INVENTORY MANAGEMENT INFORMATION SYSTEMS IN LOGISTICS DEPARTMENT AT PT. PACIFIC EASTERN COCONUT UTAMA

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ABSTRAK

PT. Pacific Eastern Coconut Utama is a manufacturing company engaged in integrated coconut processing with eleven departments of labor and one of them is the logistics department. Common tasks logistics department is managing the inventory of raw materials, including the process of ordering, receiving, dispensing, storage and stock taking. In the ordering process is often an excess of raw material received from suppliers that causes a buildup of stocks in warehouses, causing a risk of raw material is damaged, lost, and the risk of expiration.

In carrying out operational activities, PT. Pacific Eastern Coconut Utama obtain supplies of raw materials from multiple suppliers, which until now unknown number of more than 20 suppliers. To simplify the selection of suppliers best coconut then takes a decision support system that has the ability to evaluate and select suppliers according to the criteria specified company.

Based on the problems that occurred in the Logistics Department in PT. Pacific Eastern Coconut Utama, solving solution is how to build inventory management information systems to handle the buildup of stocks of raw materials and the best coconut supplier selection. The method used to resolve the stock buildup is by forecasting method Single Moving Average, while for the selection of suppliers using Analytical Hierarchy Process.

Based on the results of black box testing and beta testing, it can be concluded that the system is able to help the Logistics Department at PT. Pacific Eastern Coconut Utama in finding a solution to resolve the problem of the buildup raw materials and do the selection of suppliers.

Keywords: Management Information System (MIS), Inventory, Forecasting, Single Moving Average, Analytical Hierarchy Process

1. INTRODUCTION

T. Pacific Eastern Coconut Utama (PECU) is a manufacturing company engaged in oil processing integrated with the main products are Air Coconut (Coconut Water), Coconut Grated Dry (Desiccated Coconut), Flour Coconut Milk (Coconut Cream Powder) and Santan Liquid (Coconut Milk) , for non-food products such as Crude Coconut Oil (CCO). PT. PECU has eleven departments of labor, one of which is the logistics department. Common tasks is managing the logistics department and operations support for the next process to the distribution location or to the final consumer. Management may include the provision of raw materials (raw materials), finished goods (finished goods), spare parts (spare parts) and distribution of finished goods (distribution center). Because the production process related to inventory, procurement of raw materials are important factors to achieve the targets and objectives of the department of logistics, namely ensuring raw materials are stored properly, maintained condition and listed status. Optimize the use of space and ensure the effectiveness of distribution of raw materials in logistics, inventory management concepts required to facilitate the movement of inventory since the arrival of the raw material from the supplier of raw material expenditure towards the next process.

Based on an interview with Mr. Andhika, Supervisor Warehouse Logistics department that houses part Materials and Pack PT. PECU note that currently PT. PECU have 2 general warehouse and 11 specialized warehouse located in District coconut Pangandaran and Ciamis District. A large number of warehouses and the warehouse layout different results in the process of recording and management is done by different workers. The labor question is the party responsible for the handling of goods in warehouses, ranging from incoming goods, the goods ordered, until the goods released. Differences in labor responsible in warehouses often results in recording errors in the process of moving raw materials from one warehouse to another warehouse, resulting in the number of raw materials data are missing.

Based on an interview with Mr. Andhika, it is known that there are 5 inventory processes implemented in the logistics department in PT.PECU, namely raw material ordering, receiving raw

materials, raw material expenses, storage of raw materials and stock taking. The booking process starts from the raw materials stage of submission of the production schedule by department received PPIC Manager Logistics and checking stocks of raw materials in the warehouse. When the amount of raw material stock reaches the minimum threshold, then the logistics manager must establish how much the amount of raw materials that should be available in future periods to a certain extent that can support the company's operational processes. Sometimes in the process of receiving raw materials from suppliers needs too much resulting in excessive inventory conditions (over stock). Stacking raw materials raises the risk of raw material is damaged, lost, and the risk of expiration.

Mr. Andhika also said that as a manufacturing company engaged in the field of integrated coconut processing, oil is the main raw material availability is highly preferred. Until now known PT. PECU has more than 20 suppliers of raw material for coconut types. The number of oil suppliers often create difficulties in establishing the Logistics Manager Which suppliers decisions should be selected so as to meet the needs of companies consistently. Supplier selection process is done by evaluation of suppliers and compared based on the lowest oil price received by the company. Supplier assessment process based solely on the criteria that make the assessment results are subjective. Subjective is more to the situation where someone thought relative, the results of the suspect had expected, based on the feeling or the taste of people, estimates and assumptions. This affects the determination of ratings of suppliers, suppliers have sometimes turned out to submit coconut that do not meet company standards. Quality or products that do not fit the company's standards causes congestion or interruption of the production process.

