DISTRIBUTION INFORMATION SYSTEM OF MOTORIZED VECHICLE PARTS IN CV. HARAPAN BARU WITH SUPPLY CHAIN MANAGEMENT APPROACH METHOD (SCM)

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ABSTRACT

CV.Harapan Baru is a company engaged in the distribution of automobile parts. The procurement planning process in CV.Harapan Baru still uses intuition and does not predict the exact number, so that when ordering orders from customers increases can lead to a shortage of product stock in the warehouse. Uncertainty of product orders from customers resulted in the head of the warehouse difficulty in estimating the number of products to be ordered to suppliers. Distribution process is done in different time and amount in each period, so head of marketing department difficult to determine the nearest route from customer, this matter can cause distribution process hampered. Based on the problems that have been described, then the proposed solution is to build Distribution Information System Motor Vehicle Spares in CV.Harapan Baru Using Supply Chain Management Approach. The goal is to facilitate the head of the warehouse in planning the procurement of products to suppliers, as well as facilitate the head of marketing in determining the nearest route from customers during the distribution process. Forecasting method used in this research is Single Exponential Smoothing with Mean Square Error, inventory control method of product in warehouse using Safety Stock, method of determination of nearest route using Savings Matrix method. Based on the test results, it can be concluded that this system has helped the head of the warehouse in planning the procurement of products to suppliers, but in determining the closest route in the system has not worked well.

Key words : *Supply Chain Management*, *single exponential smoothing*, *Safety Stock*, *Savings Matrix*, *Information System*..

1. INTRODUCTION

CV.Harapan Baru is a company engaged in the distribution of four-wheel vehicle parts and workshop tools. Products distributed by CV.Harapan Baru are spare parts components such as fog lamp, oil filter, and timing belt. New CV.Harapan ordering products from several suppliers, then redistribute it back to customers who have made reservations.

CV.Harapan Baru has a storage warehouse to store products ordered from suppliers. CV.Harapan just work with several suppliers such as PT Multi Makmur Indah Industri, PT Agung Karya Sejahtera and others. The process of ordering the product to the supplier is done by the Head of Warehouse by phone, for the payment process from CV.Harapan Baru to the supplier is done when the product has been received and done by cash or transfer according to the policy of each supplier.

Based on the observation result in CV.Harapan Baru, from the sales recapitulation data for October 2016 - March 2017, the sales data indicate the fluctuation data is not necessarily from month to month, this is caused by uncertainty of product order from customer, sometimes ordering from high customer and sometimes decrease . This results in problems when customer order requests are high, resulting in a shortage of products in warehouses used to meet customer demand, as the procurement process still uses intuition or unpredicted numbers. Likewise, when customer ordering demand decreases, there is a buildup of products in the warehouse. Disadvantages and advantages of existing products in the warehouse impacted to the ordering process back to the supplier that is difficulty in determining the amount to be ordered for customer demand is met.

Based on the interview with Mr. Agung Susanto as Head of Marketing at CV.Harapan Baru, stated that the product is ordered by the customer in the fruit unit, the customer can place the order by phone or when the marketing department comes to every customer. Payment process from customer to CV.Harapan Baru done by cash or credit with maturity condition. Process returns from customers to CV.Harapan Baru is done when the product packaging is damaged or not in accordance with the amount ordered by the customer. The process of distributing products to customers is done after an agreement between the customer and the company is the Head of Marketing Division, where the distribution is done in different time and quantity in each period, so the head of the marketing department has difficulty in determining the type of vehicle that is sometimes unavailable and the nearest location

from the customer, consequently the distribution process can be hampered.

Based on the above problems can be concluded that if there is a problem in product inventory can cause the distribution process is hampered and customer demand is not met. These problems can be solved with supply chain management system, supply chain management itself is a complete chain processing cycle starting from the suppliers, operational activities in the company, continued to the distribution until the end user. The goal is that the management of the flow of products and the flow of information in the company, ranging from customer order acceptance, product procurement, product acceptance to product delivery to customers will create synchronization and consistency.

Based on the description of existing problems in CV.Harapan Baru, it is necessary a Distribution Information System of Motor Vehicle Distribution by the method of Supply Chain Management (SCM) approach to manage information from upstream to downstream.

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].

