DEVELOPMENT OF SUPPLY CHAIN INFORMATION SYSTEM IN PT.MILAGROS PUTRA MANDIRI BY USING SUPPLY CHAIN MANAGEMENT APPROACH

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ABSTRACT

PT.Milagros Putra Mandiri is a company engaged in construction services mineral water. One of the resulting product is a health drink milagros. Problems faced by companies today are often run out of supplementary materials that inhibit the production process it is caused due to procurement planning complementary materials that are less precise and the absence of a system capable of monitoring inventory complementary materials so late in returning book complementary materials. Companies often experience shortages of finished products due to the lack of methods for estimating customer orders. Delivery schedule by distributors who often suffer from lack of monitoring changes and delivery so that between the delivery and the customer is not well coordinated..

Pursuant to the problems that exist at the moment in PT.Milagros Putra Mandiri need a development management information system that regulates supplementary material procurement, production management and management of product delivery to the customer using the approach method of Supply Chain Management in PT.Milagros Putra Mandiri.

Procurement management with calculating the sales forecasting and inventory complementary materials conducted continuously into the system can help PPIC part in managing and monitoring the complementary materials, with the production schedule and production plan that is built into the production system can assist in controlling production activities , with the monitoring of delivery and production schedule into the system can facilitate the delivery and monitoring of customers in the delivery.

Key: Supply Chain Management, Safety Stock, Monitoring, Forcaseting, MPS

1. INTRODUCTION

PT.MILAGROS PUTRA MANDIRI is a company engaged in construction services mineral water. The resulting product is a health drink that is milagros. PT. MILAGROS PUTRA MANDIRI to sell its products to distributors fixed and internal customers, internal customers usually government agencies and corporations. Its main distributor, PT. Patra Graha will make a reservation at the beginning of the month or the end of the month along with the number of orders and the delivery schedule for one month, and the internal customer will typically place an order and delivery at the time and internal reservations only fulfilled when the availability of products exceeds ordering from distributors. Actors in the supply chain of the company is, the marketing and purchasing, section Production Planning and Inventory Control (PPIC), production and delivery part and from outside the company is a distributor and supplier.

Based on interviews with pak Agus Sugito part PPIC reservations complementary materials is usually done once a month, during this part PPIC not have a method for planning the purchase of complementary materials, usually in anticipation of ordering the finished product increases, the company will buy in bulk when large purchases are not efficient for venture capital turnover. The company also in managing the data still do manually, so that the activities of management has not gone well, eg for monitoring stock a parts warehouse PPIC have to check the availability of complementary materials goto admin once a week, so sometimes lead to delays in the procurement of complementary materials, delays in the procurement of complementary materials can inhibit the production activities, some complementary materials shipped partially and during this part PPIC not have a system for monitoring the stock of the warehouse so that when warehouse stocks run out supplementary materials will interfere with the smooth production and make the production is not optimal.

Based on interviews with Moch.Kholil pack as part of production that is responsible for managing the smooth production, the production department has not had a method for production planning, production planning so far only done by PO from distributors plus safety stock 5000 boxes and taken to the internal demand of safety stock so that when internal demand rises then the safety stock of finished goods will be

reduced. reduced safety stock would result in the company can not meet the demand of distributors in large numbers at the beginning of the next month or reject the internal order. PPIC parts and production parts mebutuhkan a method of procurement and production planning can predict the sales of finished products so that production could go well. One type of supplementary materials can be purchased from several suppliers, or one supplier could supply some complementary materials, during the company simply calculate the percentage of goods reject mill per complementary materials, the company has not had a calculation of the percentage of goods reject factories per supplier, whereas when the supplementary materials reject exceed damage tolerance would result in losses for the company. Based on the pack heri as part of the administrators whose job is to regulate the distribution of shipments have problems when there is a change the delivery schedule by the distributor because it must wait for notification of marketing and purchasing, if marketing & purchasinng late in giving notice of the admin section too late to change the delivery schedule The admin also does not have monitoring delivery so that customers can not memantaw delivery. Admin section also does not have a complete report as a data distribution postage so difficult in doing pengecakan postage.

