# DISTRIBUTION INFORMATION SYSTEM WITH SUPPLY CHAIN APPROACH IN CV. RIMBO TANI

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## ABSTRACT

CV. Rimbo Tani is a company engaged in the distribution of agricultural products, which is located in the area of Jambi city and has many customers from several areas in Jambi Province and its surrounding areas. They sell products in the form of plant seeds, herbicides and other agricultural products. Until today, every month, the company usually determines the amount of product procurement from suppliers based on intuition and estimation. As a result, when the demand from the customers is high, they usually experiencing stock shortages and even zero product in the warehouse. Eventually, this condition created several issues, starting from delayed shipments or order cancellations. The procurement process also take quite a long time, which is up to 7 days. The company also do not have a proper scheduling for distributions, poor information regarding the company vehicles' availability, and other technical difficulties such as distance, costs, and time of delivery.

Based on the problems above, one of the solutions that can be applied in CV. Rimbo Tani based on the result of this research, is to build an information distribution system by using *supply chain management* approach. The main purpose of this system is to enable the company to monitor the stock availability, and to decide the amount of product procurement in the warehouse, to avoid zero product availability. Therefore, the company would be able to fulfill orders from its customers on time, which eventually leads to costs efficiency. The method used in this research is *single exponential smoothing*, which is to estimate product procurement by using product sales database to customers. Other than that, the author also used *safety stock* method in order to calculate the safety limit for products procurement. And to determine the limit for the company to procure the product back to supplier, the author used *reorder point* method. The product delivery schedules were adjusted with the company's business regulations, and the use courier services.

**Keywords :** *Supply Chain Management, Push Supply Chain, Make to Stock, Single Exponential Smoothing, Reorder Point, Safety Stock.*.

## 1. INTRODUCTION

Increasingly high business competition and increasingly stringent companies have to compete - race to achieve success by updating the strategy and make adjustments to current conditions including in terms of technology utilization. CV. Rimbo Tani is a company engaged in the distribution of agricultural products located in the area of Jambi City and has many customers scattered in several areas in the province of Jambi and surrounding areas. Products sold by CV. Rimbo Tani in the form of plant seeds and herbicides such as seedlings Long nuts lavi, papaya california seeds, purple eggplant sprouts, and Lastop herbicide measuring 20 liters. The series of upstream work system in the company CV. Rimbo Tani with suppliers is the procurement of products from suppliers, acceptance of products from suppliers. Meanwhile, downstream activities with customers ordering or selling products and distributing products to customers.

## 2. RESEARCH CONTENTS

### 2.1 System

The system is an unity of interconnected components with clear boundaries working together to achieve a set of goals [1].

### 2.2 Information Systems

The system is an integration of elements, all of which work towards a goal. Information is one of the five main types of resources used by managers. All resources include manageable information. Information processing gets more and more important as business becomes complicated and computer capabilities grow. Thus, information systems can be defined as a set of elements that collaborate in collecting, processing, storing and disseminating information to support decision making, coordination, monitoring, analysis, and visualization within the organization. Understanding in general, the information system is a collection of components or elements that work together to achieve certain goals.

The system requires resources that will convert inputs into outputs. Information output is used by managers, non-managers, as well as people and organizations within the corporate environment.

Managers are at all organizational levels of the company and in all functional areas. Therefore to be successful, they need to understand the information. Information is data that has been processed so that it is useful for decision making. Information system is an arrangement of interrelated components that interact to support activities, information management, and information retrieval needed by a company or organization.

## 2.3 *Supply Chain Management*

Supply Chain Management (SCM) is an integrative method or approach for managing an integrated product, information, and money flow involving parties from upstream to downstream consisting of suppliers, factories, distribution networks and logistics services. An important principle in SCM is the transparency of information and collaboration both between the internal functions of the company and with the parties outside the company along Supply Chain [2].

Supply Chain Management activities include product development, material and component procurement, production planning and inventory control, production, and distribution or transportation. SCM activities can also be divided into two namely:

1. Physical activity including the procurement of raw materials / components, production, storage, transportation / distribution, and return of products.
2. Market mediation activities consisting of market research, product development, and sales services.

