APPLICATION OF SUPPLY CHAIN MANAGEMENT (SCM) INFORMATION SYSTEM IN PT INDUSTRI SUSU ALAM MURNI

Fanny Paisal Akbar[1], Sri Nurhayati, S.Si., M.T.[2]

[1,2] Teknik Informatika – Universitas Komputer Indonesia
Jl. Dipatiukur No. 112-116, Jl. Dago No. 160-162, Bandung, Jawa Barat 40132
E-mail : fannypaisalakbar@gmail.com[1], serieid@yahoo.com[2]

ABSTRACT

PT. ISAM is a company engaged in milk processing whose shares are owned by the Joint Association of Dairy Cooperatives (GKSI) in West Java. The procurement process is carried out by means of intuition or no exact amount is estimated. This is due to uncertainty of orders from customers, sometimes customer demand increases and sometimes decreases. When orders from customers increase, there can be a shortage of product stock, whereas when customer demand decreases can cause excess product stock, the excess product stock in the warehouse causes the product to expire, because the product warehouse can only last 3 days.

The distribution process is carried out in different times and quantities in each period, so the head of marketing has difficulty in determining the closest route from the customer, this can cause the distribution process to be hampered. Based on the problems that have been described, the proposed solution is to establish the Application of Information Systems Supply Chain Management (SCM) at PT Industri Susu Alam Murni. The aim is to assist the Procurement Manager in planning the procurement of raw materials to suppliers so that customer demand is met, as well as avoiding excess and shortage of raw materials and assisting Sales Managers in determining the closest capacity and route when shipping so that product delivery is not hampered. The forecasting method used in the study is Single Exponential Smoothing with Mean Square Error, the method of controlling the inventory of products in the warehouse using Safety Stock, the method of determining the closest route using the Savings Matrix method. Based on the results of testing, it can be concluded that this system has assisted the Warehouse Manager in planning the procurement of Raw Materials to suppliers, but in determining the closest route in the system has not worked well.

Keywords : *Supply Chain Management, single exponential smoothing, Safety Stock, Savings Matrix, Information System*

1. INTRODUCTION

PT. ISAM is a company engaged in milk processing whose shares are owned by the Joint Association of Dairy Cooperatives (GKSI) in West Java. PT. ISAM has a warehouse for storing raw materials, namely 2 tanks for storing milk raw materials from suppliers. PT ISAM cooperates with several suppliers, including milk suppliers, sugar suppliers, water suppliers, chocolate suppliers, plastic bottle suppliers and label suppliers, in selecting raw material suppliers, procurement managers prioritize the best quality, then the lowest prices from suppliers based on samples provided by suppliers .. 90ml chocolate milk packaging is a superior product from PT. ISAM, because it is the product most ordered by customers. Based on this description, the company's supply chain management strategy uses a push supply chain approach. In the make to stock model the company develops the product in the warehouse to the point that has been set beforehand, without knowing how much the customer requests.

Based on the interview with the Procurement Manager, he explained that the procurement of raw materials to suppliers was carried out every day. The procurement process is carried out by means of intuition or no exact amount is estimated Based on data on sales of 90ml chocolate milk for the period July 2017 - December 2017 (Appendix A-1) that sales data has fluctuated or fluctuated, this is due to uncertainty of orders from customers. This has an impact on the procurement of raw materials, namely the difficulty in determining the amount of raw materials that must be ordered to suppliers every day so that customer demand can be fulfilled.

Based on the interview with the Sales Manager he explained the order process from customers made by telephone or came directly to PT ISAM, for payments made by customers before the goods were sent to customers. The process of sending products to customers is done that day after the customer places an order. Delivery process at PT. The Pure Natural Milk Industry uses a Fuso Box Truck vehicle. Sales managers often have difficulty in optimizing vehicle capacity and the number of product orders that will be sent to customers, in addition the company has difficulty in route when shipping, this causes delays in the delivery process to customers.