Pursuant to the problems that exist in PT.MILAGROS PUTRA MANDIRI cause is due to a lack of coordination between supply chain actors is needed construction of an information system that is able to coordinate the supply chain actors and the system governing complementary materials procurement management, supplier evaluation, production management and product delivery management milagros health drink by using a method of Supply Chain Management in PT.MILAGROS PUTRA MANDIRI.

While the objectives to be achieved in this study are:

a. PPIC facilitate part in conducting the procurement plan supplementary materials and supplementary materials inventory monitoring.
b. PPIC facilitate part in making the percentage of reject supplementary materials for supplier evaluation.
c. Facilitate the production part in the production planning and monitoring production quantities.
d. Facilitate the admin part in making the delivery and monitoring of the distribution of finished product delivery milagros health drinks.

2. CONTENT OF RESEARCH

2.1 Theoretical basis

The theoretical basis of the thesis describes the process of system analysis as well as support the development process of supply chain systems Milagros health drink products in PT. Milagros Putra Mandiri approach supply chain management methods.

2.1.1 Information Systems

The information system is defined by Robert A. Laitch and K.Roscoe Bavis as follows: "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 reports required.

In general, the information system defined components that work together to collect, process, store and distribute infromasi to the decision making process, although in theory, the implementation of an information system does not have to use a computer in their activities. But in practice it is unlikely that very complex information system that can work well without the computer. Information System is a generating system information. Owned by the integration between subsystems, the information system will be able to provide quality information, precise, fast and accurately in accordance with the management who need it.

2.1.2 *Supply Chain*

Supply Chain is a system of organization in the activities of the distribution of goods (flow of goods) to customers. Supply Chain is a network of organizations that are interconnected and have the same goal in organizing the distribution of goods well.

Supply Chain is a concept of looking at the issue of the distribution of goods and the solution not only as an internal problem of each company, but are seen as a wider problem since the raw material (raw material) to finished goods (finished product) used consumer, is a unity the chain of distribution of goods.

Supply Chain is a set of activities of the companies involved in the production process and the transformation and distribution of goods, ranging from the earliest raw material to finished product to the consumer.

Supply Chain is a business process and information to provide products or services from the supplier through the production and distribution of goods to consumers. This chain is a network of companies that are interconnected in the form of a partnership and have the same goal and share the risks..

2.1.3 *Supply Chain Management (SCM)*

Supply Chain Management is the integration of resources competent business both inside and outside the company to gain a competitive supply system and focus on synchronizing the flow of products and information to create customer value (custemer

value) high. Sources include business integrated suppliers (suppliers), manufacturers, warehouses, transporters, distributors, retailers and consumers who work efficiently so that the products produced and distributed meet the right quantity, quality, time and location.

Supply Chain Management is the development of logistics management. Both conducting the flow of goods, including purchasing, inventory control, transportation, storage and distribution. Limited logistical management activities in one company, while supply chain management includes inter-company ranging from raw materials to finished materials which digunakaan by consumers.

There are three kinds of things that have to be managed in the supply chain: first, the flow of goods from upstream to downstream, for example, raw materials delivered from the supplier to the factory, after production is completed shipped to distributors, retailers, and then to the end user.

Supply Chain Management is a concept or mechanism to increase the productivity of a company incorporated in the supply chain by optimizing quality and time.

2.1.4 *Push* dan *Pull Supply Chain*

Pull supply chain is the production strategy of "make-to-order" the main benefit is to avoid waste inventory or a corporate strategy mainly manufacturing companies where new production is done always after the market demand and actually performed at the request of customers.

Push Supply Chain is a production strategy Make-to-Stock. This strategy is the opposite of Pull strategy where in the appeal pull, push the strategy is more popular due to its production system based forecasting and produce output in a large number of which will go into inventory prior to distribution to the customer.

This strategy has a focus on efficiency and standardization activities. Push strategy can be connoted with lean supply. Increasingly, companies have little variation, the products that fit this strategy. However, for products with market conditions change, the use of the push system will bring some disadvantages, such as:

1. Inability to meet the demands of a changing market.
2. The inventory buildup that will bring a lot of waste and need a lot of storage space.
3. Batch great production.
4. The risk of major product obsolete.

