

The Use of Distribution Requirement Planning Method in Rice Distribution System of CV. Usaha Milla Gesit for Cost Efficiency

Marco Adi Pati, Mochamad Rizky Drestiyandi, Raffi Razak Dhamhory, Danang Prihandoko

Abstract: The purpose of this research to provide a method of Distribution Requirement Planning on the form of CV. Usaha Milla Gesit's rice to efficient the cost of the material distribution. This type of research is descriptive research with a time horizon that use cross-sectional for data collection. The technique of data collection during this research is directly interviewing company's operational manager. The data that acquired processed with Distribution Requirement Planning and then compared with the results of company's conventional system. From the results of the comparison Distribution Requirement Planning can be efficient the cost of rice distribution as many as 26.76 %. With this proves Distribution Requirement Planning can efficient distribution total cost, Forecasting aims to know the period from March 2018 - February 2019 and manage it with Distribution Requirement Planning to know distribution total cost from March 2018 - February 2019.

Keywords: Distribution Cost, Distribution Requirement Planning, Economic Order Quantity, Efficient, Forecasting, Safety Stock.

I. INTRODUCTION

Rice is one of the staples that is very important for countries around the world, especially in Asia ([1]). Although there are quite a number of alternative food crops that are produced domestically and imported from other countries, such as potato, sago and wheat, rice remains the staple food most consumed, especially in Asia. This is caused by the consumption of rice that has been accustomed from generation to generation, then rice commodities derived from rice plants are very suitable and productive to be planted in tropical regions such as Indonesia.

The development of staple food needs has led to increasingly fierce industry competition. The number of industries that produce similar products results in companies having to create added value, either in the form of lower prices or better quality for the products they market, in order to compete with similar products from other companies. In addition to providing added value to the product, services from the company also determine the company's success in running its business, one of which is distribution management.

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In distribution management, distributors have an important role for the smooth distribution of products. Good distribution management will reduce the possibility of stock shortages so that consumers will be satisfied if their needs can be fulfilled on time, in the right quantities, and in the right quality. Delay in product distribution will cause losses for the company, namely consumer dissatisfaction, which results in lost sales and customer loyalty.

The distribution system is also an important factor for the operation of the product distribution. Inefficient distribution system causes some losses such as increased distribution costs, where the distribution costs include ordering and storage costs. Both of these factors affect the cost of distribution in the warehouse.

As in the CV. Usaha Milla Gesit which was founded in 2000. CV. Usaha Milla Gesit is a company engaged in Food & Beverages Supplier which focuses on 9 kinds of staples including rice, flour, cooking oil, sugar, and various kinds of herbs. Starting from a rice warehouse store that only sells rice products in small restaurants until now becoming a company registered as a CV. and suppliers in several hotels in Jakarta. Currently CV. Usaha Milla Gesit focuses on targeting its market segmentation in some hotels in Jakarta, Depok, Bekasi and Tangerang.

In addition to targeting its market segmentation in some hotels in Jadedabek, CV. Usaha Milla Gesit also targets its sales in some of the Convention Centers like the Jakarta Convention Center. The flow of customer orders to delivery on CV. Usaha Milla Gesit goes through several processes. That is, rice products in the central warehouse are sent directly to three warehouses, namely the Bekasi warehouse, the Depok warehouse, and the Tangerang warehouse based on the demand of each warehouse. Then, from the three branch warehouses, the rice will be forwarded to consumers.

Pulen Wangi Rice and Setra Ramos Rice are the highest demand in each branch warehouse. Therefore the researchers made these 2 types of rice the object of research.

CV. Usaha Milla Gesit undertakes its distribution planning by estimating the demand for monthly warehouse branches in accordance with the estimated needs of consumers within a monthly period. But there are obstacles in the company's distribution system that causes a lack of product inventory to meet consumer demand, excess inventory in the warehouse, and the amount of costs incurred by the company.