From the above problems it can be concluded that if a problem occurs in the inventory of products can cause the delivery process to be hampered and customer demand is not met. These problems can be overcome by a supply chain management system, supply chain management itself is a complete chain processing cycle starting from suppliers, operational activities in the company, continuing to distribution to end users. The goal is that the management of the flow of products or raw materials and the flow of information in the company, from receipt of orders from customers, procurement of products, receipt of products to delivery of products to customers will create synchronization and consistency.

2. CONTENT OF RESEARCH

2.1 Information Systems

Information system is a system within an organization that reconcile the needs of daily transaction processing, support operations, managerial and strategic activities of an organization and provide certain outside parties with the necessary reports [1].

2.2 *Supply Chain Management*

Supply Chain Management is an integrative method or approach for managing an integrated flow of products, information, and money involving parties from upstream to downstream. An important principle in supply chain management is the transparency of information and collaboration between the internal functions of the company and with the parties in the company along the supply chain. In supply chain management activities include the development of material and component control products, product planning, inventory control, production, and distribution / transportation [2].

2.3 Peramalan

Forecasting

According to Spyros Makridakis [4] "Forecasting is a prediction of the values of a variable based on the known value of the variable or the corresponding variable. Forecasts can also be based on assessment skills, which in turn are based on historical data and experience."

Forecasting classification is the identity of the forecasting itself. Forecasting has two classification classifications including the following [4]:

1. Forecasting based on settlement techniques include:

   a. Qualitative Forecasting Techniques

   Forecasting involving personal opinions, expert opinions, methods of Delphi market research and others. Aim to combine all information obtained logically, unbased & systematically that is connected with decision-making interest factors.

   b. Quantitative Forecasting

   Quantitative forecasting is used when past data is sufficiently available. Some quantitative techniques are often used such as the Time Series Model and Causal Model.

2. Forecasting Based on Horizon Time Grouping

a. Long-term forecasting

Forecasting with a forecast period of more than 24 months, for example forecasting is needed in relation to the production budget.

b. Medium-term forecasting

Forecasting the forecasting period between 3-24 months, for example forecasting for sales planning, planning and production budget.

c. Short-term forecasting

Forecasting with a forecast period of less than 3 months, for example forecasting in conjunction with material purchase planning, work scheduling and assignment..

2.3.1 *Single Exponential Smoothing*

Single Exponential Smoothing method is used in conditions where the weight of data in one period is different from the data in the previous period and forms the Exponential function. This method greatly reduces data deviation problems because there is no need to store historical data anymore. The effect of the size of α in the opposite direction to the effect of entering the number of observations. This method always follows every trend in the actual data because what it can do is nothing more than arranging future predictions with a percentage of the last error. Determining α close to optimal requires several trials [4].

If a historical data series Xt for t = 1,2,3, ..., N, the exponential forecast data for time data t is Ft. A simple Exponential smoothing method is developed from the method of moving averages. If there is data from the feeding observation, the forecast value at time t + 1 can be calculated with equations (2.1) and (2.2) while for the Exponential calculation for N can be seen in equation (2.3).

$$F\text{t}+1 = \frac{x1+x2+\cdots+xT}{T} = \frac{1}{T}\sum_{1}^{T} = 1^{x1} \qquad (2.1)$$

$$F_{t+2} = F_{t+1} + \frac{1}{T} = (X_{T-1} - {}_{1}) \qquad (2.2)$$

The Exponential method for N observations is as follows:

$$F\text{t}+2 = F\text{t}+1\ (\frac{Xt}{N} - \frac{\text{Xt}-\text{N}}{\text{N}}) \qquad (2.3)$$

Suppose that old observations $Xt - N$ are not available so they must be replaced by an approximation value. One possible substitute is the prediction value of the previous period Ft so that it can be calculated by equations (2.4) and (2.5).