### 2.3.1 Srategy of *Supply Chain Management*

The Supply Chain strategy can be defined as a set of activities and strategic actions along the Supply Chain that create a reconciliation between what the end-customer needs and the resource capabilities of the Supply Chain. This strategy is very important to create market competitiveness. Closely related to the Supply Chain strategy is a strategic goal to be achieved. This strategic objective must meet customer aspirations and Supply Chain capabilities. From the market side, the strategic goal to be achieved is to provide cheap, quality, timely, and varied products. The strategic objectives can be realized if the internal Supply Chain has the ability to create efficiency, quality, speed, flexibility, and the ability to innovate [2].

### 2.3.2 Main Component of *Supply Chain Management*

In supply chain management there are three main components that support the running of a business process that is:

1. Upstream Supply Chain
   It is the overall activity of the manufacturing company by its distribution or the relationship between manufactures, the distributor relationship can be extended to several levels, all the path from the origin of the raw materials / materials. The main activity in upstream supply chain is the procurement of goods.
2. Internal Supply Chain
   It is the whole process of delivery of goods to the warehouse which will then be used to transform the business process of input raw materials from distributors into the output of the company. Main activities: prduction management, manufacturing, inventory control
3. Downstream Supply Chain
   It is an entire activity that involves sending to the end consumer. Main activities: Distribution, warehouse, transportation and sales services

### 2.3.3 *Forecasting*

The forecast theory is used for forecasting the demand that the company will use as a benchmark in the planning of production activities or the procurement of raw materials and finished products. Demand forecast is an activity to estimate the amount of demand for certain goods or services in a particular period and marketing area.

### 2.3.4 Kinds of Forecasting

There are several types of forecasting that are often used, among others, as follows:

1. Time Series Model
   Time series method is a method of forecasting quantitatively by using time as the basis for forecasting.
2. Casual Model
   Forecasting models that use cause-and-effect relationships as assumptions, namely that what happened in the past will be adventurous in the present.
3. Judgmental Model
   When the time series and casual model rests on quantitative, the judgmental includes to include quantitative / subjective factors into the forecasting method. Particularly useful when subjective factors are expected to be of great importance when the expected subjective factors become very important when an accurate quantitative data is obtained.

### 2.3.5 General Objectives of Forecasting

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

1. Short Term
   Determine the quantity and time of the item being made into production. Usually it is

daily or weekly and is determined by Low Management

2. Medium Term (Small Term)
   Determine the quantity and time of production capacity. Usually it is bulana or quarter and is determined by Middle Management
3. Long Term
   Planning the quantity and timing of production facilities. It is usually annual 5 years, 10 years, even 20 years and is determined by Top Management.

### 2.3.6 Single Exponential Smoothing

The Single Exponential Smoothing method is used to predict fluctuations in random (irregular) ways. Single Exponential Smoothing Formulas:

Ft +1 = α * Yt + (1- α * Ft – 1)

Information:

Ft: Previous period
α: Parameter (alpha)
Yt: Real data

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

### 2.3.7 Mean Square Error(*MSE*)

Mean Square Error (MSE) is another method for evaluating forecasting methods. Each error or residual squared. Then summed and added with the number of observations. This approach sets the big forecasting error because the errors are squared. The method produces a moderate error that is likely to be better for a small error, but sometimes produces a big difference.

The following are some measures used to calculate forecasting errors.

MSE = (Σ |Ft-Y|2)/n

Keterangan :

Ft = The result of forecasting period k
Y = Real data period t
n = Number of observation periods
Ft-Y = Forecasting error

## 2.4 Teknik Safety Stock dan Reorder Point

The security of all situations is a "safety stock" between placing an order for inventory replacement, receipt of goods into the inventory. According to Sofjan Assauri, Management Production, in his book (2000: 114) the definition of safety stock, which is a safety stock is an additional supply held to protect or maintain the possibility of stock-out.

Planning of raw material inventory has been taken into account, but often the raw material inventory is insufficient because it often jumps the company's production stock or the inventory is damaged or does not meet industry standards to meet consumer demand. The safety formula formula can be calculated as follows:

$$ROP = d\ x\ l + SS$$

$$Safety\ Stock = z\ x\ \sqrt{\frac{PC}{T}}\ x\ \sigma D$$

ROP = Reorder Point
d = Average demand for goods to suppliers
l = request during lead time (7 days)
SS = Safety Stock
Z = Safety Factor (90% = 1.281552)
PC = Performance Cycle = Cycle order or demand of goods to supplier (30)
T = Ycle Period of Demand (7 days)
$\sigma D =$ Standard Deviation request = Request or order data / 10