Based on the problems that were outlined earlier, we need an information management system that can provide assistance in procurement planning and decision-making raw material supplier of oil in the logistics department at PT. Eastern Pacific Coconut Utama.

1.1 Problem Formulation

Based on the description Background So the problem can be taken formulation of the problem is, how to Build Inventory Management Information System ON Logistics Department at PT. Pacific Eastern Coconut Utama.

1.1 Purpose and Objectives

Purpose Of Research And Writing Tasks Performed Late singer is Building Information Management System inventory AT Parts Logistics in the PT. Eastern Pacific Coconut Main.

The objectives achieved Want From Research singer holding is as follows:

1. Assist Manager Logistics planning hearts Period Should Raw materials Amount: Available for review and analysis support.
2. Helps Logistics Manager hearts monitor the procurement process Raw materials for review avoid OR Excess Shortage of raw materials.
3. Helps Logistics Manager palm hearts selecting Suppliers Yang Fit Criteria specified Company.

2. CONTENTS

2.1 Research Methodology

The paradigm used dalama this research is the paradigm Post Positivism, which is a basic belief that is based on careful observation and measurement of objective reality. Based on the paradigm of Positivism Post research strategies using quantitative research. Quantitative research is research revealed from data and utilize existing theories as explanatory material. Quantitative research includes a survey, descriptive causal comparative, retrospective, and experimental complex with many variables. Descriptive research is research conducted to provide a systematic description of the object of study.

Stages of research methods can be seen in Figure 1 Flow Research (1) and Figure 2 Flow Research (2),

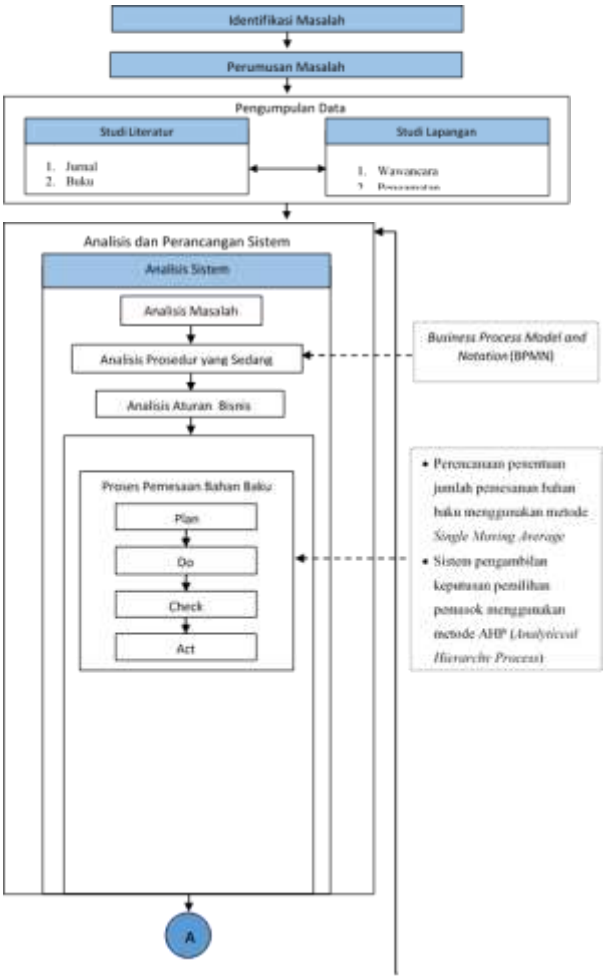


Figure 1. Flow Research (1)