$$F_{t+1} = F_t + (\frac{Xt}{N} - \frac{\text{Ft}}{\text{N}}) \qquad (2.4)$$

$$F_{t+1} = (\frac{1}{N})\, X_t + (1 - \frac{1}{N})\, F_t \quad (2.5)$$

So the forecast value at time t + 1 depends on the weighting of the observation value when t, which is 1 / N and at the weighting of the forecast value, 1 - 1 / N is between 0 and 1. If 1 / N = a, it can be calculated by equation (2.6) So the forecast value at time t + 1 depends on the weighting of the observation value when t, which is 1 / N and at the weighting of the forecast value of 1 - 1 / N is between 0 and 1. If 1 / N = a, it can be calculated with equation (2.6).

$$F_{t-1} = aX_t + (1 - a)F_t \quad (2.6)$$

Information

Ft + 1 = forecast results for period t + 1

a = Smoothing constant

Xt = Actual demand data for period t

Ft = Forecast in period t

Exponential smoothing method data metode value can be determined freely, meaning that there is no definite way to get the optimal a value. Then the selection of the a value is done by trial and error. The amount a is between 0 and 1.

2.3.2 *Mean Square Error* (MSE)

Mean Squared Error (MSE), which is the average of forecasting errors squared and can be seen in equation (2.11).

$$MSE = \frac{\sum(Xt - Ft)^2}{n} \quad (2.11)$$

Information

Xt = Actual data in period t

Ft = forecast data from the model used in period t

n = Lots of forecast data

2.4 Monitoring

Monitoring is gathering information continuously and regularly that will help answer questions about a project or activity. Monitoring helps remind when something goes wrong and helps keep the work on track [5].

2.5 *Safety Stock*

Ordering an item until the item arrives requires a period that varies from several hours to months. The time difference between when ordering until the item comes is known as the lead time. Grace time is influenced by the availability of goods ordered and distance between the buyer and the supplier of goods. Erratic grace times result in a shortage of goods, for example due to the use of goods that are larger than previously estimated, therefore a safety stock is needed [6].

If Safety Stock is set too low, the inventory will be depleted before the replacement supply is received so production can be disrupted or customer demand can not be met.

The safety stock formula can be calculated by equation (2.13).

$SS = Usage\ of\ previous\ period\ average\ x\ LT$ (2.13)

Information :

SS = *Safety Stock*

LT = *Lead Time* (Product procurement from supplier to company)

2.6 Transportation and Distribution Management

One of the most important operational decisions in distribution management is determining schedules and shipping routes from one location to several destination locations. This decision is very important for the delivery of products from locations to various shops scattered in a city. To minimize the distance of delivery, the order of destination is closest to the distance.

2.7 *Entity Relationship Diagram* (ERD)

ERD is a graphical notation in conceptual data modeling that describes the relationship between storage (table) [9]. ERD is used to model data structures and relationships between data, we can test data by ignoring the process that must be done and can find out what data we need, and how these data can be interconnected.

2.8 *Data Flow Diagram* (DFD)

Data Flow Diagram or often referred to as Data Flow Diagram, is a logic data model or process that is made to describe where data comes from and where the data that comes out of the system, from which data is stored, what process produces the data and the interaction between stored data and processes imposed on the data [12].

DFD describes in detail the sequence of steps of each process described in the data flow diagram. DFD is synonymous with bubble chart, transformation graph, and process model.