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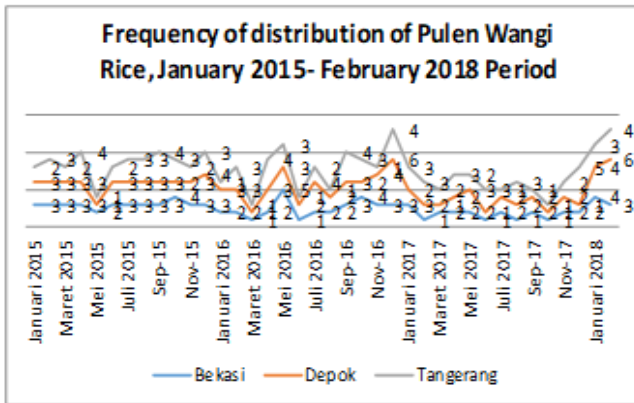


Fig. 1. Frequency of distribution of Pulen Wangi Rice in Graph, January 2015-February 2018 Period
Source: CV. Usaha Milla Gesit, processed by researchers (2018)

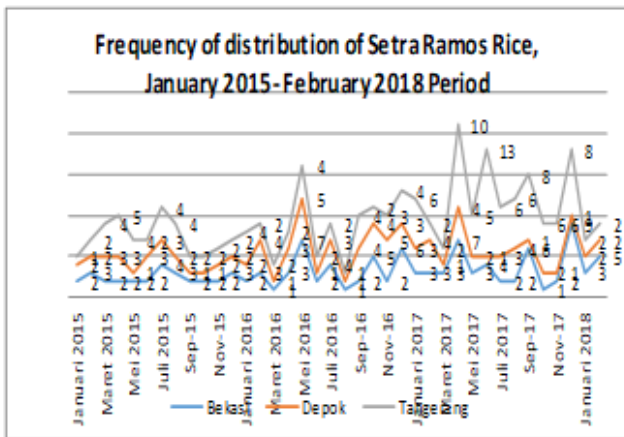


Fig. 2. Frequency of distribution of Setra Ramos Rice in Graph, January 2015- February 2018 Period
Source: CV. Usaha Milla Gesit, processed by researchers (2018)

Based on the graph, the frequency of delivery of Pulen Wangi and Setra Ramos rice at each branch warehouse fluctuates and is erratic which results in frequent small-scale shipments that only send a small amount of rice which thereby increase delivery frequency and costs due to unplanned distribution,

From this it can be seen that the company does not have a good distribution plan, makes uncontrolled demand for rice products, so that excess or shortage of inventory results in high distribution costs that must be incurred by the company compared to other costs to the company as in the following graph:

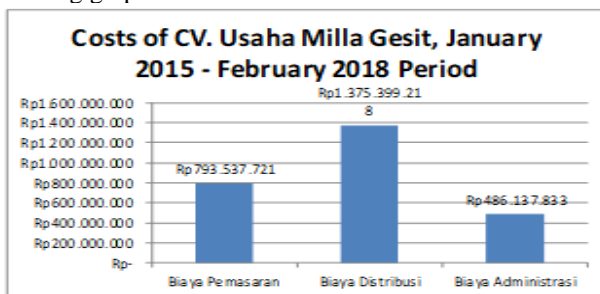


Fig. 3. Graph of Costs Comparison at CV. Usaha Milla Gesit, January 2015 - February 2018 Period
Source: CV. Usaha Milla Gesit, processed by researchers (2018)

Based on the above problems, namely the absence of demand forecasting and distribution planning, according to [2] the company can find out how many estimates of demand in the future by using the forecasting method and then analyze the distribution problem so that the efficient distribution conditions with the Distribution Requirement Planning method was created. Distribution Requirement Planning is a method for planning and scheduling activities, with an Economic Order Quantity order policy. According to [3] the Distribution Requirement Planning method can determine distribution scheduling.

II. RESEARCH METHODOLOGY

This research was conducted at CV. Usaha Mila Gesit which is engaged in the distribution of rice. As for the objects that will be examined in the distribution system in this research, there are several warehouses, namely Bekasi Warehouse, Depok Warehouse, and Tangerang Warehouse. The data obtained is secondary data provided by the company. These data are data on the number of requests for the period January 2015 - February 2018, lead time, project on hand, distribution costs, ordering costs, and storage costs. Data analysis methods are carried out as follows:

A. Determining Lot Size Decision :

In Distribution Requirement Planning (DRP) it is necessary to determine the Lot Size determined by the characteristics of the company's distribution. CV. Usaha Mila Gesit uses lot size EOQ.

B. Determining Optimal Safety Stock

The calculation of optimal safety stock is carried out to support distribution activities in the company to the existing warehouses with the aim that the goods that are used as safety stock are not too many and too few to match the demand and lead time.