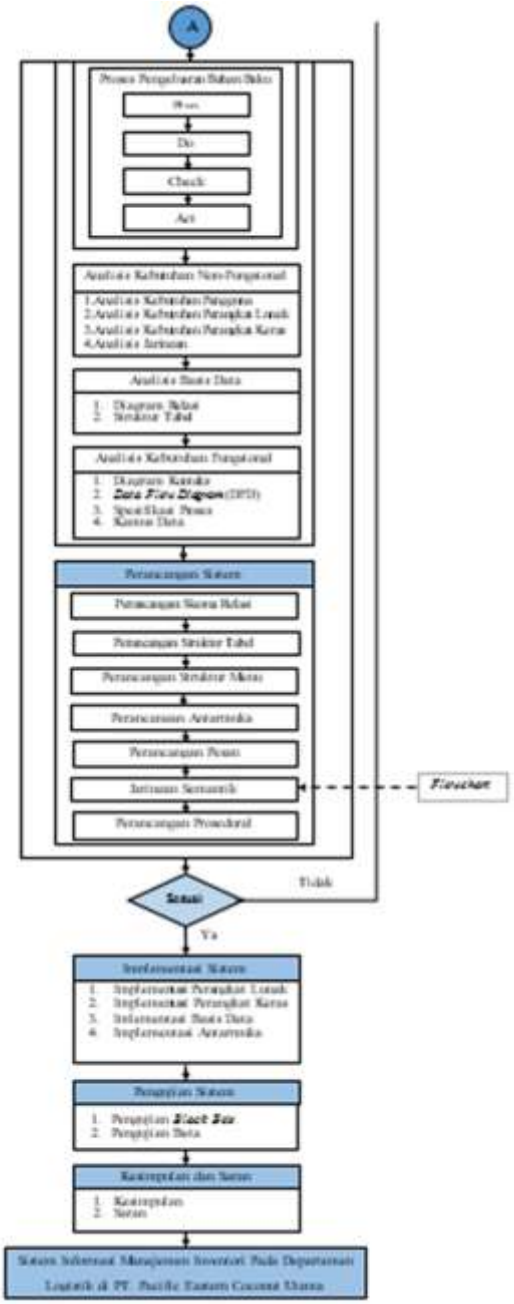


Figure 2. Flow Research (2)

2.3 Theoretical Basis

Theoretical basis used in preparing the final report Inventory Management Information System Logistics Department at PT. Eastern Pacific Coconut Utama is as follows:

2.2.1 Inventory

Inventories are materials or goods stored to be used to fulfill a specific purpose, eg, for use in the production process / assembly or resale. Inventories can be raw materials, auxiliary materials, goods in process, finished goods or spare parts. If large inventory will arise small inventory costs and inventory in short supply. Inventories are a source of funds idle, because before the inventory used to mean funds related thereto can not be used.

Inventories based on the type and position of items in the order of the work product, among others:

a. Raw materials (Raw Materials)

Tangible goods such as steel, wood, clay or raw materials derived from natural sources, or purchased from a supplier, or processed by the company for use in the company's own production process.

b. Component

The goods consist of parts (parts) obtained from another company or of own products for use in the manufacture of finished or semi-finished goods.

c. Semi-finished goods (Work in Process)

Items output of each production or assembly operations which have had a more complex shape than the components, but still need further processing into finished goods separately.

d. Finished goods (Finished Good)

Goods that have been processed and are ready for distribution to consumers.

e. Adjuvant (Material Supplies)

Goods that are required in the manufacture or assembly of goods, but is not a component of finished goods. Including adjuvant is fuel, lubricants, electricity and others. [6]

2.2.2 Information System

The information system is a system within an organization reconcile the needs of daily transaction processing, support the operation, managerial and strategic activities of an organization and provide certain outside parties with the necessary reports. [2]

The information system is an organized association of data along with procedures for its use which covers more than just the presentation. The term implies a purpose to be achieved by selecting and organizing data as well as set up protocols for its use. The success of an information system that is measured by mean pembuatanya depends on three main factors, namely: the harmony and the quality of data, organizing data, and procedures penggunaanya.untuk meet the demand for a particular use, the structure and workings of different information systems, air suspension on the sorts of purposes or the kinds of requests that must be met. [1]

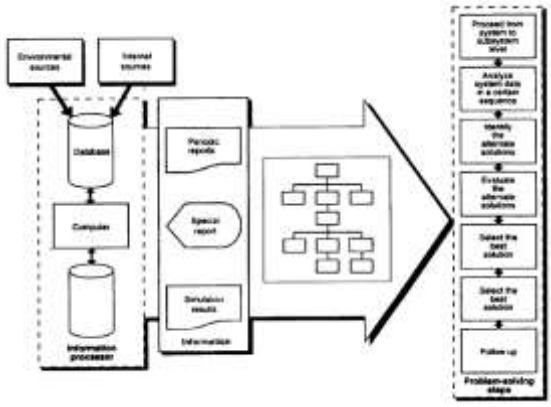
2.2.3 Management information System

The information system is a system within an organization reconcile the needs of daily transaction processing, support the operation, managerial and strategic activities of an organization and provide certain outside parties with the necessary reports. [2]

