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Rice Inventory in Bulog General Company East Nusa Tenggara Province

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Abstract: This research is entitled "Rice Inventory In Public Company Bulog East Nusatenggara Province" which is the problem of this research is how the level of rice inventory at the Bulog Public Company, East Nusa Tenggara Province. The objectives used are EOQ to find out the size of an economical order per period, ROP to find out when to reorder, SS to keep from experiencing a shortage of rice supplies and MS to keep the company from experiencing excess rice inventory in the warehouse. From the results of the analysis of rice inventories carried out by researchers, with the calculation of EOQ in three years the company must place an order of 78,558 tons each time an order with an order frequency of 3 times. With the ROP calculation, the company must immediately place an order again if the stock of rice in the warehouse is only 51,484,80 tons in order to overcome the problem of late arrival of rice supplies.
Keywords: Inventory, Rice, EOQ

Preliminary

Background

In meeting the needs of the Indonesian people for rice and maintaining the stability of rice prices, the government has formed an agency tasked with maintaining food in Indonesia. Perum BULOG as a State-Owned Enterprise has the main task, which is to organize a quality and adequate basic food logistics business for the livelihood of many people. Every company, especially industrial companies must stock up on raw materials, because without the supply of raw materials it will result in disruption of the production process. And also means that the entrepreneur will lose the opportunity to make a profit.

Excessive inventory will harm the company. This means that a lot of costs are incurred from the costs incurred with the existence of these inventories, where the costs of the purchase can actually be used for other, more profitable purposes. On the other hand, a shortage of raw material inventory can be detrimental to the company because it will disrupt the company's production and distribution activities. Perum BULOG Regional (Divre) East Nusa Tenggara (NTT) which has other responsibilities in handling food security for rice is easy, because like perishable and seasonal products, the availability of sufficient supplies is important to meet the needs of the market demand of the people of NTT.

Based on this description, it is necessary to conduct research on rice supplies at Perum BULOG Divre NTT in meeting the needs of the community for rice. Rice is a staple food for the Indonesian people, so that rice dominates the lives of many people and becomes a parameter of the country's economic and social stability (Bulog, 2012). The population growth rate in Indonesia in 2000-2015 reached 1.4 (BPS, 2015).

Population growth continues to increase causing the need for rice also increases. The availability of rice is expected to continue to ensure the demand for rice. The Logistics Agency (BULOG) has a Public Service Obligation (PSO) task by maintaining the basic purchase price for grain, stabilizing prices, especially basic prices, distributing rice for the poor (Raskin) and managing food supplies. The implementation of PSO's duties is expected to be able to maintain the availability and affordability of rice for the community. BULOG's vision is to become a company that excels in realizing food sovereignty. This vision is manifested in several missions, including providing excellent service to the community and other stakeholders to meet basic food needs, achieve sustainable business growth and implement good corporate governance. Rice inventory management is done by knowing the flow of rice procurement, rice procurement channels.

Rice is the staple food for the Indonesian people. Therefore, its existence is very necessary for the needs of small people who have lower incomes. Factory companies or better known as manufacturing, are companies whose main business activities are processing raw materials into finished products, and then selling the products produced.

Inventory is a very important element for every company, be it a manufacturing company or a trading company because inventory is the main source of income in realizing and increasing company profits. A trading company can be defined as an organization that carries out business activities by buying goods from other parties or companies and then reselling them to the public in the form of retail or wholesalers and distributors (Makisurat, 2014). Trading companies engaged in the distribution of goods (distributors) of course have merchandise inventory that is ready to be sold, and the amount of this inventory is of course also very large,

because the distributor company functions as a supplier to retailers (supermarkets, shops, and others).

The Public Company Logistics Affairs Agency or commonly known as Perum Bulog is a food agency in Indonesia that is in charge of the rice trading system. Perum Bulog, which operates based on a Presidential Decree (Kepres) provides the food supplies needed to meet the needs of the Indonesian people and create rice price stability (a study of funding for the national rice stock).