2.2.1 Component Supply Chain Management

Supply Chain Management has three main components that support the running of a business process as follows [2]:

1. Upstream Supply Chain

The entire activity of the manufacturing company by its distribution or distributor relationship can be extended to several levels. The main activity in Upstream Supply Chain is the procurement of goods.

2. Internal Supply Chain

Internal Supply Chain is the process of delivering goods to the warehouse. The main activities in Internal Supply Chain are production management, manufacturing, and inventory control.

3. Downstream Supply Chain

Activities within the downstream supply chain involve the delivery process to the end consumer. The main activities in the downstream supply chain are the distribution of goods, warehouses, transportation.

2.2.2 Types of Supply Chain Management

The following are common types of supply chain management [2]:

1. Integrated make-to-stock

This supply chain model tracks customer demand for a time, so the production process can efficiently procure inventory. This can be overcome by using an integrated information system. By using the integrated information system, the company can know the information about customer demand in a timely manner, so that information can be used to develop and modify the planning and production schedule.

2. Continuous Replesnishment

Supply chain model is, carried out procurement of goods on a continuous basis. This type is very suitable for corporate environments whose customer demand patterns are stable.

3. Build-to-order

Supply chain model, the assembly of finished goods is done when the customer has made a request or order of the goods.

4. Channel Assembly

Channel assembly is a modification of the build-to-order model. Supply chain model, the assembly process of goods occurs when the movement of goods on the distribution channel.

2.3 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."

When viewed in terms of time, the purpose of forecasting can be seen as follows [4]:

1. *Short Term*

Determine the quantity and time of the item to be produced. Usually it is daily or weekly and is determined by Low Management.

2. *Small Term*

Determine the quantity and time of production capacity. Usually monthly or quarterly and determined by Middle Management.

3. Long Term

Planning the quantity and timing of production facilities. It is usually annual 5 years, 10 years, or 20 years and is determined by Top Management.

The classification of forecasting is the identity of the forecast itself. Forecasting has two classifications of forecasting among them as follows [4]:

1. Forecasting based on the technique of completion, among others:
   a. Teknik Peramalan Secara Kualitatif
      Forecasting involves personal opinion, expert opinion, Delphi method of market research and others. Aims to combine all the information obtained logically, unbased & systematic that is linked to the decision maker's interest factor.
   b. Peramalan Secara Kuantitatif
      Quantitative forecasting is used when sufficient past data is available. Some commonly used quantitative techniques such as Time Series Model and Causal Model.
2. Forecasting Based on Time Horizon Grouping
   a. Long Term Forecasting
      Forecasting which forecasting period is more than 24 months, for example forecasting that is needed in relation to production budget.
   b. Medium-term forecasting
      Forecasting that forecasting period between 3-24 months, for example forecasting for sales planning, production planning and budget.
   c. Short Term Forecasting
      Forecasting that forecasting period is less than 3 months, for example forecasting in relation to material purchase planning, job scheduling and assignment.

2.3.1 *Single Exponential Smoothing*

The Single Exponential Smoothing method is used in conditions where the data weights in a period differ from the data in the previous period and form the Exponential function. This method greatly reduces the problem of data irregularities because no longer need to store historical data. The influence of the magnitude of α is in opposite direction with the influence of entering the number of observations. This method always follows every trend in the actual data because it can do nothing more than set up the forecast with a percentage of the last error. Determining α to approach optimally requires several experiments [4].

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

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

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

Exponential methods for N observations are as follows:

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

Suppose that the old observation Xt-N is unavailable and should be replaced with an approximation value. One possible substitute is the predicted value of the previous period Ft so that it can be calculated by (2.4) and (2.5).

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

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

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

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

Information
Ft + 1 = Forecast result for period t + 1
a = Smoothing constant
Xt = Actual demand data for period t
Ft = Forecast in period t

Exponential smoothing method data a values can be determined freely, meaning there is no certain way to get the optimal nilai value. Then the selection of values a done by trial and error. The magnitude a lies between 0 and 1.

2.3.2 *Mean Square Error* (MSE)

Mean Squared Error (MSE) is the mean of forecasting error 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 of the model used in period t
n = Many predicted data

2.4 Monitoring

Monitoring is a continuous and regular collection of information that will help answer questions about a project or activity. Monitoring helps alert when things go wrong and help keep the work on track [5].

Monitoring aims to improve the effectiveness and efficiency of a project or organization and is based on defined goals and plans. Monitoring enables us to determine whether our resources are sufficient and well used and serve as a useful basis for evaluation and knowing our capacity is feasible and sufficient.