Management Information System can be defined as a collection of subsystems inter-related, gathered together and form a unity, mutual interaction and cooperation between the parts to one another in a particular way to perform data processing functions,

receive input (input) in the form of data , then process (processing), and produces output (output) in the form of information as a basis for a decision that is useful and has a real value that can be felt as a result either at that time or in the future mendatan, supports kegiattan operational, managerial and organizational strategy, utilizing a variety of existing data sources and provided for in order to achieve the goal. [4]

Model Risk Management Information System can be seen in Figure 2. 5 Model Management Information System (MIS) below:



http://darmansyah.weblog.esaunggul.ac.id

Figure 3 Management Information System

Listener information is on the left includes a computer with a database that contains the data and information from internal and environmental as well as software libraries. Another important element that although not visible in the model is an information specialist staff.

Listener infformasi provide information in three basic forms to users of SIM. Users, which is displayed in the middle with the organizational chart diempatkan orgnisasional levels and in all areas of functioning.

The right hand side of the model meunjukan how the information is used in problem solving. The arrow that connects the three forms infrmasi with troubleshooting steps show how users implement SIM output. That information gave a statement to the problem and not to a particular decision, and it is intended for managers to determine bagaimanan the information will be used. [1]

2.2.4 Forecast

Needs analysis is a step aimed to see or estimate the economic outlook or business activities as well as environmental influences on the outlook. Forecasting (Forecasting) is an activity that is trying to estimate the sale and use of the products so that these products can be made in the exact amount or quantity (Vincent Gasperz, 2001). Forecasting is not the same as the prediction, because forecasting is based on past data that is processed with statistical techniques. Forecasting is done when the forecast is uncertain. If a condition can planned or calculated (be sure), it is not necessary to use forecasting.

In a manufacturing forecasting is the first step in the preparation of Production Inventory Management, Manufacturing Planning and Control, and Manufacturing Resource Planning, where objects were foreseen is needed. In addition there is some important information that can be obtained from forecasting that production scheduling information, as well as information about business expansion plans either the amount or resources.

2.2.5 Safety Stock

Based on the classification of inventory described earlier authors use the technique Safety stock to accommodate the demand uncertainty affecting supplies.

Safety stock inventory or security function to protect the error in predicting demand during Lead Time. Lead time is the time it takes between the raw material booked up until the company. The amount of safety stock depends on the uncertainty of supply and demand.

$$SS = \text{Average usage period of the previous} \times LT$$

Description:

SS = Safety Stock

LT = Lead Time [5]

2.2.6 Analytical Hierarchy Process

Metode Analytical Hierarcy Process adalah teknik untuk mendukung proses pengambilan keputusan yang bertujuan untuk menentukan pilihan terbaik dari beberapa alternatif yang dapat diambil. AHP dikembangkan oleh Thomas L.Saaty pada tahun 1970-an, dan telah mengalami banyak perbaikan dan pengembangan hingga saat ini. Kelebihan AHP adalah dapat memberikan kerangka yang komprehensif dan rasional dalam menstrukturkan permasalahan pengambilan keputusan. AHP merupakan salah satu metode untuk menyelesaikan masalah Multi Criteria Decision Making (MCDM).

Konsep dasar metode AHP adalah menguraikan masalah multi faktor atau multi kriteria yang kompleks menjadi suatu hirarki. Hirarki didefinisikan sebagai suatu representasi dari sebuah permasalahan yang kompleks dalam suatu struktur multi level dimana level pertama adalah tujuan, yang diikuti level faktor, kriteria, sub kriteria, dan seterusnya ke bawah hingga level terakhir dari alternatif. Dengan hirarki, suatu masalah yang kompleks dapat diuraikan ke dalam kelompok-kelompoknya yang kemudian diatur menjadi suatu bentuk hirarki sehingga permasalahan akan tampak lebih terstruktur dan sistematis. [12]

There are three main principles in solving problems in AHP, namely: Decompositiot, Comparative Judgment, and Logical

2.2.7 Single Moving Average

Method of moving average single-use amount of actual data to generate new demand forecast values for future requests. This method will be effectively implemented if we can assume that the market demand for the product will remain stable over time. This method has two special properties, namely to make a forecast requires data.