To determine the national demand for rice, good management and forecasting are needed in planning food supplies that can meet the needs of the community in the future so that the supplies carried out can be in accordance with the national rice needs. The supply of national rice needs is obtained by buying unhulled rice or rice or by importing by following the standards provided by the government (study of national rice stock funding).

As a company that continues to carry out public duties from the government, BULOG continues to carry out activities to maintain the basic purchase price for grain, stabilize prices, especially basic prices, distribute rice for the poor (Raskin) and manage food stocks. This warehouse complex can accommodate up to 12,500 tons of rice. With a very large amount of rice, of course it will cause problems. Problems that will arise are damage, loss, and mismatch of inventory records with goods in the warehouse. These problems can of course be prevented by an effective internal control system.

Formulation of the Problem

Based on the description above, the formulation of the problem in this study is: "How is the Level of Rice Inventory in Public Company Bulog NTT Province"?

Objectives and Benefits of the Research

1. Research Objectives

To find out the level of rice supply at the BULOG Public Company, East Nusa Tenggara Province.

2. Research Benefits

a) For Perum BULOG in NTT as a guide or information for the management of Perum BULOG so that it can be used as input and a basis for decision making b) For other parties as reading material that provides information and adds insight for readers and can be used as input for other research.

Literature Review

Rice Stock

Rice supply management at Perum BULOG Regional Division of NTT begins with the flow of rice procurement, rice supply, rice quality maintenance and rice distribution. Wijayanti et al. (2011) revealed that inventory management is important to support efforts to fulfill rice needs in the community. The flow of rice procurement starts from the Head Office of Perum BULOG providing procurement targets to the Regional Division (Divre)/Regional Sub-Division (Subdivre). The Divre/Subdivre contracts through 3 channels, namely the Unhusked and Rice Processing Business Unit (UB-PGB), Work Partners, and the Task Force (SATGAS)'

The three channels deliver rice to the designated warehouse, according to the agreed amount. Receipt of rice at the warehouse begins with a quality and quantity inspection survey before it is entered by the quality inspector. If the quality and quantity are in accordance with the agreement, the warehouse receives the rice and makes a report on the receipt of goods. The source of rice procurement for Perum BULOG Divre East Java only comes from within the country. Rice is purchased from the produce of farmers in 38 districts in East Java. The rice procurement of Perum BULOG Divre NTT is based on the target given by the Head Office. The maximum warehouse capacity at Perum BULOG Regional Division of NTT is 1,139,000 tons, so that the maximum rice supply in the warehouse at Perum BULOG Divre East Java is 1,139,000 tons.

Definition of Inventory

According to Rangkuti (2004:1) inventory is an asset that includes goods belonging to the company with the intention of being sold in a certain business period, or inventory of goods that are still in the works or production process, or inventory of raw materials waiting for their use in a production process. Kusuma (2009:132) inventory is defined as goods stored for use or sale in future periods.

According to Siswanto (2007:122) the costs used in inventory analysis:

a. Ordering Cost

Order costs arise when the process of ordering an item occurs. The costs of making letters, telephones, faxes, and other overhead costs that are proportionally incurred due to the process of making an order for goods

are examples of ordering costs.

b. Carrying Cost atau holding Cost

Storage costs arise when the process of storing an item occurs. Warehouse rent, insurance premiums, security costs and other overhead costs that are relevant or incurred due to the storage process of an item are examples of storage costs. In this case, it is clear that the costs that still arise even though there is no inventory are not included in the category of holding costs

c. Stockout Cost

Stockout costs are incurred when supplies are depleted or unavailable. Included in this cost category are losses due to machine stops or employees not working. Missed opportunity to make a profit.