2.5 *Safety Stock*

Booking an item until the item is coming it takes a period ranging from several hours to months. The time difference between ordering until the item comes is known as the grace period (Lead Time). Grace period is influenced by the availability of goods ordered and the distance between the buyer and the provider. Uncertain grace period resulted in the shortage of goods for example due to the use of goods larger than previous estimates, therefore required a safety provision (safety stock) [6].

If the Safety Stock is set too low, inventory will be exhausted before replacement supplies are received so that production may be disrupted or customer demand can not be met. Planning raw material inventory that has been taken into account but often the stock of raw materials is not sufficient because often jumping inventory of the company's products or goods inventory is damaged and does not meet the standards to meet consumer demand.

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

$SS = Average\ usage\ of\ previous\ period\ x\ LT$ (2.13)

Keterangan :

SS = *Safety Stock*

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

2.6 Transportation and Distribution Management

One of the most important operational decisions in distribution management is the determination of schedules and delivery routes from one location to multiple destinations. This decision is very important for the delivery of products from locations to various stores scattered in a city. To minimize the distance of delivery is done sorting delivery destination with the closest distance. There are several methods in sorting the closest distance that is [2]:

1. Metode *Nearest Insert*
   The nearest insert method uses the principle of selecting a store when it is entered into an existing route resulting in an additional minimum distance. Initially only had a trip from the warehouse to the warehouse with a zero distance. Next will be seen the distance that occurs when adding the distance of each store [2].
2. Metode *Nearest Neighboard*
   The nearest neighbor method is also quite simple; in principle we always add stores closest to the stores we visited last [2]. Nearest Neighboard is an algorithm that is easy to implement and easy to execute, but does not guarantee an optimized solution. The procedure of Nearest neighbor method is as follows [20]:
   a. Starting with the starting point (depot), go to step b.
   b. Find the closest point from the starting point, then connect the point, go to step c.
   c. Repeat procedure b until all points visited, and go to step d.
   d. Connect the first point with the last to complete the tour, the procedure is completed.

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 know what data we need, and how the data can be interconnected. ERD consists of several basic components that are as follows:

1. Entitas
   Is an individual who represents something real and can be distinguished from something else. Entity shows the individual an object, while the set of entities shows the clumps of individuals.
2. Atribut
   Describe the characteristics (property) of the entity. Determination / selection of relevant attributes for an entity is another important thing in the formation of a data model.
3. Relationships between relations (*Relationship*)
   Relationships show a relationship among a number of entities derived from different entity sets.
4. Cardinality / Degree of Relation
   The cardinality of the relation shows the maximum number of entities that can relate to the entity on another set of entities.

2.8 *Data Flow Diagram* (DFD)

Data Flow Diagram or commonly referred to as Data Flow Diagram, is a logical model of data or process created to describe where the data and where the destination data out of the system, from where data is stored, what processes produce the data and the interaction between stored data and processes imposed on the data [12].

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

2.9 Problem analysis

Based on the research conducted in CV.Harapan Baru there are some internal corporate issues and related issues between distributor CV.Harapan Baru with customers. Some of the problems that arise in the current system are as follows:

1. Uncertainty of the number of product orders from customers, resulting in the head of the warehouse difficulty in determining the number of products ordered to suppliers to meet customer demand.
2. Head of the marketing department difficulty in determining the type of vehicle and the closest distance from the customer, because the

distribution process is done in different times and numbers in each period, so that it can cause the distribution process is hampered.

2.9 Supply Chain Management Analysis

Supply Chain Management (SCM) used by CV.Harapan Baru is 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 makes a reservation to the supplier or can be called make to stock to meet customer needs without knowing how much customer needs.

There are two streams that occur in CV.Harapan Baru is the flow of information and financial flows. In the flow of information there is a flow of reservations from CV.Harapan Baru to suppliers for ordering product procurement and flow of product order information from customers to CV.Harapan Baru. In addition, in the flow of information there is also a flow of delivery or distribution of products from CV.Harapan Baru to customers and the flow of delivery or distribution of products from suppliers to CV.Harapan Baru. In this scope, CV.Harapan Baru performs monitoring of product inventory to know the safe limit of product quantity in warehouse, inventory control so that there is no shortage or void of stock, monitoring order status so Head of Operation can know order status accepted or rejected by Head of Marketing, and monitoring the distribution status for the Head of Operations to know whether the product is still in delivery or has been received by customers. Stages of monitoring the availability of warehoused products that use safety stock method to determine the safe limit that must be available in the warehouse. The flow of procurement information is using the method of forecasting in order to estimate the number of products to be ordered not too slip and product demand from customers are met.