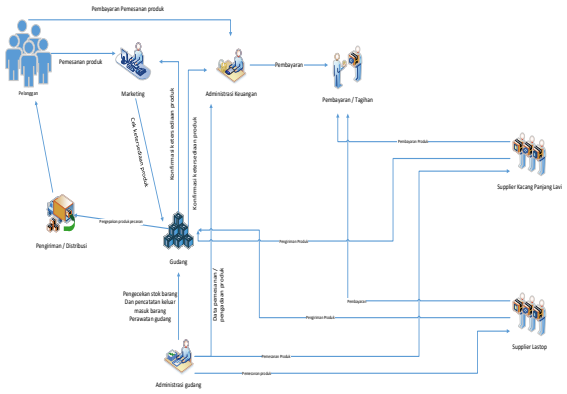
## 2.5 Problem Analysis

Problem Analysis is an assumption of the problem that will be described in the procedures - data processing procedures on distribution information system development program with supply chain management approach in CV. Rimbo Tani. Problem analysis of the current system is:

1. The company is difficult to determine the estimated number of procurement of products from suppliers due to frequent vacancy of the product and need to control the stock of the product so as not to happen excess or decrease even the product void.
2. The absence of scheduling the distribution which resulted in the cost, delivery time, availability of the vehicle becomes a constraint when performing the distribution.

## 2.6 *Supply Chain Management* Model in CV. Rimbo Tani

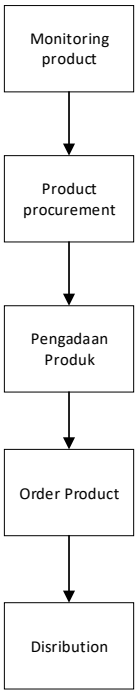
Here is a mapping that includes the components - components that exist in the CV. Rimbo Tani which can be seen in his Picture




Picture . *Supply Chain* Picture in CV. Rimbo Tani

## 2.7 Analisis *Supply Chain Management*

In distribution information system with SCM approach in CV. Rimbo Tani done several stages to solve the problems faced by CV company. Rimbo Tani. On the problems that happened part of product procurement planning and product control to anticipate the occurrence of vacant warehouse products and make scheduling distribution and use of appropriate distribution tools. Here are the general stages that occur and the stages to be built will be applied SCM coverage area:




Picture . SCM stages in CV. Rimbo Tani

Based on the picture above, it can be done analysis of stages - stages of SCM in the company CV. Rimbo Tani which is as follows:

### 2.7.1 Product Monitoring Analysis

Analysis of monitoring on CV. Rimbo Tani conducted aim to monitor inventory of existing product in CV. Rimbo Tani. Monitoring aims to determine the amount of stock in warehouse products and avoid the occurrence of shortages and depletion of existing product stock in CV. Rimbo Tani using indicators. Stock monitoring requires an indicator derived from a method in order to reduce the risk of running out of product inventory. Indicator that will be used that is Reorder point method and Safety Stock.

Reorder point is the many remaining products where the company has to re-order. Meanwhile, safety stock serves to protect the error in demand during lead time and ROP only take the average value of demand during lead time. Thus, planning product demand that will run out can be done if the total inventory is below the safe limit value of reorder point or safety stock.

Calculation of product data ordered to fulfill the sale is long lilo nut seedlings 180 bags with weight 500gr / bag and Lastop 280 gallons.

Product data ordered for sale: 180 bags
*d* = level of unit requirement per time (30 days or 1 month)
*l* = lead time (7 hari)
Standard deviation of demand = 18
Average monthly orders (*d*) : 180 / 30 = 6
Service Level :90 %
Service Factor : 1.281552
Then it can be calculated safety stock:

$$SS = 1.281552 * (18)$$

Result is : SS = 23,07 = 23 bags

As for calculating the reorder point:

ROP = (d *x l*) + SS
ROP = (6 x 7) + 23 = 65 bags

The value of safety stock is 23 bags and reorder point 65 bags.

While for Lastop data ordered products to meet sales of 140 gallons per 20 liters with the following calculations:

Product data ordered for February sale: 280 gallons
*l* = lead time (7 days)
Standard deviation of demand = 28
Average monthly orders (*d*) : 280 / 30 = 9,3
Service Level :90 %
Service Factor : 1.281552
Then it can be calculated safety stock:

$$SS = 1.281552 * (28)$$

The results are::
SS = 35,88= 36 galons
Meanwhile, to calculate the reorder point :

ROP = (d *x l*) + SS
ROP = (9,3 x 7) + 36 = 101 galon

Then, the value of safety stock is 36 gallons and reorder point 101 gallon.