Inventory Function

Rika Ampuh Hadiguna (2009:95), inventory can be classified based on its function, namely:

a) Cycle stock is the amount of inventory available at any time ordered in lot size. The reasons for ordering in lots are economies of scale, quantity discounts in product purchases or transportation, and technological limitations such as the limited size of the premises for the production of chemical processes

b) Congestion stock, inventory of manufactured products related to the existence of production limits, where many products are produced on the same production equipment, especially if the production setup costs are relatively large

c) Safety stock is the amount of inventory available on average to meet uncertain demand and distribution in the short run

Definition of Inventory Control

In the opinion of Assauri (2004:176), inventory control is one of the activities of a sequence of activities that are closely sequential with each other in the entire production operation of the company in accordance with what has been planned in advance both in time, quantity, quantity, and cost.

According to Rangkuti (2004:25), inventory control is one of the management functions that canbe solved by applying quantitative methods. Meanwhile, according to Handoko (2000:333) control is a very important managerial function because the physical inventory of many companies involves the largest rupiah investment in current asset inventory. The above understanding can be concluded that inventory control is an activity to determine the amount of inventory by taking into account the balance between the amount of inventory stored with the costs it incurs.

Inventory Control Purpose

The purpose of detailed inventory control can be expressed as an effort to (Assauri 2004:177):

a) Take care not to let the company run out of inventory so that it can result in the cessation of production activities.

b) Ensure that the formation of inventory by the company is not too large or excessive. c) Keeping purchases on a small scale can be avoided because it will result in too large ordering costs. profits or interests of the company.

Definition of EOQ (Economic Order Quantity)

EOQ (Economic Order Quantity) according to Riyanto (2001:78) is the quantity of goods that can be obtained with minimal costs or often referred to as the optimal purchase amount. Meanwhile, according to Heizer and Render (2005:68) is one of the oldest and widely known inventory control techniques, this inventory control method answers 2 (two) important questions, when to order and how much to order. The order level that minimizes the overall inventory cost is known as the EOQ model (Hendra Kusuma, 2001: 136).

The above EOQ (Economic Order Quantity) model can only be justified if the following assumptions can be met according to Petty, William, Scott and David (2005: 278) that is:

a) Demand is constant and uniform even though the EOQ (Economic Order Quantity) model assumes constant demand, actual demand may vary from day to day.

b) The constant price per unit incorporating the price variable arising from the quantity discount can be handled rather easily by modifying the initial model, redefining total costs and determining the optimal order quantity.

c) Ordering costs are constant, holding costs per unit may vary greatly as inventory levels increase.
d) Constant ordering costs, although this assumption is generally valid, the customer assumption can be accommodated by modifying the initial EOQ (Economic Order Quantity) model in a manner similar to that used for variable unit prices.

Determination of EOQ (Economic Order Quantity)

As for determining the number of economic orders (EOQ) there are 3 ways according to Assauri (2004: 182), namely:

a. Tabular Approach

Determination of the number of orders that are economical with the tabular approach is done by compiling a list or table of the number of orders and the total cost per year.

b. Graphical Approach

Determination of the number of economic orders by "Graphical approach" is done by depicting the graphs of carrying costs and total costs in one picture, where the horizontal axis is the number of orders (orders) per year, the vertical axis is the magnitude of the costs of ordering costs, carrying costs and total costs.

EOQ Multi Product/Item (Joint Economic Order Quantity)

EOQ Multi Item is a techniques of controlling demand/ordering of several types of items that are optimal with the lowest possible inventory costs. The purpose of the EOQ model is to determine the quantity (Q) of each order so as to minimize the total inventory cost. The multi-item EOQ method is because it is able to reduce inventory costs to a minimum from storage costs and ordering costs. Multi-item EOQ is an optimal technique for controlling demand/ordering of goods with the lowest possible inventory costs. The number of costs that are reduced as low as possible are carrying costs (storage costs) and ordering costs (order costs).

Multi Item EOQ Models

The multi-item EOQ model is an EOQ model for joint purchases of several types of items. The assumptions used include:

a. The level of demand for each item is constant and known with certainty, the lead time is also known with certainty. Therefore there is no stockout or stockout fee.
b.

b. The lead time is the same for all items, where all ordered items will arrive at the same point in time for each cycle.
c. The holding cost, unit cost and ordering cost for each item are known. There is no change in the cost per unit (quantity discount), ordering costs, and holding costs.