2.1.5 Forcase Methode *Single Eksponensial Smoothing*

Single Exponential Smoothing method is a method of forecasting the movement of average weight. Forecasting involves few records that preserve data earlier times and easy to use it appropriately. This method is used in the condition where the weight of the data in the period that differs from the data in the previous period and form the exponential function. This method reduces the problem of irregularities lot of data because no longer need to store historical data. The influence of the size of α in opposite directions with influences include the number of observations. This method always follow every trend in the data is actually because he can do no more than regulate the upcoming forecast by a percentage of the last error. A determine the optimal approach requires several attempts. α is the smoothing constant or weights that are used to smooth the difference in sales from period to period. Can also be written mathematically as follows:

$Ft = Ft\text{-}1 + \alpha(At\text{-}1 - Ft\text{-}1)$ (1)

Where :

Ft = new forcase

Ft-1 = old forcase

α = smoothing value ($0 \leq \alpha \leq 1$)

At-1 = The actual demand for the previous period

2.1.6 *Mean Absolute Deviatioan (MAD)*

Mean Absolute Deviation (MAD) measure 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.

Mean Absolute Deviation (MAD) is the average deviation absolute. This value is calculated by taking the sum of absolute values of individual forecasting error (deviation) and dividing by the number of data period (n) can be seen in equation 2

$$MAD = \frac{\sum(Absolut\ dari\ Forecast\ Error)}{n} \quad (2)$$

2.1.7 *Mean Absolute Percentage Error*

MAPE is a measure of the relative error. MAPE is usually more significant than MAD as stated percentage error MAPE forecasting results against the actual demand for a certain period that will provide information on the percentage of errors is too high or too low. Mathematically, MAPE can be seen in Equation 3

$$MAPE = \frac{100}{n} \sum |A_t \frac{F_t}{A}| \quad (3)$$

2.1.8 Procurement

PSecurity or safety stock inventory Procurement is the process of obtaining goods or services from parties outside the organization. to meet the needs of companies, procurement is a profit center, because it is directly involved in the production process and operations that mennetukan production costs.

According to Arjan van Weele "Procurement is the acquisition of goods or services. It is advantageous that the goods or services that are appropriate and that they are purchased at the best cost to meet the needs of buyers in terms of quality and quantity, time and location. "(Weele, 2010)

2.1.9 Mater Production Schedule (MPS)

According to Hamid Noori And Russell Radford (2002), master production schedule (MPS) is a production schedule that contains a list of the number of a product or set of products that will be produced, usually based weekly, even daily. Here is an example MPS table as in Table 1 Sample Table MPS

Tabel 1 Tabel MPS Sample

Item no			Description		
Lead time			Safety stock		
On hand			Dtf		
			Ptf		
Priode	Past due	1	2	3	4
Forcase					
Actual order					
PAB					
ATP					
MS					

2.1.10 Supply

According to Yamit, (2002), supplies the company's assets that have an important role in business operations, the company needs to make inventory management a proactive, which means that the company must be able to anticipate the circumstances and challenges that exist in inventory management to achieve the ultimate goal in inventory management, ie for minimizing the total cost to be incurred by the company for handling supplies.

In principle, inventories facilitate or expedite the course of the company's operations both in the factory or plantation should be done in succession to produce the goods. Inventory or inventory is a very important asset, both in number and their role in the company's activities. Inventory is also one of the elements that are most active in the company's operations are continuously acquired or produced and sold. Supplies are becoming more important and need to be considered because it has a higher value compared with other treasures.

2.1.11 Reorder Point (ROP)

Reorder point is the reorder point to do a company, in connection with the lead time (waiting time of delivery). In implementing the repurchase of the relevant management course will take into consideration the length of the waiting time required in the purchase of raw material. Thus, the repurchase implemented this will bring raw materials into the warehouse in a timely manner, so there will be a shortage of raw materials due to delays in the arrival of raw materials.