2.9 Problem Analysis

Problems that exist at PT. The Pure Nature Milk Industry includes:

1. The uncertainty of ordering products from customers results in Procurement Managers having difficulty in determining the amount of clothing material that must be ordered to the supplier.
2. Sales Manager has difficulty in optimizing vehicle capacity and the number of product orders to be sent to customers, as well as determining the closest route when shipping,

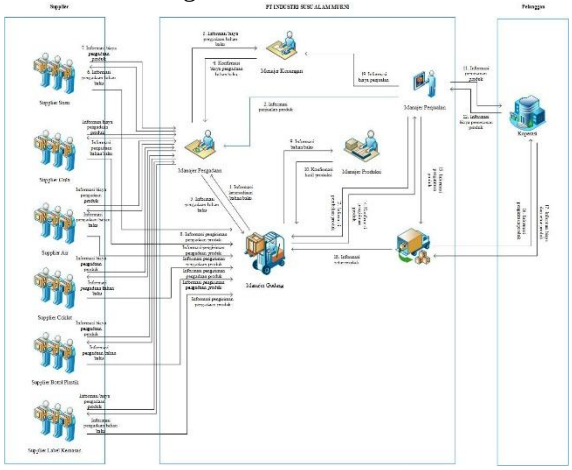
so that it can cause delays in the delivery process to customers.

2.9 Analysis of Supply Chain Management

Supply Chain Management (SCM) used by PT. ISAM is a Push-based supply chain. Push based Supply chain is a system where the company determines the product to be produced before the order, so the company places an order on the supplier or it can be called make to stock to meet customer needs without knowing how much the customer needs.

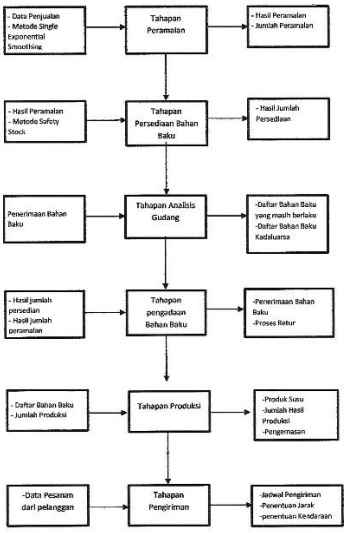
There are two streams that occur at PT. ISAM is the flow of information and financial flows. In the information flow there is an order flow from PT. ISAM to suppliers for ordering procurement of products and flow of product ordering information from customers to PT. ISAM. In addition, in the information flow there is also a flow of product delivery or distribution from PT. ISAM to customers and the product delivery or distribution flow from suppliers to PT. ISAM. Within this scope, PT. ISAM monitors product inventory to find out the safe limit of the number of products in the warehouse, inventory control so that there is no shortage or stock void, monitoring order status so that the Production Manager can know the order status received or rejected by the Sales Manager, and monitor distribution status so that the Production Manager knows whether the product is still in shipping or has been received by the customer. The stages of monitoring product inventory in warehouse are using the safety stock method to find out the safe limits that must be available in the warehouse. The procurement information flow that is using the forecasting method so that the estimated number of products to be ordered is not too missed and the product demand from customers is fulfilled.

Based on the description of the streams and systems owned at PT. ISAM, it can be proposed to use the supply chain tegement method on the system to be made. In the supply chain management method has a mapping and framework that is a component of the builder in the system that will be created. The mapping of Supply Chain Management at PT. ISAM can be seen in Figure 1.



Gambar 1. Mapping *Supply Chain Management* at PT. ISAM

The strategic information system approach to Supply Chain Management will be built at PT. ISAM consists of several stages which can be seen in Figure 2



Gambar 2. Stages of *Supply Chain Management* at PT. ISAM

Based on Figure 2 regarding the stages of supply chain management at PT. ISAM, it can be analyzed for each stage of Supply Chain Management in the company PT. ISAM is as follows:

1. The company manages data on sales of products ordered by customers and the company predicts the procurement of products in the next period from the product sales data of the previous period which requires product sales data, the forecasting method to be used is the Single Exponential Smoothing method.Tahapan monitoring persediaan produk
2. After performing the forecasting stage, the company monitors product inventory in warehouse and determines how safe the product must be available in the Stock Safety method.
3. Stages of Product Procurement
   After the forecasting and product monitoring process, the company conducts the procurement process to the supplier, the company looks at the safe limit of product inventory in the warehouse and procures the product with the procurement amount from the forecast calculation minus the remaining product stock in the warehouse.
4. Stages of delivery (distribution) to customers

The company determines the type of vehicle and the officer who sends it and adjusts orders from customers who will be sent the closest distance, until finally the customer receives the product according to the order. The method of determining the closest route using the Nearest Neighbor method.