Safety Stock

The definition of safety stock (Safety Stock) according to Rangkuti (2004:10) is additional inventory held to protect or maintain the possibility of material shortages (Stock Out). protect or maintain the possibility of material shortages (Stock Out).

Reorder Point (Reorder Point)

In addition to taking into account the concept of EOQ (Economic Order Quantity), companies also need to take into account when to reorder (Re-Order Point).

The definition of Re Order Point (ROP)

According to Rangkuti (2004:83) is an inventory operation strategy which is an order point that must be made by a company in connection with the Lead Time and Safety Stock. Meanwhile, according to Riyanto (2001:83) ROP is the time or point where orders must be held again in such a way that the arrival or receipt of the ordered material is on time where the inventory above the Safety Stock is equal to zero.

According to Assauri (1999: 196) ROP (Re Order Point) is a point or limit of the amount of inventory that exists at a time where orders must be held again.

ROP (Re-Order Point) according to Gaspersz (2004:291) says that the pull of the Re-Order Point (Pull System with Re-Order Point) causes cashloading inputs for each level which is the output of the previous level or stage, causing interdependence between levels in the distribution system. According to Bambang Riyanto (2001:83) the factors to determine the ROP are: a) Use of materials during the procurement lead time.

b) Amount of Safety Stock.

Re Order Point= (Lead Time × Usage per day)+ Safety Stock Forecasts are usually classified by the future time horizon they cover.

Economic Order Quantity is the most economical purchase quantity (Eqonomical Order Quantity = EOQ).

The definition of the amount for each material purchase accompanied by the minimum cost = the most economical number of material purchases EOQ formula:

$$\sqrt{\frac{2\ XAXP}{RXC}}$$

Inventory is inventory or stock of various items or resources used in the company. The Inventory System is a set of policies and controls that monitors the level of inventory that should be maintained, when inventory should be added and how much of an order should be made with the formula:

$$TIC = \frac{AxP}{N} + \frac{RxCxN}{2}$$

Research Methods

Operational Definition, Indicator.

a. Inventories are goods purchased by the company with the aim of being resold without changing the shape and quality of the goods, or it can be said that there is no production process since the goods are purchased until they are resold by the company. Indicators: direct material, Work in proses, Finished goods.
b. Bulog is a state-owned public company engaged in food logistics. The company's business scope includes logistics/warehousing, surveys and pest control, supply of plastic bags, transportation business, food commodity trading and retail business. As a company that continues to carry out public duties from the government, BULOG continues to carry out activities to maintain the Basic Purchase Price for grain, stabilize prices, especially basic prices, distribute rice for the poor (Raskin) and manage food stocks.

Indicator:

- Managing food ingredients
- Manage the transportation and processing
- Store and distribute according to the provisions of the Foodstuff Board

Population and Sample

The population in this study is the entire rice inventory data of Bulog NTT. While the sample will be analyzed for the data of the last three years from 2015 to 2017.

Data Types and Sources

a. The data collected in this study are divided into two, namely:
Primary data, which was collected from resource persons who came from the head of the NTT Bulog Public Corporation.
b. Secondary Data, this data is needed to support maximum analysis and discussion. Secondary data is also needed regarding the disclosure of social phenomena in this study. These secondary data include literature (Library Research) and materials from the internet.

Data collection technique

Data collection techniques that the author uses in this final project are:

1. Observation

Data collection techniques by observing directly to the object of research to clearly know the condition of the object of research and obtain the necessary data.

2. Literature study

This data collection technique is by reading, studying, citing several opinions from various book sources,

the internet and from other sources that are used as theoretical material.

3. Dokumentation study

This data collection technique is by collecting the necessary data at the time of the research. Starting from what is written about company data.