Monitoring of product inventory will be presented in table form, which will be sorted by the difference between stock amount with ROP value and Safety Stock. Examples of product inventory monitoring presentation can be seen in the following table:

Table. example of product monitoring

| **Produks** | **Unit** | **ROP** | **Safety stok** | **Stok** | **Status** |
|---|---|---|---|---|---|
| Kacang Panjang Lavi | **Bags** / 500gr | 65 | 23 | 0 | Not safe |
| Lastop | **Galon/20 liter** | 101 | 36 | 5 | Not safe |

From the table above the product stock for lavi nuts long and lastop 20 liters. Lavi long beans are not safe, lastop was not safe, therefore it is necessary to order from forecasting results that have been calculated as a benchmark ordering.

### 2.7.2 Forecasting Analysis

Forecasting analysis aims to simplify the process of fulfilling the supply of products in the CV. Rimbo Tani. The first thing is choosing a method to forecast the product inventory by paying attention to the type of data pattern. The method to be used in forecasting the ordering of products for the fulfillment of the amount of product supply in CV. Rimbo Tani is a fluctuating forecasting method that is Single Exponential Smoothing method.
Here is one forecasting calculation using single exponential smoothing:
Single exponential smoothing:

$$Ft+1 = \alpha Yt + (1-\alpha) Xt$$

Informaions :

$Ft+1$ = Forecast result for period t + 1

$\alpha$ = Smoothing Constant

$Yt$ = Actual demand data for period t

$Ft$ = Long smoothing value or smoothing average until period t-1

For example, in the calculation of forecasting of long bean lavi 500gr / bag bean data then the data to predict it obtained from the previous month ie february 2016 known forecasting data before or $Ft-1$= **171,3 (bibit Kacang panjang lavi)** bags and previous actual data or $Yt-1$= **180** dengan rasio alfa atau $\alpha$ = 0,1 with the ratio of alpha or = 0.1 then in March the calculation is as follows:

$$Ft+1 = \alpha Yt + (1-\alpha) Ft$$

$$Ffebruari+1 = 0,1(180) + (1-0,1)*(171,3)$$

$$Ffebruari+1 = 172,2$$

After doing the whole calculation of ordering of seed products Long beans lavi 500 gr. For the alpha category 0.1 obtained his forecasting results worth 172.2
So, then the data must be calculated error or error value using Mean Square Error (MSE) to know which is close to the accuracy level of ordering long beans lavi 500gr / pocket is the most accurate reference forecasting in anuary 2017. How to calculate as follows:

$$MSE = \frac{\sum e_i^2}{n} = \frac{\sum (X_i - F_i)^2}{n}$$

MSE = The number of squared errors: the number of data
MSE = 107,416 : 12
MSE = 8,9513333

After doing all the calculation of MSE based on the product of each from January to December 2016, the result of error calculation from alpha value 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8 0.9
MSE error results look alpha = 0.1 has the error error smallest value of 8.951 it can be concluded that in the year 2017 January CV. Rimbo Tani ordered long lavi 500 gr / bag as many as 8,951 bags / 500gr or with rounding up.

### 2.7.3 Analysis of Distribution

In the final activity In the supply chain at the company CV. Rimbo Tani has distribution / delivery activities. In this stage of analysis, the date of scheduling for the distribution of the product and determining the distribution tool is used. for company or jambi City, distribution using company vehicle. Meanwhile, if delivery out of town using delivery service in the form of courier.

#### 2.7.3.1 Determinaion Analysis of Distribution Date of Product

Analysis of determining the date of distribution of the product to the customer. Distribution of product to customer for Jambi City area or company estimation of delivery time is 1 day which has been included apbila there is possibility of delay. As for delivery by courier service can be 3 to 7 days.
Scheduling is done daily if there is an order.
Here is a sample calculation of 21 February 2016 on behalf of Mr. Eko:

$$T_p = T_{pemesanan} + (lama\ pengiriman + lama\ pengadaan\ produk)$$

= 21 februari + (1+0)
= 22 februari

Based on the results obtained from the above calculation is the distribution of products then the distribution of products to customers that om eco sent with the estimated delivery time of 1 day.