Based on the description of the flow - flow and system owned in CV.Harapan Baru, it can be proposed the use of supply chain methods in the system will be made. In the supply chain management method has a mapping and framework that is a builder component on the system to be created. The mapping of Supply Chain Management in CV.Harapan Baru can be seen in Figure 1.

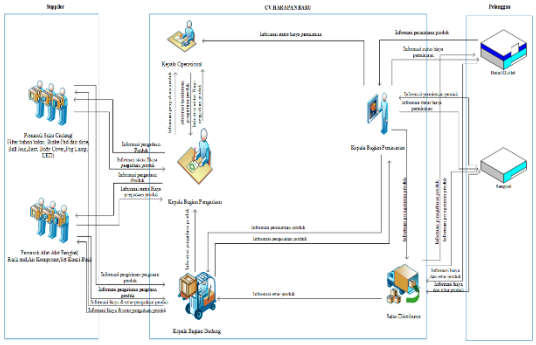


Figure 1. Mapping of Supply Chain Management at CV.Harapan Baru

The information system strategy approach Supply Chain Management to be built in CV.Harapan Baru consists of several stages that can be seen in Figure 2

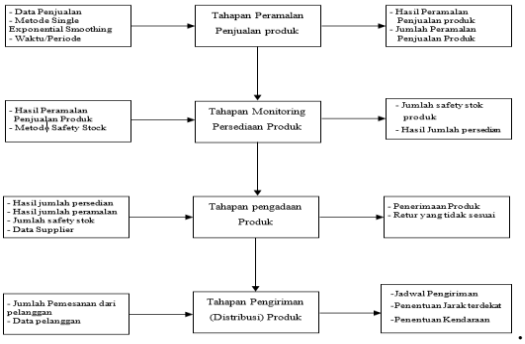


Figure 2. Stages of Supply Chain Management at CV.Harapan Baru

Based on Figure 2 regarding supply chain management stages in CV.Harapan Baru, it can be done analysis of each stages of Supply Chain Management at CV.Harapan Baru company that is as follows:

1. Stages of Product Sales Forecasting
   The Company manages data on product sales ordered by the customer and the company forecasts for the procurement of products in the next period from the previous product sales data which requires product sales data, the forecasting method to be used is Single Exponential Smoothing.
2. Stages of monitoring of product inventory
   After performing the forecasting stage, the company monitors the inventory of the warehouse product and determines how safe the product must be available in the warehouse using Safety Stock method.
3. Stages of Product Procurement
   After the process of forecasting and monitoring the product then the company conducts the procurement process to the supplier, the company first see the safe limit of product inventory in the warehouse and make procurement of products with the procurement amount of forecasting calculations minus the remaining stock of products in the warehouse.
4. Stages of delivery (distribution) to customers

The company determines the type of vehicle as well as the officer who sends it and adjusts the order from the customer to be shipped with the closest distance, until the customer finally receives the product according to the order. The method of determining the nearest route using Nearest Neighbor method.

2.9.1 Stages of Product Sales Forecasting

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

1. Preparing sales data from previous period to be processed as input data.
2. Calculate the predicted value of sales data by using single exponential smoothing method or technique.
3. Find the MSE value to find out the smallest result.
4. The smallest MSE value that will be used as the result of forecasting for the next period.

Product Forecasting Fog Lamp AVZ / VLS uses sales data from October 2016 until March 2017. Sales Recapitulation Data can be seen in Table 1.