The equation used to calculate ROP Reorder points are as follows:

ROP = d x l (4)

Where :

d= consumption needs per day

l = lead time

2.2. Problem Analysis

Problem analysis is an assumption of the problems will be described in the procedures of data processing in program development with Information Systems Approach Supply Chain Management at PT. Milagros Putra Mandiri. Assumptions analysis of the problems of the current system at this time is:

a. Part PPIC not have a method for planning the purchase of supplementary materials and monitoring of complementary materials.
b. Part PPIC not have a factory reject calculation of complementary materials for supplier evaluation.Bagian produksi mengalami kesulitan dalam melakukan monitoring produksi dan perencanaan produksi.
c. Part of production difficulties in monitoring production and production planning.
d. Admin section (delivery) difficulties in determining the change in the delivery schedule and incomplete shipment data and the lack of monitoring delivery.

2.3 *Supply Chain Management (SCM) Stage* in PT. Milagros Putra Mandiri

Based on the analysis of business rules and systems that run the company, the supply chain stages in the company as shown in Figure 1 Stages Supply Chain in PT.Milagros Putra Mandiri.

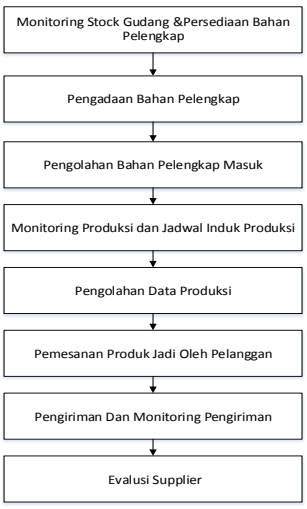


Figure 1 Supply Chain Management (SCM) Stage in PT. Milagros Putra Mandiri

1. Warehouse & Inventory Monitoring Stock Supplementary Material

Monitoring warehouse stock is overseeing the stock quantity of complementary materials in the warehouse, the percentage of acceptance of complementary materials from suppliers and supply of supplementary materials if it reaches a minimal amount of complementary materials, a minimal amount of supplementary materials shall be calculated using the formula ROP. If the supplementary material has reached a minimum point it must be immediately dialakukan procurement of complementary materials.

2. Supplementary Material Procurement

Supplementary material procurement is the purchase of supplementary materials to suppliers and a number of complementary materials to be purchased is calculated using the forecasting period sebelummnya order and composition of the complementary materials.

3. Supplementary Material Processing

The processing of complementary materials entrance is recording complementary materials sent by the supplier and performed by the warehouse.

4. Monitoring of Production And Master Production Schedule

Monitoring of production is the stage of monitoring the production of beverage products milagros and Master production schedule is the schedule as a reference for production part in determining the amount of production, production schedules will use the data and sales forecasting the next period of booking data distributors.

5. Processing of production data

Monitoring of production is the stage of monitoring the production of beverage products milagros and Master production schedule is the schedule as a reference for production part in determining the amount of production, production schedules will use the data and sales forecasting the next period of booking data distributors.

6. Booking Finished Product by The Customer

Booking a finished product by the customer is ordering process undertaken customers and distributors to PT.Milagros Putra Mandiri.

7. Delivery and Monitoring

Monitoring is monitoring the delivery of finished products ordered by customers and distributors.

8. **Supplier Evaluation Stage**

Supplier evaluation stage is the stage of the calculation of the percentage of reject supplementary material suppliers on a monthly basis. The percentage breakdown complementary materials can be used to consider the continuation of cooperation with suppliers.

2.4 Analysis of Database

Analysis of the data on the basis infornasi system will be built using the 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. The diagram is illustrated in Figure 2 ERD Supply Chain Information Systems.

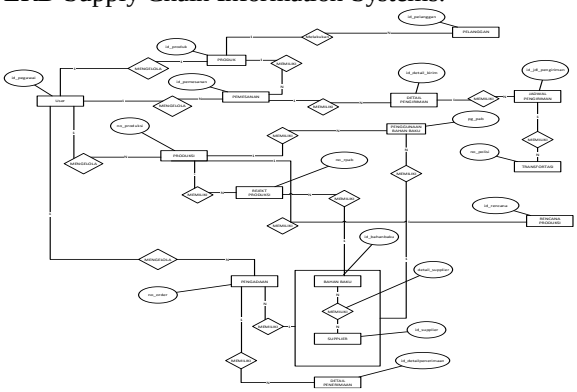


Figure 2 ERD Suplly Chain Mangement Information System

2.5 Context Diagram

Context Diagram is a global model to explain how the data is used and transformed to process or describe the flow of data into and out of the system. Context diagram on this system can be seen in Figure 3 Diagram Context Information Systems Supply Chain.

