ANALYSIS OF MATERIAL INVENTORY MANAGEMENT IN CANNED FOOD SME

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Abstract

Material inventory is a fundamental aspect of the company. The smoothness of the production process is not only based on the level of effectiveness in the production process, but also on other processes related to material inventory. If materials are in short supply, the production process will experience disruption which results in financial and non-financial losses. If there is too much material inventory, then the material storage costs borne by the company will be greater. The aim of this research is to maximize material supplies and determine the right time to reorder raw materials. The methods used are EOQ, ROP, and ITO. Data collection was carried out quantitatively at a fish canned food company. Based on the calculation results, it was found that the economic level of purchasing main raw materials using the EOQ method approach was 25 kg per order and the recommended reorder amount was 10 kg per order, while for safety sticks the recommended amount was 4.4 kg/day.

Keywords: Canned Food, EOQ, Inventory Management

INTRODUCTION

Business competition is getting tighter, so every company wants to endure sued for work with more efficient and effective in face level competition business more strict For guard continuity of company operations (Pitoy et al., 2016). Several influencing factors continuity operation on something company influenced by various typefactor for example price product, supply material raw, and effectiveness production (Nur Daud et al., 2017). Problem inventory considered very important for companybecause it can affect the company's production function where it is determined by arrangement supply. When supply considered safe in accordance need, so process flowtime and flow rate happen in production company can reach levels expected, thereby on the contrary when inventory does not match needs, then the performance of flowtime and flowrate will be disrupted will ultimately affect productivity levels company.

If a supply of raw materials is considered sufficient, there will be none problems that can disrupt the course of production, resulting in finished goods produced according to a predetermined time is direct can ensure level effectiveness activity marketing in give satisfaction optimal to customer (Sanjaya & Purnawati, 2021). However if material standard no available or amount quantity needed not enough, so company lost chance for seize or control market because company no can supply material on level optimal. Based on the description above, inventory can be intepreted as stock of goods will marketed or used in period time certain for activity sale. Without exists system supply sufficient, company faced on a risk

no can fulfil amount request desired customers. Likewise, if there is too much inventory then cost issued for handle supply the increasingly big.

This raw material ordering is not optimal due to the quantityuneconomic ordering from the company because there is no such thing tools that can predict the amount of demand and supply of goods or predictions still in level conventional (Hadi et al., 2020). Wrong one for predictamount booking material with method maximizing amount economical materialand the order price is also called the Economic Order Quantity (Kamarudin & Amalyah Rasyid, 2023). Apart from inside maximizing amount booking material, company must know When make your next order. The reorder point is called as Reorder Points (ROP). Function ROP is for know when somethingcompany must do booking return and how many bigthe order.

Based on description on, writer try study control inventory with take studies case in canned fish food with objective For know levels control already done companyand evaluate form control company. So the formulation problem in study such as what composition biggest supply material on product fish canned food and how many average need the ingredients must fulfilled, how many big mark EOQ so that created booking material standard economical, and when done booking return If use method ROP And how many big mark safety stock must fulfilled. Then objective this study such as : (1) Find out the composition of the largest inventory of ingredients in canned food products and determine the average amount of ingredients needed, (2) Determine the size of the EOQ value to create economical raw material orders, and Determine when to place a reorder and determine the value of the safety stock.

METHODS

For the type of data collection in this research, the author used direct interviews, documentation and literature data. The direct interview technique is a method of collecting data by asking the relevant parties directly to obtain information about the issue being studied. The author conducted interviews with management and customers to obtain information and input on the research. Documentation is carried out by obtaining data that already exists and has been previously recorded. Apart from that, data was also collected from scientific books and other sources obtained during research.

Meanwhile, research data is divided into primary data and secondary data. primary data was obtained through direct observation and testing. This data is in the form of questionnaire results obtained also through interviews with management and customers. Meanwhile, secondary data is obtained from internal data, namely data obtained from books or reports available at the company and external data, namely other references outside the company. Secondary data needed in this research include sources from the Internet and research journals that support this research.