2.9.1 Stages of Product Sales Forecasting

In forecasting product sales, there are several steps that must be done, namely as follows:

1. Prepare sales data from the previous period to be processed as input data.
2. Calculate the forecast value on sales data using a single exponential smoothing method or technique.
3. Look for the MSE value to find out the smallest result.
4. he smallest MSE value that will be used as the forecasting result for the next period.

Data on recapitulation of sales of 90ml chocolate milk products in July 2017 to December 2017 can be seen in Table 1.

Table 1. Recapitulation of Sales of 90ml Chocolate Milk Products.

Bulan	Jumlah Penjualan
Juli	860210
Agustus	802199
September	785168
Oktober	782215
November	735941
Desember	763960

For example, the calculation will be done in August 2017, then the minimum data entered is the data in July 2017. Forecasting is done by taking samples of sales of chocolate milk products 90ml PT. The Pure Alam Milk Industry in July 2017 to December 2017 can be seen in table 3.2. The first step that must be done to calculate the forecasting method for Single Exponential Smoothing is to determine the value of the alpha constant = 0.1 and predict the demand for the second period. As for the values of variables taken from product sales data in table 3.2, then distribute these values into the formula (2.6) then the calculation will be obtained as below:

Forecast calculations for $\alpha = 0.1$:

Based on data on sales of 90ml chocolate milk products in Table 3.2 and the forecasting calculation formula (2.6) in chapter 2, calculate the sales forecast for July 2017. It is known that:

Sales of 90ml chocolate milk products in Agustus 2017 (Xt) = 860210 packaging and forecast results for Juli 2017 (Ft) = 860210 packaging,

So based on the formula (2.6) in chapter 2, the calculation is as below:

Fjuli = (0.1 *860210) + (1 – 0.1) * 860210
= (86021) + (774189)
= 860210 pcs

Fagustus = (0.1 *802199)+(1– 0.1) * 860210
= (80219,9) + (774189)
= 854408,9 pcs

After the forecasting results are obtained, the next step is to see the accuracy in predicting what has been done before. There are several methods for calculating the accuracy of error rates. One of the methods used in this study is the MSE (Mean Square Error) method with formula (2.11) which has been described in CHAPTER 2. The results of the MSE calculation for $\alpha = 0.1$ are as follows:

$$MSE = \frac{\begin{array}{c}((860210 - 860210)^2 + (860210 - 802199)^2 + (854408{,}90 - 785168)^2 \\ +(847484{,}81 - 7782215)^2 + (840957{,}83 - 735941)^2 \\ +(830456{,}15 - 763960)^2)\end{array}}{6}$$

$$= 4644999712$$

For the calculation of alpha error = 0.2 and up to 0.9, it is done in the same way.

2.9.2 Stages of Product Inventory Monitoring

After doing the forecasting, the next step is to monitor inventory to monitor and control inventory in the warehouse. To monitor inventory control by looking at inventory history data every month. Monitoring function so as to avoid the occurrence of vacancies and shortages of 90ml Chocolate Milk product stocks in the warehouse. This inventory control monitoring requires an indicator to determine the safe limit that must be available in the warehouse using the safety stock method.

The application of the safety stock method is the process of calculating the safe limit of inventory that must be available in the warehouse for the next period and the point of reorder. Calculation of safety stock can be seen in equation (2.13) which has been explained in chapter 2. The following is an example of calculation using safety stock..