C. Lot Size Calculation

After determining the lot size and safety stock, the researchers then calculated the lot size, EOQ

D. Calculating scheduling distribution costs using the Distribution Requirement Planning method for January 2015-February 2018 period.

E. Compare distribution costs with the distribution requirements planning method with the methods used by the company.

F. Determine demand forecasting for March 2018-February 2019. Determination of demand forecasting using forecasting methods. Forecasting calculations using QM software for Windows 5.

G. After that, make a distribution scheduling using Distribution Requirement Planning (DRP) for the period March 2018-March 2019.

III. RESULT AND DISCUSSION



Table- I: Fee for Ordering the DRP Method

Rice Type	Warehouse	Total Order Frequency	Ordering Fee per Frequency	Total Ordering Cost
Pulen Wangi	Bekasi	68 times (3 years 2 months)	Rp. 27,000	Rp. 1,836,000
	Depok	72 times (3 years 2 months)	Rp. 27,000	Rp. 1,944,000
	Tangerang	74 times (3 years 2 months)	Rp. 27,000	Rp. 1,998,000
Setra Ramos	Bekasi	93 times (3 years 2 months)	Rp. 27,000	Rp. 2,511,000
	Depok	76 times (3 years 2 months)	Rp. 27,000	Rp. 2,052,000
	Tangerang	114 times (3 years 2 months)	Rp. 27,000	Rp. 3,078,000
Total		497 times (3 years 2 months)	Rp. 27,000	Rp. 13,419,000

Table- II: Storage Cost Calculation Table

Rice Type	Warehouse	Total Storage Frequency	Storage Cost per Kilogram	Total Storage Cost
Pulen Wangi	Bekasi	10.674 (3 Years 2 Months)	Rp. 9,778	Rp. 104,370,372
	Depok	10.718 (3 Years 2 Months)	Rp. 10,789	Rp. 115,636,502
	Tangerang	10.100 (3 Years 2 Months)	Rp. 10,750	Rp. 108,575,000
Setra Ramos	Bekasi	22.359 (3 Years 2 Months)	Rp. 9,778	Rp. 218,626,302
	Depok	10.438 (3 Years 2 Months)	Rp. 10,789	Rp. 112,615,582
	Tangerang	27.241 (3 Years 2 Months)	Rp. 10,750	Rp. 292,840,750
Total		91530		Rp. 952,664,508

Total Cost = Storage Cost + Ordering Cost
 = Rp. 13,419,000 + Rp. 952,664,508
 = Rp. 966,083,508

Table- III: Calculation of Total Ordering Cost with a Conventional System

Rice Type	Storage	Total Order Frequency	Ordering Fee per Frequency	Total Ordering Cost
Pulen Wangi	Bekasi	84	Rp. 27,000	Rp. 2,268,000
	Depok	93	Rp. 27,000	Rp. 2,511,000
	Tangerang	95	Rp. 27,000	Rp. 2,565,000
Setra Ramos	Bekasi	121	Rp. 27,000	Rp. 3,267,000
	Depok	98	Rp. 27,000	Rp. 2,646,000
	Tangerang	162	Rp. 27,000	Rp. 4,374,000
Total		653	Rp. 27,000	Rp. 17,631,000

Table- IV: Calculation of Total Storage Cost with Conventional System

Rice Type	Storage	Total Storage Frequency	Storage Cost per Kilogram	Total Storage Cost
Pulen Wangi	Bekasi	17786	Rp. 9,778	Rp. 173,911,508
	Depok	18870	Rp. 10,789	Rp. 203,588,430
	Tangerang	14700	Rp. 10,750	Rp. 158,025,000
Setra Ramos	Bekasi	27850	Rp. 9,778	Rp. 272,317,300
	Depok	16820	Rp. 10,789	Rp. 181,470,980
	Tangerang	34300	Rp. 10,750	Rp. 368,725,000
Total		130326		Rp. 1,358,038,218

So, the calculation of total cost using the company's conventional system is as follows:

Total Cost = Storage Cost + Ordering Cost
 = Rp. 17,631,000 + Rp. 1,358,038,218 = Rp. 1,375,399,218
 Total Cost Difference = Results with Conventional Methods – Results with the DRP Method
 = Rp. 1,375,399,218 - Rp. 966,083,508
 = Rp. 409,315,710
 Cost Efficiency = Total Cost Difference: Results with Conventional Methods
 = Rp. 409,315,710:Rp. 1,375,399,218
 = 26,76%