Historically within a certain period, the longer the moving averages will produce a moving average increasingly fine, systematically moving average can be calculated using equation 2.7.

$$S_{t+1}=\frac{xt+xt-1+\cdots+xt-n+1}{n} \quad (2.7)$$

Description:

S_{t+1} = Forecast for the period to t + 1.

X_t = Data in period t.

N = Timed Moving Averages [10]

2.2.8 Measurement Errors Forecasting

Measurement errors can be forecast using Mean Absolute Error, Mean Square Error Mean Absolute Percentage Error

1. Mean Absolute Error (MAE)

   Mean Absolute Error (MAE) ie an average absolute error of error foresee (positive and negative values not seen) can be seen in equation 2.8.

   $$MAE = \frac{\Sigma|xt-Ft|}{n} \quad (2.8)$$

2. Mean Absolute Deviation (MAD)

   Mean Absolute Deviation (MAD) measuring forecast accuracy by averaging the alleged error (absolute value of each error). MAD useful when measuring forecast error in the same units as the original series. MAD value can be seen in equation 2.9.

   $$MAD = \frac{\Sigma(\text{Absolut dari Forecast Error})}{n} \quad (2.9)$$

3. Mean Squares Error (MSE)

   Mean Squared Error (MSE) which is the average of the squared forecasting error and can be seen in equation 2.10.

   $$MSE = \frac{\Sigma(xt-Ft)}{n} \quad (2.10)$$

Keterangan:

X_t = The actual data in period t

F_t = Data predictions of the model used in period t

n =Lots of data forecast results Mean Absolute Precentage Error (MAPE)

MAPE merupakan ukuran kesalahan relatif. MAPE biasanya lebih berarti dibandingkan MAD karena MAPE menyatakan persentase kesalahan hasil peramalan terhadap permintaan aktual selama periode tertentu yang akan memberikan informasi persentase kesalahan terlalu tinggi atau terlalu rendah. Secara matematis, MAPE dapat dilihat pada persamaan 2.11.

$$MAPE = \frac{100}{n}\Sigma \mid A_t \frac{Ft}{A}\mid \quad (2.11)$$

4. Tracking Signal

   Tracking Signal adalah suatu ukuran bagaimana baiknya suatu peramalan memperkirakan nilai-nilai aktual. Secara matematis nilai Tracking Signal dapat dilihat pada persamaan 2.12.

   $$Traking\ Signal = \frac{RSFE}{MAD} \quad (2.12)$$

   Keterangan:
   RSFE = Cumulative Error
   MAD = Mean Absolute Deviation [10]

2.3 Analysis System

Pada bagian ini dijelaskan prosedur inventori yang sekarang sedang berjalan di departemen Logistik PT. Pacific Eastern Coconut Utama. Analisis prosedur yang sedang berjalan meliputi prosedur pemesanan bahan baku, prosedur penerimaan bahan baku dan prosedur pengeluaran bahan baku.

2.3.1 Analysis Forecasting Raw Materials

The prediction of raw materials with Single Moving Average method for raw material coconut:

1. Calculations for n = 3

Forecasting results for n = 3 is obtained by entering a value Xt three months before the month you want to know the results of forecasting. Here are the details on the calculation using equation (2.9) to determine the forecast in October 2016.

$$St_{Oktober} = \frac{Xt_{Juli} + Xt_{Agustus} + Xt_{September}}{n}$$
$$= \frac{45.094 + 44.740 + 46.225}{3}$$
$$= \frac{136.059}{3}$$
$$= 45.353 \text{ butir}$$

2. Calculations for n = 6

$$St_{Oktober} = \frac{Xt_{April} + Xt_{Mei} + Xt_{Juni} + Xt_{Juli} + Xt_{Agustus} + Xt_{September}}{n}$$
$$= \frac{43.141+45.6652+42.947+45.094+44.740+46.225}{3}$$
$$= \frac{267.799}{6}$$
$$= 44.633 \text{ butir}$$