1. **Calculation of Safety Stock for 90ml Chocolate Milk Products**

The following is an example of calculation using the Safety Stock method for January 2018 (calculation of safety stock is done based on the sales data of the last month) :

Noted that:

December sales amount = 763960

Number of days in January = 31 days

Lead Time for procurement to suppliers = 3 days

Settlement :

$$safety\ stock = \frac{(763960)}{31} \text{x} 3 = 73931{,}61$$
$$= 73932$$

Based on the calculation of the safety stock above, PT. Alam Murni Milk Industry must provide as much as 73932 pcs of 90ml chocolate milk products for January. So that when the product stock is less than the amount of safety stock, the system will notify that there is an insecure stock, but because PT. Alam Murni Milk Industry does not store milk products in warehouses, so the safety stock will be converted into some raw materials needed to make 90ml chocolate milk. Safety stock of 90ml chocolate milk products and 90ml chocolate milk raw material can be seen in table 2.

Tabel 2. 90ml Chocolate Milk Stock Safety

Safety Stock produk Susu Coklat 90ml	Jenis Bahan Baku	Peramalan bahan baku (susu Coklat 90ml)	Safety Stock Bahan baku (susu Coklat 90ml)	Stockdi Gudang	Status
73932	Susu (ml)	38081350	3696600	283921	tidak aman
	Cokelat (gram)	7616270	739320	67510	tidak aman
	Gula (gram)	7616270	739320	58920	tidak aman
	Air (ml)	7616270	739320	69821	tidak aman
	Botol Plastik (pcs)	761627	73932	71002	tidak aman
	Label Kemasan (pcs)	761627	73932	69821	tidak aman

2.9.3 Product Procurement Stages

In the stages of procurement of this product the Head of Procurement Section made an order based on the results of forecasting and monitoring that had been done.

Based on monitoring product availability in table 2. If the number of product supplies has an unsafe status, the company procures products with the following amount:

Amount of procurement = (sales forecast results + Safety Stock) - remaining stock

So the amount of procurement for milk is as follows:

Amount of Procurement of Milk

= (38081350+ 3696600) – 283921

= 41494029 ml

Whereas, if the number of product supplies has a safe status, the company procures products with the following amounts:

Number of procurement = forecasting results

So the amount of procurement for Milk is as follows:

Amount of Milk Procurement = 41494029 ml

2.9.4 Product Distribution Stages

In the supply chain there are distribution / shipping activities. The scope of activities includes monitoring shipping status, shipping scheduling, vehicle capacity to be used in distribution, and determining the route of customers closest to distribution. Distribution monitoring is done so that the product arrives at the customer at the right time and place and knows the delivery status. The schedule for distributing products to customers is done on a schedule agreed upon between PT. Pure Nature Milk Industry with customers. The first stage in product distribution is knowing product orders made by customers, ordering products can be seen in Table 3.12 in the analysis of customer orders. The second stage is knowing the packaging of product orders to be distributed to customers, packaging product orders can be seen in Table 3.13 in the packaging analysis. The third stage is the company determines the vehicle for distribution, there are two vehicle statuses for distribution, namely available and shipping. Available means that the vehicle is in the company and can be used for product delivery, while shipping means the vehicle is on the way to sending customer orders. The following is the distance between PT. ISAM with customers can be seen in Table 3.

Tabel 3. Distance of PT. ISAM with Customers Using Goggle Maps

Alamat PT. ISAM	Nama Pelanggan	Alamat Pelanggan	Jarak
Jl. Rumah Sakit no. 114, Ujung Berung Bandung 40601, Jawa Barat	Toko Rukun Ihtiar	Jl. Otto Iskandar Dinata No.435, Ciateul, Regol, Kota Bandung	133 km
	Toko Sejahtera Bersama	Jl. Soekarno Hatta No.503, Cijagra, Lengkong, Kota Bandung	6,8 km
	Toko Warga Gresik	Jl. Ahmad Yani No.99, Dawuan Bar., Cikampek, Kabupaten Karawang	98 km