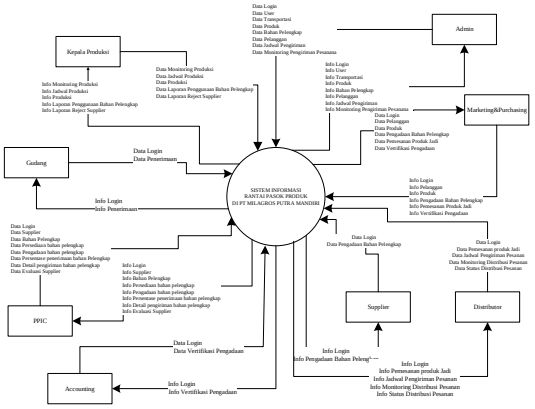


Figure 3 Context Diagram Supply Chain Mangement Information System

2.6 *Data Flow Diagram (DFD)*

The data flow diagram shows how the flow of data and outlines the processes that occur in the system to process more detail. processes that occur in the system to process more detail. In the context diagram of information systems such as figure 4 DFD Level 1 Supply Chain Information Systems PT. Milagros can be broken down into several DFD.

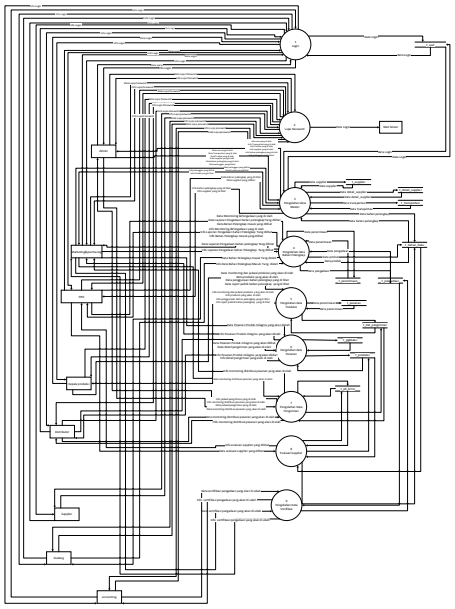


Figure 4 DFD Level 1 Supply Chain Management Information System in PT Milagros

2.7 Relationship Table

Describing the relationship table connectedness tables in the system in detail or clear, then use table relationships. Table relationships are described in Figure 5 Table Relationships Supply Chain Information Systems Milagros.

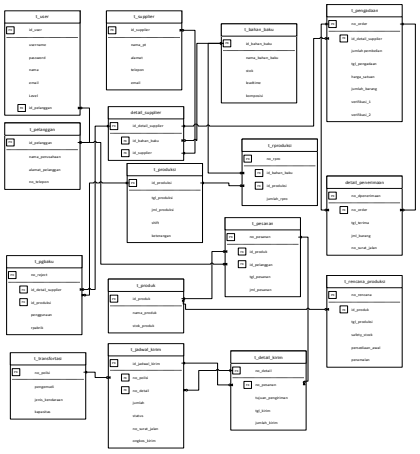


Figure 5 Relationship of Table Supply Chain Mangement Information System PT Milagros

2.8 Design Interface

Interface design created to describe the look of the program that will be used by the user to interact with the system are made. The design is based on the user interface inputs and outputs to be generated when the application is implemented. Here is a sample login interface design as the login interface design gamabr 6

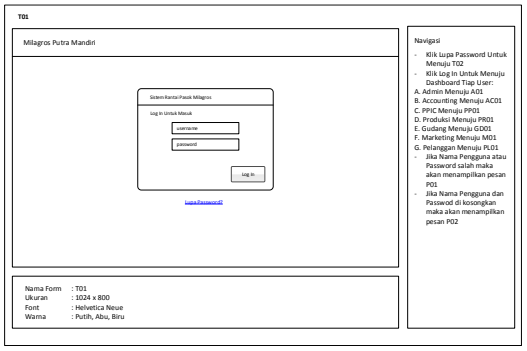


Figure 6 Design Interface Login

2.9 Structure Menu Design

The design of the menu structure is designed to provide the functions that will be used in the information system to be built. A large number of the menu structure to be designed in accordance with the relevant number of users or users who have access rights.