3. Calculations for n = 9

$$St_{Oktober} = \frac{Xt_{Januari} + Xt_{Februari} + Xt_{Maret} + Xt_{April} + Xt_{Mei} + Xt_{Juni} + Xt_{Juli} + Xt_{Agustus} + Xt_{September}}{n}$$

$$= \frac{\begin{array}{c}51.568+44.740+49.630+\\ 43.141+45.6652+42.947+\\ 45.094+ 44.740+46.225\end{array}}{3}$$

$$= \frac{413.737}{9}$$

$$= 45.970 \text{ butir}$$

Table 1 Hasil Peramalan

No	Periode	3	6	9
1	Oktober2015	-	-	-
2	November 2015	-	-	-
3	Desember 2015	-	-	-
4	Januari 2016	54.179	-	-
5	Februari 2016	49.122	-	-
6	Maret 2016	45.817	-	-
7	April 2016	48.646	51.413	-
8	Mei 2016	45.837	47.480	-
9	Juni 2016	45.239	45.528	-
10	Juli 2016	43.913	46.280	489.13
11	Agustur2016	44.564	45.201	46.508
12	September 2016	45.162	45.201	45.406
		45.353	44.633	45.971

2.3.2 MSE calculations on the results of Forecasting

1. Calculation MSE 3-month period

MSE = (6.819.062+ 19.201.924+ 14.541.511+30.305.025+ 8.352.100+170.294+ 393.974+ 30.859 + 1.129.969) / 9
= 81.944.717 / 9
= 9.104.969

2. Calculation MSE 6-month period

MSE = (68.420.469+ 20.543.556 + 15.376 + 1.405.805+ 212.214+ 1.049.259) / 6
= 91.646.680 / 6
= 15.274.447

3. Calculation MSE 9-month period

MSE = (14.583.912 +3.125.038 +670.761) / 3
= 18.379.712 / 3
= 6.126.571

No	Periode	3	6	9
1	Oktober 2015	-	-	-
2	November 2015	-	-	-
3	Desember 2015	-	-	-
4	Januari 2016	6.819.062	-	-
5	Februari 2016	19.201.924	-	-
6	Maret 2016	14.541.511	-	-
7	April 2016	30.305.025	68.420.469	-
8	Mei 2016	8.352.100	20.543.556	-
9	Juni 2016	170.294	15.376	-
10	Juli 2016	1.393.974	1.405.805	14.583.912
11	Agustus 2016	30.859	212.214	3.125.038
12	September 2016	1.129.969	1.049.259	670.761
Jumlah		9.104.969	15.274.447	6.126.571

Based on the results of the comparison can be concluded that the forecasting method forecasting 9 Single Moving Average monthly forecasting will be used as the basis in determining the palm as raw material. Due to the error value contained in the smallest MSE forecasting methods Single Moving Average monthly 9.

2.4 Supplier Rating

Calculation of raw material suppliers electoral votes coconut with Analytical Hierarchy Process.

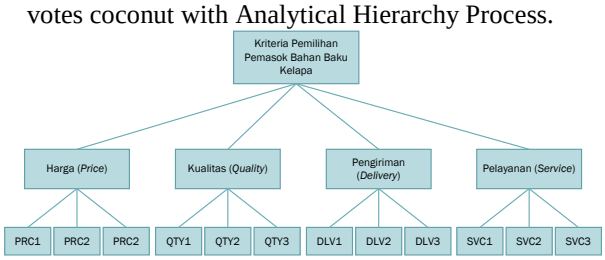


Figure 4 Hierarchy Process Assessment Suppliers

The next stage is the merging of the results of the prioritization of each criteria and sub-criteria.

Table 2 Priority Table List

No	Kriteria	Kode	Nilai Prioritas
1	Harga (Price)	PRC1	2,85
		PRC2	1
		PRC3	0,52
2	Kualitas (Quality)	QLT1	2,84
		QLT2	1,44

		QLT3	0,4
3	Pengiriman (Delivery)	DLV1	3,41
		DLV2	1,76
		DLV3	0,34
4	Pelayanan (Service)	SVC1	4,42
		SVC2	1,65
		SVC3	0,38

Table 3 Supplier Assessment Phase

Kriteria	A07	A08	A09
Harga (Price)			
PRC1	70*2,85	80*2,85	70*2,85
PRC2	80*1,00	70*1,00	70*1,00
PRC3	70*0,52	70*0,52	70*0,52
Kualitas (Quality)			
QLT1	70*2,84	70*2,84	80*2,84
QLT2	70*1,44	75*1,44	80*1,44
QLT3	80*0,40	80*0,40	80*0,40
Pengiriman (Delivery)			
DLV1	80*3,41	80*3,41	80*3,41
DLV2	80*1,76	75*1,76	80*1,76
DLV3	75*0,34	80*0,34	80*0,34
Pelayanan (Service)			

The next stage is the stage of determining which of the supplier action should be selected in the period subsequent ordering of raw material.