Table 1. Recapitulation of Fog Lamp Product Sales AVZ / VLS

No	Bulan	Banyak Penjualan
1	Oktober 2016	2300
2	November 2016	2240
3	Desember 2016	2420
4	Januari 2017	1800
5	Februari 2017	1840
6	Maret 2017	2220

The first thing to do is to calculate the single exponential smoothing forecasting method of determining the constant value of alpha = 0.1 and forecasting the order for the 2nd period. The variable values taken from the actual product sales data in Table 3.2, then distributed these values to the formula (2.6) it will get the following calculation:

Forecasting results for $\alpha = 0.1$:

Based on product sales data in Table 3.2, compute sales forecast for November 2016. It is known that:

Product sales in October (Xt) = 2300 and October forecasting result (Ft) = 2300, so the calculation result is as follows:

$F_{november}$ = (0.1 * 2300) + (1 – 0.1) * 2300
= (230) + (2070)
= 2300 pcs

For the calculation of December, it is known that:

Product sales in november (Xt) = 2240 and forecasting results for november (Ft) = 2300, So the results obtained calculation as follows:

$F_{desember}$ = (0.1 * 2240) + (1 – 0.1) * 2300
= (224) + (2070)
= 2294 pcs

The calculations for January and subsequent months are conducted in the same manner as in the forecasting calculation in November and December.

Example of forecasting calculation for $\alpha = 0.2$:

Product sales in October (Xt) = 2300 and October forecasting results (Ft) = 2300, So the results obtained calculation as follows:

$F_{november}$ = (0.2 * 2300) + (1 – 0.2) * 2300
= (460) + (1840)
= 2300 pcs

For the calculation of December, it is known that:

Product sales in november (Xt) = 2240 and forecasting results in november (Ft) = 2300, So the results obtained calculation as follows:

$F_{desember}$ = (0.2 * 2240)+ (1 – 0.2) * 2300
= (448) + (1840)
= 2288 pcs

Calculations for alpha = 0.2 from January and next month are done in the same way as forecasting for November and December. Do the calculations in the same way as forecasting for november and december up to alpha = 0.9.

After calculating product forecasting, then calculation of error value in forecasting. Calculation of error value using MSE (Mean Squared Error) with the formula (2.11). The result of MSE calculation for $\alpha = 0.1$ is as follows:

$$= \frac{(0 + 3600 + 15876 + 256643.6 + 173006.1 + 31.96772)}{6}$$

$$= \frac{449157.61}{6}$$

$$= 74859.6$$

For calculation errors alpha = 0.2 and up to 0.9 is done in the same way,

2.9.2 Stages of Product Inventory Monitoring

After doing the forecasting, CV Harapan Baru conduct inventory monitoring which aims to monitor and control the existing inventory at CV Harapan Baru. Monitoring function to avoid the occurrence of vacancies or shortage of existing product stock in CV.Harapan Baru. This inventory control monitoring requires an indicator to determine how secure the product must be available in CV Harapan Baru by using safety stock.

Implementation of Safety Stock method is the process of calculating the safe limits of inventory that must be available at CV Harapan Baru for the period of the selenjutnya and the point of re-ordering. Safety stock calculation is done daily so that company can monitor and control inventory in warehouse. The calculation of safety stock can be seen in equation (2.13) which has been described in chapter 2. Example of calculation using product sales data of Fog Lamp, Timming Belt, and Oil Filter, from October 2016 until March 2017.

1. Safety Stock Calculation for Fog Lamp Products AVZ / VLS
   Here's an example calculation with Safety Stock method:
   Noted that:

Total sales in March = 2220
The number of days in March = 31 day
Lead Time on procurement to supplier = 3 day
Settlement:

$$safety\ stock = \frac{(2220)}{31} x3 = 214.83$$
$$= 215\ pcs$$

2. Pe Safety Stock calculation for ESC / FTR Timing Belt Products
   Here's an example calculation with Safety Stock method:

   Noted that:
   Total sales in March = 1900
   The number of days in March = 31 day
   Lead Time on procurement to supplier = 3 day
   Settlement:

$$safety\ stock = \frac{(1900)}{31} x3 = 183.87$$
$$= 184\ pcs$$

3. Safety Stock calculation for KJG / INV Oil Filter Product
   Here's an example calculation with Safety Stock method:

   Noted that:
   Total sales in March = 1640
   Number of days in March = 31 days
   Lead Time on procurement to supplier = 3 days
   Settlement:

$$safety\ stock = \frac{(1640)}{31} x3 = 158.70$$
$$= 159\ pcs$$

Based on the calculation of safety stock above, then for March 2017 CV.Harapan Baru must provide Safety stock Fog Lamp AVZ / VLS as much as 215 pcs, 181 pcs Timming Belt ESC / FTR, and Oil Filter KJG / INV as much as 159 pcs, the amount of product inventory is less than the amount of safety stock then the system will notify that there is a product that has unsafe inventory status, the product which has unsafe inventory status must be made at the same time, for the status of product having secure inventory status does not need to be procured at that time also, but it is better to do procurement directly if the inventory amount is less than the forecast result.