Data analysis technique

The calculations will use formulas that have to do with the problems studied, namely: 1. Descriptive method

Descriptive method is a method that aims to describe the nature of a situation or symptoms that are happening at the time the research is conducted and examine the causes of a particular symptom (Soehartono, 2000). This method is used to answer the research objectives

2. Quantitative method

Quantitative method is the method used if the conclusions used can be proven by numbers, this method is used to answer the research objectives. In the calculations that are then carried out will use formulas that have to do with the problem under study, namely:

a. Determining Economical Order Quantity (EOQ)

Reksohadiprojo and Gitosudarmo (1999), economic order quantity (EOQ) is the most economical volume or purchase amount to be carried out at each purchase. Determining the economical order quantity can be determined by the following formula:

EOQ = $\sqrt{\frac{2\,XAXP}{RXC}}$

b. Determining the Amount of Safety Stock

The definition of safety stock according to Freddy Rangkuty (2004) is additional inventory held to protect or maintain the possibility of material shortages (Stock Out). In determining the minimum stock, Perum BULOG has a safety stock provision that must be available equal to three distributions per month. Safety stock (S) = 3 × distribution of rice every month

c. Determining the Maximum Inventory Amount

According to Assauri (1999), the maximum inventory or Maximum Inventory can be determined by adding up the safety stock (S) with the Economical Order Quantity (EOQ).
Maximum Inventory (MI) = S + EOQ

d. Determining the Total Inventory Cost of Rice

The total cost of inventory can be calculated using the following formula:

$$TIC = \frac{AxP}{N} + \frac{RxCxN}{2}$$

Research Results and Discussion

Rice Inventory Analysis at Perum Bulog Divre NTT

a. Determining Economical Order Quantity (EOQ)

To analyze the number of economical rice orders for each order that should be made by Perum BULOG Divre NTT, it is necessary to know the assumptions to limit the problem to be solved so that conclusions can be drawn that are close to the truth. Data from Perum Bulog Divre NTT in 2015 to 2017 as follows:

1. Rice needs for 3 years are 343,051,972,00 tons (A)
2. The price of rice per ton is IDR 32,178,000 (R)
3. The ordering cost is IDR 5,148,480 (P)
4. Carrying Cost of 0.14% (C)

Based on the data above, the number of orders for economical rice can be calculated as follows:

EOQ = $\sqrt{\frac{2 X A X P}{R X C}}$

EOQ = $\sqrt{\frac{2 X 343.051.972,00 X 5.148.480}{32.178.000 X 0,14}}$

EOQ =78,558 ton

b. Frequency of orders for 3 years $= \frac{343.051972,00}{78.558}$

= 436 kali

Perum BULOG Divre NTT in 2015/2016/2017 realized the procurement of rice amounting to 344.531,299.28 tons obtained from domestic procurement, imports and transfer of rice from one Divre to another Divre or so-called move nas with an order frequency of 419 times with the average each time an order is 822.27 tons.

Based on the above calculation, the number of economical orders that should be made by Perum BULOG Divre NTT is 78,558 tons for one order with an order frequency of 436 times.

Determining the Amount of Safety Stock (Safety Stock)

Perum BULOG determines that the safety stock that must be owned is three months of regular distribution, assuming that in the event of crop failure, Perum BULOG still has a security stock or a minimum stock (Safety stock) so it is necessary to know the amount of distribution each month, namely :

$$\text{disburseme nt per month} = \frac{\text{distributi on 3 years}}{36 \text{ month}} = \frac{343'051.972,00}{36} = 9.529.211 \text{ tons per month}$$

Based on the above calculation, the safety stock can be calculated according to Perum BULOG, which is nine times the routine distribution every month as follows:

$$Safety\ Stock = 9x\text{distributi on every month}$$
$$= 9 \text{ x } 9529.221 = 85.762,989 \text{ tons}$$

The average number of safety stock that should be owned by Perum BULOG Divre NTT is 85,762,989 tons so that it can meet the needs of consumers in NTT in the event of crop failure and delays in receiving the ordered rice

Maximum Inventory

The maximum inventory is calculated by adding up the economical order (EOQ) with the minimum inventory/safety stock. Then the maximum amount of inventory (maximum inventory) can be calculated as follows:

$$MI = EOQ + SS$$
$$= 78,558 + 85.762.898 = 85.763.067 tons$$

The maximum amount of rice supplies owned by Perum BULOG Divre NTT in 2015/2016/2017, amounted to 84,511,480 tons, while after the analysis, the maximum stock that is usually managed by Perum BULOG Divre NTT is 85,763,067 tons.