The research carried out is quantitative research. Takingdata is data taken based on results observation and interviews with company owners, while the research object is in industry fish canned food on July 2023. As for analysis data in this research uses Suply, Safety Stock (SS), Average Inventory (AI), Inventory Turn Over (ITO), Reorder Points (ROP), and Economics Orders Quantity (EOQ).

RESULT AND DISCUSSION

A. Supplies Material

Material inventories are goods or materials that are stored over time and period certain and for sale on time will come (Sukendar et al., 2020). Meanwhile, according argument from (Pratiwi et al., 2020), supplies can influence notes report finance. Reason company must notice supply because supply can determine direction company, like plan production, plan sale, until to satisfaction consumer (Tiloly et al., 2022). If in company too a little reserve supply There is, so process production will hampered, it's delayed delivery of goods, to consumer complaints because the goods have been delivered ordered did not arrive on time (Lubis et al., 2022). Meanwhile, if there are too many companies inventory reserves will have an impact on quality reduction material due to being stored for too long includes the possibility of swelling cost storage (Prihasti et al., 2021). Based on data Already processed there is a number of factor influence emergence cost supply, that is as following:

1. The main raw material cost is fresh fish IDR 70,000,- as the main raw material for canned fish food, while supporting raw materials include tomatoes, sugar, chilies, salt, monosodium glucomate, shallots and white onions, bay leaves, some ginger and galangal.
2. Frequency of ordering main raw materials every month is 25 times.
3. The average daily order of main raw materials is 4 kg of fresh fish, with prices average booking material standard every time message fish IDR 280,000.
4. Time wait material main standard is a day, with material fish as the main raw material accounts for more than 60% composition material brought in from supplier to center canner.
5. The average product demand per day is 30 cans by weight net 300 grams/can.
6. The fraction of material storage costs is 10% is calculated from the costs electricity/lighting, obsolescence And material handling to total cost quantity material standard.
7. Amount day Work employee every Sunday as much 6 day.

B. Safety Stock

Following is need material standard fish for canning based on daily data recaps for the period 1 July - 31 July 2023 showed on table 1.

Table 1. Requirements Material Fish Raw July 2023

Date (1 to 16)	Needed	Date (17 to 31)	Needed
July 1, 2023	5 kg	July 17, 2023	4 kg
July 2, 2023	7 kg	July 18, 2023	7 kg
July 3, 2023	3 kg	July 19, 2023	7 kg
July 4, 2023	4 kg	July 20, 2023	6 kg
July 5, 2023	4 kg	July 21, 2023	6 kg
July 6, 2023	5 kg	July 22, 2023	5 kg
July 7, 2023	7 kg	July 23, 2023	5 kg
July 8, 2023	7 kg	July 24, 2023	5 kg
July 9, 2023	7 kg	July 25, 2023	8 kg
July 10, 2023	6 kg	July 26, 2023	8 kg
July 11, 2023	3 kg	July 27, 2023	10 kg
July 12, 2023	3 kg	July 28, 2023	9 kg
July 13, 2023	3 kg	July 29, 2023	6 kg

Date (1 to 16)	Needed	Date (17 to 31)	Needed
July 14, 2023	5 kg	July 30, 2023	6 kg
July 15, 2023	4 kg	July 31, 2023	6 kg
July 16, 2023	4 kg		

Based on from data taken on period July 2023, canconcluded as following : (1) Amount booking each month as much 31 time or every bookingmaterial standard fish done every day, (2) Minimum need production fish recorded as much 3 kg and the maximum recorded was 10 kg, (3) Average need production fish recorded as much 5,6 kg/day on period July 2023, and (4) Total need production fish recorded as much 175 kg/ month