#### 2.7.3.2 Product Distribution Analysis

At this stage analyze the distribution of products after going through the stages of calculation analysis determining the date of product distribution. Company CV. Rimbo Tani has 3 units of company vehicles to distribute orders to customers. 3 vehicles and their cargo will be shown in the following table:

**Table of Vehicle Data CV Rimbo Tani**

| No | No Polisi | Jenis Kendaraan | Tipe Kendaraan | Kendaraan Muatan |
|---|---|---|---|---|
| 1 | BH 7069 SR | Mini Fuso | Mitsubishi Mini Fuso | 7 Ton |
| 2 | BH 1266 HA | Pick up | Mitsubishi L300 | 1,5 Ton |
| 3 | BH 7619 YD | Motor | Supra X 125 CC | 50 kg |

The products distributed will be transported and wrapped or packaged according to the packaging by the supplier. based on the calculation of delivery schedule for the customer om Eko, with the delivery of the city of jambi yaiut still area of the company location then the estimated product up to 1 day ie the order made on February 21, then the goods until approximately February 22nd. Distribution needs to be calculated based on the number of orders made by the customer that is here om eco. Om eco do order 15 gallon herbicide Lastop Size 20 liters or 20 Kg or add up to weigh about 300 Kg. Therefore the use of motor vehicles is not possible, so the vehicle used is a pickup truck (pick-up) with a capacity of 1.5 tons to be delivered to the location of om Eko is located in the city of jambi. Therefore the system can recommend for its distribution process will be sent by using pickup (pick-up) to still in Jambi City, whereas if delivery has been sent city by courier service which cost will be borne if still below 7 Kg of delivery. However, if it has passed the weight of the delivery by courier will be borne by the customer. Here is the table of distribution activities:

**Table Schedule Distribution**

| Pelanggan | Tanggal Pengiriman | Lokasi | Kendaraan | Nama produk | Jumlah Pemesanan |
|---|---|---|---|---|---|
| Pak Eko | 21/2/2016 | Kota Jambi | Mobil Pickup | Lastop | 15 |

### 2.8 Fungsional Funcional Testing (*Black Box*)

Functional testing using the blackbox method is focused on the functional requirements of the built system. Black box testing scenario for distribution information system with supply chain management approach in CV. Rimbo Tani.

Based on the test results with some cases of test samples that have been done, it can be concluded that the process - the process on the system is correct. Filtering process errors in the form of the user interface is sufficient and maximum feedback from the system is maximal process done.

### 2.9 Beta Testing

Beta testing is a direct test of the real environment. Users will conduct an assessment of the system using interviews about the system that has been built. From the interview results can be concluded whether the system is built as expected or not. The interviews were conducted using unstructured interviews, where the implementation process was based only on the outline or purpose of the problems in this research.

#### 2.9.1 Beta Testing Scenarios

This beta test is done by doing direct test by using interview technique which addressed to administration of CV warehouse. Rimbo Tani with questions based on the purpose of the research, so the questions given are clear and directed.

#### 2.9.2 Conclusion Beta Testing

Based on beta test, it can be concluded from the interview are:

1. Distribution Information System with supply chain management approach is helpful in monitoring existing products in warehouse to know the number of products coming out of the warehouse and also can determine the number of products ordered premises forecasting results as a benchmark procurement of products from suppliers.
2. Distribution Information System with supply chain management approach is helpful in scheduling the distribution of products to customers.
3. Distribution information system with supply chain management approach also helps customers in ordering products. So there is a recording in and out of the product.

## 3. Closing

The conclusions obtained from the results obtained after the analysis of the design, implementation and testing of the system design that has been developed and developed and suggestions that will provide important records and possible improvements that need to be done for the development of previous systems.

### 3.1 Conclusions

Based on the results obtained after the analysis, design, and testing it can be obtained conclusion as follows:

1. The built system has helped CV. Rimbo Tani in monitoring the control of warehoused stock that can be monitored the amount of available stock and which is not available and determine the amount of procurement of product to supplier.
2. This system has helped the company CV. Rimbo Tani in determining and scheduling the distribution of products along with the distribution used.
3. This system helps the stock control so that it can know when the stock inventory is almost empty.

### 3.2 Suggestions

As for suggestions from the author and warehouse administration for the development of

distribution information system with supply chain management approach is as follows:

1. Required the development and maintainance of the system to be built, so that the system can be used with the needs needed later.
2. For the future distribution information system can be added to the calculation of procurement cash costs so that it can be directly confirmation when making procurement without checking the company's cash and can manage the data - managerial company.

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