Determination of Reorder Point (Reorder Point)

The data needed to calculate the reorder point is as follows:

1. The lead time is 48 days, starting from the time of ordering until arriving at the warehouse
2. $$\text{Estimated average daily needs} = \frac{\text{Needs in 3 years}}{\text{Number of days in 3 years}}$$
$$= \frac{343.051.972,00}{1,095} = 313.289,4 \textit{tons peer day}$$
3. $$\text{Distributi on during waiting time(D)} = 48 \text{ days x average distributi on per day}$$
$$= 48 \text{X} 313.289,4 = 15,037,89 \textit{tons}$$

So the reorder point can be calculated as follows :

$$\text{ROP} = \text{safety stock} + \text{D}$$
$$= 85.762,989 + 15.037,89 = 100.800,87 \textit{tons}$$

Based on the analysis data above, the optimal time equation is obtained, namely at the level of availability equal to 100,800.87 tons, while the data from Perum BULOG Divre NTT orders are not based on the level of inventory managed, but follow the pattern of rice production. This is because Perum BULOG Divre NTT prioritizes maintaining food stability.

Calculation of Total Inventory Cost

In calculating the cost of rice supplies with optimal supervision, the following data are used:

1. Total demand for rice for 3 years is 343,051,972,00 tons (A)
2. .Economical purchase quantity (EOQ) of 78,558 tons (N)
3. The booking fee is IDR 5,148,480 (P)
4. Storage cost 0.14% (C)
5. The price of rice per tons is IDR 32,178,000 per ton (R)

Based on these data, the cost of inventory for one year can be calculated as follows:

$$TIC = \frac{AxP}{N} + \frac{RxCxN}{2}$$
$$= \frac{343.051.972,00x5.148.480}{78,558} + \frac{32.178,000x0,14x78,558}{2}$$
$$= 22.482.703.439 + 176.948.752,68$$
$$= 22.659.652.191$$

The total cost of rice inventory based on optimal rice inventory control is 22,659,652,191 tons while the actual inventory costs incurred by Perum BULOG Divre NTT are 22,613,863,714 tons, it is known that the efficiency of rice inventory costs that can be carried out by Perum BULOG Divre NTT is 45,788. 477 tons

Conclusion

Based on the evaluation of the optimal Rice Inventory Monitoring Analysis at Perum Bulog Divre NTT, it was concluded as follows:

1. The flow of rice procurement is carried out, namely the Head Office of Perum Bulog will ask the Divre to

procure rice then the Divre will carry out Contract Negotiations with Work Partners. Furthermore, the Work Partner will send the rice to the Warehouse based on the agreed contract. Before receiving the rice, the Survey Officer at the Warehouse will check the feasibility of the rice (Quality Survey).

2. Based on the analysis results, the number of orders for economical rice is 78,558 tons. With an order frequency of 436 times, the number of safety stock that must be owned by Perum Bulog Divre NTT is 85,762.98 tons and the Maximum Inventory that can be managed is 86,548.56 tons.

Suggestion

1. Based on the conclusions above, it can then be found several suggestions that can be taken into consideration for the Company in determining inventory control policies in the coming period as follows.
2. The company should be more optimal in procuring rice from the production of farmers in East Nusa Tenggara
3. The company should pay more attention to the number of economical orders for each order and the maximum amount of inventory, as well as the reorder point. 4. The company should optimize rice inventory control so that the total inventory cost canbe more efficient.

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