Based on the data above, conclusions can be drawn regarding safety stock calculations as follows:
Safety Stock = (Usage Maximum – Usage Average) x Leads Time
$$= (10 \text{ kg} - 5.6 \text{ kg}) \times 1 \text{ day}$$
$$= 4.4 \text{ kg}$$

So the company must provide Safety Stock of 4.4 kg/daybefore the next order arrives. Safety stock amount 4.4 kg is to anticipate demand fluctuations come from consumer. Need is known that big minimum inventory is calculated from request average daily material standard multiplied with lead time then added to the size of the safety stock, the amount Maximum inventory is calculated from 2 times the average daily demand for materials The standard is multiplied by the lead time then added by the amount of safety stock, while the average inventory value is calculated by adding up minimum And maximum inventory then shared two.

Following data used for calculation big inventory, where orders for raw materials are made at the company is 1 time every day, between other as following :
D : Total need production fish recorded as much 175 kg/ month
d : Flat need production fish per day as much 5.6 kg/day
Ss : The size safety stock is 4.4 kg/ day
L : Leads time material 1 day

Based on data on, minimum, maximum, a n d a v e r a g e inventorycan calculated as following :
1. Minimum Inventory : (d x L) +Safety Stock = (5.6 kg x 1day) + 4.4 kg =10 kg/ day
2. Maximum Inventory : 2(d x L) +Safety Stock = 2(5.6 kg x 1day) + 4.4 kg =15.6 kg/ day
3. Average Inventory   : (min+ max inventory) / 2 = 10 kg + 15.6) / 2 = 12.8kg / day

C. Inventory Turn Over (ITO)

Inventory Turn Over (ITO) shows the comparison between requestsraw materials divided by average inventory. This concept is always used by management to monitor inventory levels. Inventory turnover in matter This is big number show exists a speed replacement on period certain.
ITO = request material standard / average supply material standard
$$= 175 \text{ kg} / 25.6 \text{ kg}$$
$$= 6.83$$

D. Reorder Points (ROP)

Reorder point is one type of inventory control, where company stage booking material base return to supplier because the company's stock is insufficient or there are sales orders exceed reserve supply company, so that need done ordering raw materials again (Aprilianti &

Ishak, 2023). With management good inventory through determining the reorder point , then the company does not need worry to accumulation material standard or lack material standard due to real time monitoring (Sukosyah et al., 2023). According argument (Idayani & Subchan, 2020), reorder point aim in set the amount quantity material standards in real time , where technically the relevant department submits quantity and items material standard to department procurement of materials so that material can ordered and processed quick possible (Kumala Sari et al., 2020). In determine booking return, to calculation must done. Calculation of reorder point (ROP) or also called reordering as following (Sukosyah et al., 2023) :

Reorder Pont = (AU x LT) + SS

Information :

AU : Average usage

 LT : Leads Time or where is time wait in unit day/week/month

SS : Safety stock or is supply safety

In control inventory, company must guard so that stock can used especially when experiencing a surge in demand. Checking and monitoring stock of materials is necessary so that when materials are needed it does not happen lack stock material, on the contrary stock material standard should also no too lots because give rise to accumulation material and risk material damaged getting bigger. Therefore, so that raw materials can be controlled according to demand and supply of raw materials, it is necessary control booking return or called Also Reorder Points (ROP). Calculation Reorder Points is as following :

ROP = Min Inventory = (d x L) + Safety Stock

= (5.6 kg x 1 day) + 4.4 kg

= 10 kg/ day

E.   Model Economics Quantity Orders (EOQ)

One of the methods used in analyzing the economic costs of materials is to use the EOQ method. This method helps companies in optimizing cost booking with method do quantity purchase optimally by reducing the amount of inventory costs (Ahmed et al., 2021). The EOQ concept is to achieve a minimum level of inventory possible with cost low however own quality more good (Pinatih & Hidayatullah, 2022). Determination mark EOQ can run effectively if several conditions are met, namely if at product demand, ordering cost level costs, and purchasing costs per the unit has a constant value or does not experience extreme levels of fluctuation (Sanjaya & Purnawati, 2021). Calculation booking or EOQ with method determine quantity inventory needed by company for operate activity operational. EOQ can be calculated with the formula as following (Filia Sari et al., 2023) :