After determining the type of vehicle to be used and knowing the distance of the customer, the system to be built will determine the shipping route using the Nearest Neighbor method, here is the determination of the shipment:

a. Distance to Warehouse - Toko Rukun Ihtiar = 133 Km
b. Jarak Gudang - Toko Sejahtera Bersama = 6.8 Km
c. Distance Warehouse - Gresik Residents Shop = 98 Km

Because the minimum distance produced is 7.2 km, then the first thing to be visited is the Rukun Ihtiar Shop. Then in the same way the second visit is determined as follows:

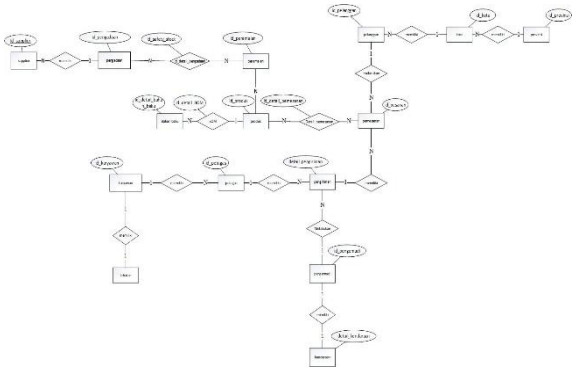
a. Distance Gudang - Toko Rukun Ihtiar - Toko Sejahtera Bersama = 133 Km + 6.8 Km = 139.8 Km
b. Distance Gudang - Toko Rukun Ihtiar - Gresik Citizen Shop = 133 Km + 98 Km = 231 Km

Obtained a minimum distance of 139.8 Km, the shipping route is the Warehouse - Toko Rukun Ihtiar - Toko Sejahtera Bersama - Toko Warga Gresik with a total distance of 237.8 Km.

2.10 *Entity Relationship Diagram* (ERD)

Data analysis is obtained from data that will be used in the process of developing a distribution information system at PT. The Pure Natural Milk

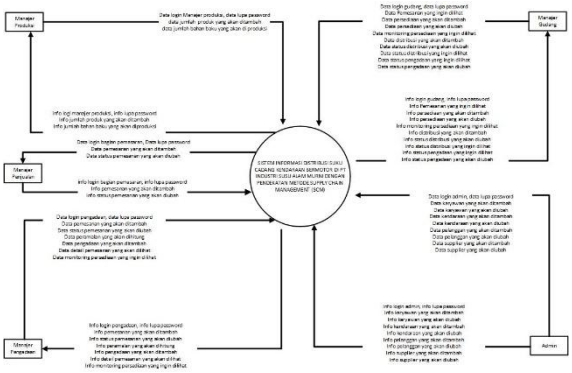
Industry, then the data that has been obtained is built a database design using Entity Relational Diagram (ERD) tools which are used to explain the data flow that is processed so that it can produce the information needed. Relationships between these entities can be seen in Figure 3.



Gambar 3. Entity Relationship Diagram for Application of Information Systems Supply Chain Management (SCM) in PT Industri Susu Alam Murni

2.11 Context Diagram

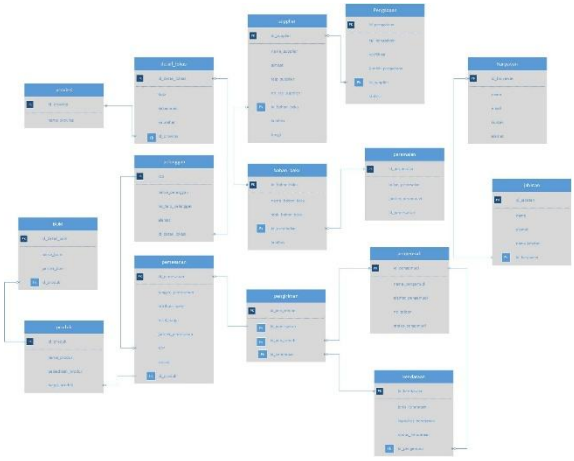
Context Diagram is a diagram that serves to describe the flow of data between systems and external entities. The context diagram on this system can be seen in Figure 4.