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Table- V: Forecasting Results of Pulen Wangi Rice Types at Bekasi Warehouse

Method	Forecast (unit)	MAD	MSE
Naïve Method	750	191,081	54.483,79
Moving Average	730	145.224	27003.45
Exponential Smoothing	718.353	156.447	35850.79
Exponential Smoothing with Trend	720.749	156.154	35651.15

From the calculation results of forecasting rice demand using QM for Windows 5, the smallest MAD and MSE results using the Moving Average method was obtained.

The results of forecasting each type of rice in each warehouse using a moving average produces the following data:

Table- VI: DRP Calculation Results Table for March 2018 - February 2019

Name :	Pulen Wangi Bekasi Storage		On Hand :	141 Kg									
Lead Time :	3		Lot Size :	221 Kg									
Safety Stock :	6 Kg		Planning Time Fences :										
Period	Past Due	Mar - 18	Apr - 18	May - 18	Jun - 18	Jul - 18	Aug - 18	Sep - 18	Oct - 18	Nov - 18	Des - 18	Jan - 19	Feb - 19
GR		730	716	730	728	743	736	746	737	747	744	725	736
SR													
PAB1		-589	-642	-708	-552	-632	-705	-567	-641	-725	-585	-647	-720
NR		595	648	714	558	638	711	573	647	731	591	653	726
PO Receipt		663	663	884	663	663	884	663	663	884	663	663	884
PO Release		663	663	884	663	663	884	663	663	884	663	884	
PAB2	141	74	21	176	111	31	179	96	22	159	78	16	164

Table- VII: Calculation of Order Total Cost

Rice Type	Storage	Total Order Frequency	Ordering Fee per Frequency	Total Ordering Cost
Pulen Wangi	Bekasi	40 times (1 Year)	Rp. 27,000	Rp. 1,080,000
	Depok	41 times (1 Year)	Rp. 27,000	Rp. 1,107,000
	Tangerang	42 times (1 Year)	Rp. 27,000	Rp. 1,134,000
Setra Ramos	Bekasi	46 times (1 Year)	Rp. 27,000	Rp. 1,242,000
	Depok	42 times (1 Year)	Rp. 27,000	Rp. 1,134,000
	Tangerang	67 times (1 Year)	Rp. 27,000	Rp. 1,809,000
Total		278 times (1 Year)	Rp. 27,000	Rp. 7,506,000

Table- VIII: Calculation of Total Storage Cost

Rice Type	Storage	Total Storage Frequency	Storage Cost per Kilogram	Total Storage Cost
Pulen Wangi Rice	Bekasi	1.127 (1 Year)	Rp. 9,778	Rp. 11,019,806
	Depok	2.130 (1 Year)	Rp. 10,789	Rp. 22,980,570
	Tangerang	1.541 (1 Year)	Rp. 10,750	Rp. 16,565,750
Setra Ramos Rice	Bekasi	2.069 (1 Year)	Rp. 9,778	Rp. 20,230,682
	Depok	1.371 (1 Year)	Rp. 10,789	Rp. 14,791,710

	Tangerang	23.356 (1 Year)	Rp. 10,750	Rp. 251,077,000
Total				Rp. 321,873,808

Based on the calculation of ordering costs and storage costs, the following total cost result was obtained:

$$\begin{aligned} \text{Total Cost} &= \text{Ordering Cost} + \text{Storage Cost} \\ &= \text{Rp. 7,506,000} + \text{Rp. 321,873,808} \\ &= \text{Rp. 329,379,808} \end{aligned}$$

IV. CONCLUSION

Comparison of the total cost of the conventional method with the Distribution Requirement Planning method is Rp. 409,315,710. This result shows that if the company applies the Distribution Requirement Planning method, it can streamline the total cost spent during the rice distribution process.

The company can obtain a total cost efficiency of 26.76% if it applies the Distribution Requirement Planning method to the process of distributing rice during the January 2015 - February 2018 period.

The most appropriate forecasting method to predict rice demand on the CV. Usaha Milla Gesit for the period March 2018 - February 2019 is using the Moving Average method.

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