No	Nama Pemasok	Nilai Akhir	Peringkat
1.	Asep	1542	III
2.	Nana	1601	II
3.	Yudi	1637	I

Conclusion:

Yudi get the highest final score 1,637 on the first rank. Based on the final value obtained by Yudi, the Logistics Manager will select suppliers of oil for the next period.

2.5 Analysis Database

Database analysis on inventory management information systems at the logistics department at the Main Eastern PT.Pacific be built using Entity Relationship Diagram (ERD). ERD is a data model that uses some notation to describe the data in the context of the entities and relationships described by the data.

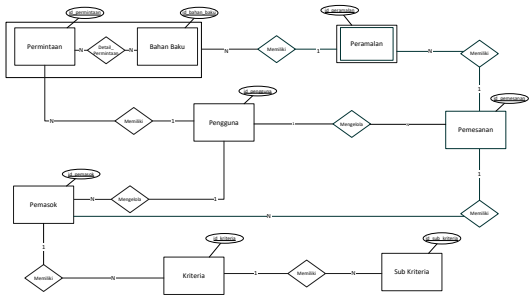


Figure 5 ERD SIM Inventori

2.6 System planning

The design is part of a software development methodology that should be done after going through the stages of analysis. The design was identified as the application system to be implemented.

The design was identified as the application system that will have the techniques and principles for the objectives to be achieved, able to provide a system that is easy to use at the time of use as well as adequate from the desired goal. The design is described in the form of a multi-step process in which the representation of information structure, the structure of the program, display characteristics and detailed procedures..

2.7 Relationship Diagrams

Relationship diagrams describe the relationship between the data, meaning data and limits. The process of relations between attributes is a combination between the attributes that have the same primary key, so that these attributes into a single unit that is connected by the key fields.

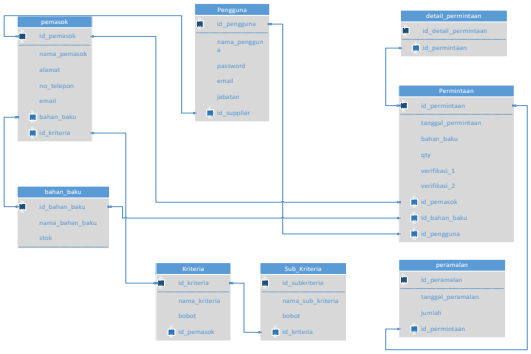


Figure 5 Diagram Relasi

3. CLOSING

3.1 Conclusion

Based on the description discussion of analysis has been done, it can be concluded the Inventory Management Information System at the Department of Logistics at PT.Pacific Eastern Main Coconut as follows:

1. Inventory Management Information System at the Department of Logistics at PT.Pacific Eastern Main Coconut is enough to help managers of logistics in making the presentation of information availability of raw materials in every warehouse, and plan the amount of raw materials should be in the message for the coming period to support the production process.
2. Inventory Management Information System at the Department of Logistics at PT.Pacific Eastern Main Coconut can provide assistance in supply management with status monitoring system of raw materials, so as to reduce the likelihood of the condition lack or excess raw material that causes disruption of the operations of the company.

3. Inventory Management Information System at the 3. Department of Logistics at Coconut PT.Pacific Eastern Main features coconut raw material supplier recommendations based on criteria that the set of companies.

3.2 Suggenstion

1. Sistem Informasi Manajemen Inventori pada Departemen Logistik di PT.Pacific Eastern Coconut Utama ini hanya bisa melakukan pengelolaan terkait bahan baku tetapi tidak bisa mengolah data keuangan lebih lanjut seperti pada sistem informasi akuntansi. Oleh karena itu untuk pengembangannya diharapkan juga bisa mengolah data akuntansi PT. Pacific Eastern Coconut Utama.
2. Diperlukan pengembangan lebih lanjut dari pembuatan sistem aplikasi ini terutama dari segi back-up secara otomatis, sehingga dapat mengurangi kemungkinan terjadinya hal-hal yang didak diinginkan seperti kehilangan data dikarenakan kerusakan komputer dan sebagainya.

ACKNOWLEDGEMENTS

The authors thank the PT. Eastern Pacific Coconut Top who was willing to cooperate in this research.

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