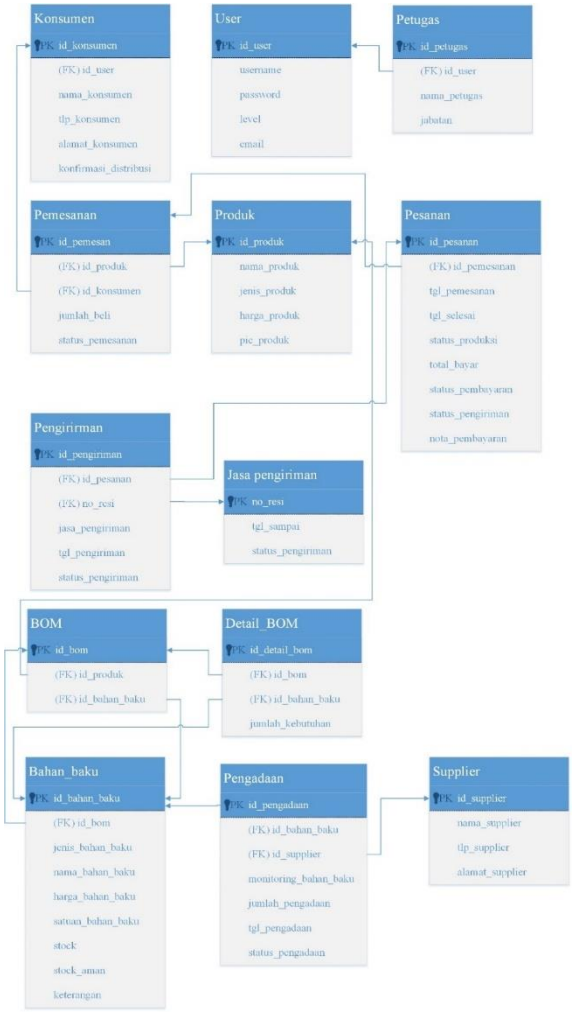
2.7 System Design

Designing will be formed after the analysis phase of a state resulting in a summary of the system to be implemented. Designing in the identification as a system application process that will have techniques and principles for the objectives to be achieved, able to provide a system that is easy to use when using it and adequate from the desired purpose. The design is described as a multi-step process where the information structure representation, program

structure, interface characteristics and procedure details.

2.8 Relationship Schemes

The relationship Diagram illustrates the relationship between data, data meaning and its boundaries. The relationship process between attributes is a combination of attributes that have the same primary key, so this attribute becomes a unified one that is linked by a key field



Picture 6. Skema Relasi

3 CLOSING

3.1 Conclusion

Information Systems Supply Chain Management is completed. Made, through several design processes, modeled, then implemented, so the following conclusions are obtained:

1. This system is built to help the warehouse part in ordering raw materials to suppliers.
2. Assisting the distribution part in scheduling delivery and selecting the vehicle to be used based on the number of orders.

3.2 Advice

This information system Supply Chain Management still needs further development, such as the addition of delivery tracking features and feature features that can be integrated into this information system.

THANK

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