Monitoring of product inventory will be presented in tabular form. Examples of presentation of product inventory monitoring can be seen in table 2.

Table 2. Monitoring of Product Inventory

Product	Stock	Safety Stock	
Fog Lamp AVZ/VLS	189 pcs	215 pcs	Persediaan Tidak Aman
Timming Belt ESC/FTR	328 pcs	184 pcs	Persediaan Aman
Oil Filter KJG/INV	564 pcs	159 pcs	Persediaan Aman

2.9.3 Stages of Product Procurement

In the Procurement Stages of this product the Head of Procurement Department makes an order based on forecasting and monitoring results that have been done.

Based on the monitoring of product supply in table 2. If the amount of product supply has unsafe status, then the company makes the procurement of products with the amount as follows:

Procurement amount = (forecasting result of sale + Safety Stock) - remaining stock

So the procurement amount for Fog Lamp AVZ / VLS product is as follows:

Number of Procurement Fog Lamp AVZ / VLS
= (2113 + 215) - 189
= 2139 pcs

Meanwhile, if the amount of product supply has a secure status, then the company makes the procurement of products with the amount as follows:
Procurement amount = Forecasting results
So the procurement amount for product of Timming Belt ESC / FTR and Oil Filter KJG / INV are as follows:
Number of Procurement ESC / FTR = 2161 Timming Belt
Total Procurement of Oil Filter KJG / INV = 1664

2.9.4 Stages of Product Distribution

In the supply chain there are distribution / delivery activities. Scope of activities include monitoring of delivery status, delivery scheduling, vehicle capacity to be used in distribution, and determination of the closest customer route during distribution. Distribution monitoring is done so that the product reaches the customer at the right time and place and knows the delivery status. Product distribution schedule to customer is done on the agreed schedule between CV Harapan Baru with customer that is one day after customer order.

The first stage in the distribution of products that know the ordering of products made by customers. The second stage is to know the packaging or packaging of product order that will be distributed to the customer. The third stage is the company determines the vehicle for distribution.

After determining the vehicle for distribution, then the company determines the company's distance with the customer. To know the distance CV.Harapan Baru with customers can use GPS from google maps to know the fastest route for delivery. Here the distance CV.Harapan Baru with customers can be seen in Table 3.

Tabel 3. Jarak CV.Harapan Baru dengan Pelanggan Menggunakan Goggle Maps

Alamat CV.Harapan Baru	Customer's name	Customer Address	Distance
Jl. Jati No 32 Paledang lengkong Bandung	CKR Motor	Jl.PLN Dalam No 43 Ciseureuh Bandung Jawa Barat	7.2 km
	Bali Jaya Motor	Jl. Margaluyu no 38 Tasik. Ciamis Jawa Barat	128 km

Alamat CV.Harapan Baru	Customer's name	Customer Address	Distance
	Iskandar Motor	Jl. Raya Caracas no 69 Kuningan Jawa Barat	230 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 delivery route using the Nearest Neighbor method, here is the determination of the delivery:

a. Warehouse Distance - CKR Motor = 7.2 Km
b. Distance Warehouse - Bali Jaya Motor = 128 Km
c. Distance Warehouse - Iskandar Motor = 230 Km

Because the minimum distance produced is 7.2 km then that will be visited first is CKR Motor. Then in the same way the second visit is determined as follows:

a. Distance Warehouse - CKR Motor - Bali Jaya Motor = 7.2 Km + 108 Km = 115.2 Km
b. Distance Warehouse - CKR Motor - Iskandar Motor = 7.2 Km + 151 Km = 158.2 Km

The minimum distance is 115.2 Km, so the delivery route is Warehouse - CKR Motor - Bali Jaya Motor - Iskandar Motor with total distance that is 249.3 Km.

2.10 *Entity Relationship Diagram* (ERD)

Database Analysis is obtained from the data that will be used in the development process of distribution information system in CV Harapan Baru, then the data has been obtained built a database design by using Entity Relational Diagram (ERD) tools used to explain the flow of data processed so that it can produce the required information. The relationship between these entities can be seen in Figure 3.