Gambar 4. Context Diagram for Application of Supply Chain Management (SCM) Information Systems in PT Susu Susu Murni Industry

2.12 Relationship Table

Table Relations aims to describe the connectedness of tables in the system in detail or clearly, then use the relationship table. The relation table will be explained in figure 5.



Gambar 5. Relationship Table

2.13 System Testing

System Testing Phase is the stage used to test the system that is built is appropriate. Testing of Supply Chain Management (SCM) Information System Implementation In PT Industri Susu Alam Murni will be tested in two stages of testing, namely alpha and beta testing.

2.13.1 Conclusion of alpha testing

Based on the results of testing with a sample test case that has been done, it gives a conclusion that the process is correct. Filtering process errors in the form of a message page display direction is quite maximal. Functionally the system can produce the expected output.

2.13.2 Conclusion of beta testing

After conducting interviews at PT. ISAM can be concluded that this information system has helped PT. ISAM in managing product planning to suppliers, managing order data, forecasting, monitoring inventory of raw materials and products, and managing shipments quite well, in terms of the use of the language used is good, easy to use and the interface is quite good.

3. CLOSING

3.1 Conclusion

Application of Supply Chain Management (SCM) Information Systems at PT. Alam Murni Milk Industry has been built and tested on the system so that it can be concluded that.

This supply chain management information system can make it easier for Procurement Managers to plan product procurement to suppliers so that product order requests from customers are met.

The supply chain management information system can help the Sales Manager determine the closest route from the customer during the distribution process, because from the conclusion of the alpha and beta testing the system built can still determine the closest route from the customer.

3.2 Saran

Application of Supply Chain Management (SCM) Information Systems at PT. The Alam Murni Milk Industry can still be further developed with higher system specifications and better performance.

The following are some suggestions that can be used for the development of this research:

1. Further research is expected that the system built can carry out Tracking when distributing so that the implementation of Supply Chain Management can be even more complete.
2. The interface display in the next research is expected to be more interesting for system users.

REFERENCE

[1] M. P. Jogiyanto HM., Analisis & Desain Sistem Informasi Pendekatan Terstruktur Teori dan Praktek Aplikasi Bisnis, Yogyakarta : Andi, 2005.

[2] Pujawan, I Nyoman 2010. Supply Chain Management Edisi Kedua. Surabaya: Guna Widya

[3] S. Choper and P. Meindel. 2007. *Supply Chain Management: Strategy, Planning, and Operation*, New Jersey: Pearsin Prentice Hall

[4] S. Makridakis, S. C. Wheelwright and V. E. McGree.1999.Metode dan Aplikasi Peramalan Jilid 1, Jakarta: Binarupa Aksara.

[5] Taufik, Muh. 2010. Monitoring dan Evaluasi.Jakarta : PNPM-PPK.

[6] Nur Bahagia, senator. 2006. Sistem Inventori. Bandung: Penerbit ITB

[7] Lerbin R, Aritonga R. 2009. Peramalan Bisnis Edisi Kedua. Jakarta: Ghalia Indonesia

[8] Alma, Buchari. 2005. Manajemen Pemasaran dan Pemasaran Jasa. Bandung: CV. Alfabeta

[9] Arief Ifandi, Utami Dewi Widianti, "Pembangunan Sistem Informasi dengan menggunakan Pendekatan Supply Chain Management di Sentra Susu Cipageran" Teknik Informatika,UNIKOM , 2017

[10] Gigin Saepul Rohman, Rani Susanto, "Supply Chain Management di Koperasi Peternakan Bandung Selatan Pangalengan (KPBS)" Teknik Informatika,UNIKOM , 2017