Information systems are built users who have access rights there are 8 users among other structures admin menu, the menu structure of marketing and purchasing, menu structure part of PPIC, the menu structure the accounting, the menu structure of the warehouse, the menu structure part of the distributor, the menu structure head of production and the menu structure supplier ,

2.9 Semantic Network

Semantic network design is a representation of the design interface that shows where each interface is connected. Here is an example design of a semantic network admin is network design that connects menus that can be accessed by admin with error messages that occur in every process as shown in Figure 7 Semantic Network Admin

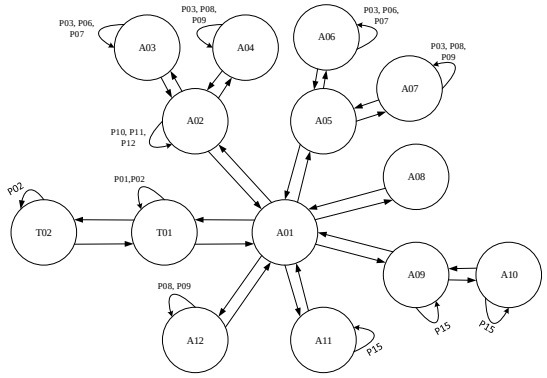


Figure 7 Semantic Network of Admin

2.10 System Testing

Testing of the system is the cornerstone that aims to find errors or deficiencies in the information system under test. Testing intended to determine the system has met the information that is made according to the performance design objectives.

Tests are used to test the new system is a black box testing methods. Black box testing focuses on testing the functional requirements of information systems.

Plan testing to be performed is to test the system built by Black Box and Beta. Testing of the construction supply chain system in PT. Milagros Putra Mandiri using test data based on data provided from some of the data that has been given.

1. Black Box Testing

Black box testing focuses on functional requirements of software that is built. Testing is done by testing each process for possible mistakes.

2. Beta Testing

Beta testing is testing that is directly within the truth. Users undertake an assessment of the software using interviews. From the interviews, it can be deduced whether the software is built in accordance with the purpose or not.

Interviews conducted for the users of the system comprising, part of PPIC, production, warehouse, parts distributors, the marketing and purchasing, accounting and supplier parts. This research was conducted at PT Putra Milagros independently in order to determine the extent to which the system is built to be a solution and settlement of issues that have been described previously.

3. Closing

This chapter will explain about the conclusions which contains the results obtained after the analysis, design, and implementation of the software design was built and has been developed as well as suggestions that will provide important records and possible improvements that need to be done for the development of the next software ,

3.1 Conclusion

Based on the results obtained in this thesis, it can be concluded as follows:Sistem informasi yang dibangun ini dapat memudahkan bagian pengadaan dalam menentukan jumlah pembelian bahan pelengkap ke supplier.

1. The information system built to facilitate procurement in determining the amount of the purchase of supplementary materials to the supplier.
2. The information system built to facilitate procurement in conducting complementary materials reject percentage for supplier evaluation.
3. The information system built to facilitate the production part in monitoring the production
4. The information system built facilitate the delivery part in making the delivery and monitoring delivery schedules.

3.2 Suggestion

Suggestions for the development of information systems are some suggestions that can be done, among others:

1. Make it looks more attractive because the display used today is still modest.
2. Future studies are expected system built to manage and breakdown in calculating the cost to purchase supplementary materials to the Supplier.
3. Further research is expected to System should be connected directly to the supplier, so that when the availability of complementary materials ranging consumables supplier can make deliveries of complementary materials.

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