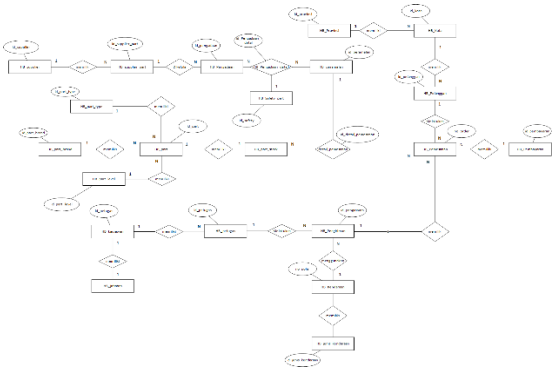


Figure 3. Entity Relationship Diagram Distribution Information System of Motor Vehicle Parts in CV Harapan Baru With Approach Method of Supply Chain Management (SCM)

2.11 Context Diagram

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

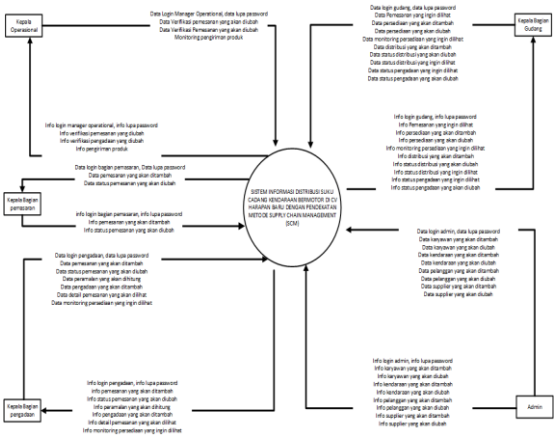


Figure 4. Context Diagram of Distribution Information System of Motor Vehicle Parts in CV Harapan Baru With Approach Method of Supply Chain Management

2.12 Table Relationships

Table Relationships aims to Describe the linkage of tables in the system in detail or clear, then use table relations. Table relation is described in figure 5.

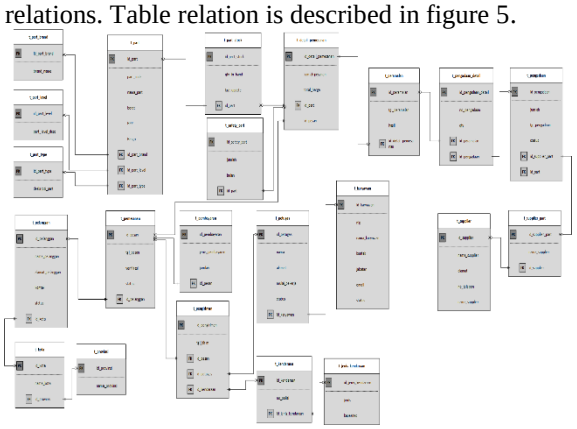


Figure 5. Table Relationships

2.13 System Testing

Testing Phase System is the stage used to test the system built whether it is appropriate. Testing information system Distribution of Motor Vehicle Parts in CV.Harapan Baru using Supply Chain Management Method will be tested with two stages of testing, namely testing alpha and beta.

2.13.1 The conclusion of alpha testing

Based on the test results with the test sample case that has been done to give the conclusion that the process is correct. Filtering process errors in the form of landing page view messages is quite maximal. Functionally the system is able to produce the expected output.

2.13.2 Conclusion beta testing

After an interview in CV.Harapan Baru can be concluded that this information system has helped the CV.Harapan Baru in managing product planning to suppliers, managing ordering data, forecasting, monitor product inventory, and manage delivery fairly well, only when determination the closest distance to the customer is still not functioning

properly, in terms of use of the language used is good, easy to use and the interface is good enough.

3. CLOSING

3.1 Conclusion

The conclusions that can be drawn from all the processes that have been done in building this information system are as follows:

1. Supply chain management information system can facilitate the Head of Warehouse in terms of planning the procurement of products to suppliers.
2. Supply chain management information system has not run well when determining the type of vehicle and the closest route when distributing.

3.2 Suggestion

Informmation system built with supply chain management approach in CV.Harapan Baru can still be developed furthermore with higher system specification and better performance.

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

1. The interface display on the next research is expected to be more interesting for system users.
2. Further research is expected that the built system can determine the type of vehicle and the closest route is better when distributing.

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