$$EOQ = \sqrt{\frac{2\,D \times S}{H}} \quad ....(1)$$

EOQ = Quantity optimum units per orders

D = Orders annual in units

S = Cost orders For every orders

H = Cost storage per units per year

Based on the results of data collection at the company, the calculations are made EOQ as following:

1. The composition of the raw material for making gudeng lies in fish, so writer use fish as material standard main for calculation.
2. Orders for fish raw materials are made once a day, with The amount of demand for fish

raw materials ordered is 175 kg/month (R).

3. The company orders fish from fishermen at a price of IDR 70,000 / kg (P) with an ordering fee of IDR 1,000 each kg, so order cost (C) can calculated become :

   Order Cost (C) = Q / heavy x IDR 1.0 00,- = 10 kg / 1 kg x IDR 1.0 00,- = IDR 10.000,-

4. The fraction of material storage costs is 2 0% is calculated from the costs electricity/lighting, obsolescence And material handling compared with total cost quantity material standard.

So big EOQ value is as following:

$$\text{EOQ} = \sqrt{\frac{2\,C \times R}{P \times F}} = \sqrt{\frac{2\,\text{Rp }1,000 \times 175\text{ kg}}{\text{Rp }70,000 \times 0.2}} = \sqrt{\frac{350,000}{14,000}}$$

EOQ = 25 kg per order

Then calculated Total The cost every time message use method EOQ obtained Total Cost (TC) as following :

Total Cost (TC) = purchasing costs + ordering costs + storage total cost

$$\text{Total Cost (TC)} = P \times R + \frac{C \times R}{EOQ} + \frac{H \times EOQ}{2}$$

$$\text{Total Cost (TC)} = \text{IDR }70,000 \times 175\text{ kg} + \frac{\text{Rp }10,000 \times 175\text{ kg}}{25\text{ kg}} + \frac{\text{Rp }70,000 \times 0.2 \times 25\text{ kg}}{2}$$

Total Cost (TC) = IDR 12,250,000 + IDR 70,000 + IDR 175,000

Total Cost (TC) = IDR 12,320,000 per month

Then many booking economical in a year with use method Economics Orders Intervals , as following:

$$T^* = \frac{2\,C}{P \times F \times R} = \frac{2\,\text{Rp }10,000}{\text{Rp }70.000 \times 0.2 \times 175\text{ kg}} = \frac{\text{Rp }20,000}{2.450.000} = 0.00816 \text{ years}$$

T* (in day) = 0.00816 x 298 day Work in a year = 2.43 days

So that mark many economies ordering raw materials fish in a year :

$$m^* = \frac{1}{0.00816} = 122.5 \text{ or } 122 \text{ times each order of fish raw materials year or } 10.21 \text{ orders}$$ per month that the company must make For create frequency booking economical.

DISCUSSION

A. Supply

Based on the research results, it was found that the composition of the main raw materials in canning fish food includes fish, while the supporting raw materials include tomatoes, sugar, chilies, salt, monosodium glucomate, shallots and white onions, bay leaves, ginger and galangal. Therefore, the largest raw material inventory is fish as a raw material which is very influential on the company's inventory system level. Other data regarding the estimated need for fish raw materials is around 175 kg/month with orders for raw materials made every day or 30 times a month.

B. Safety Stock

After knowing the size of the safety stock, the next step is to determine the minimum and maximum values, as well as the average inventory that must be available before the next order is placed. Determining minimum, maximum and average inventory is important to avoid shortages of raw materials and to predict raw material order estimates every time a company places an order. Based on the results of the research calculations above, it shows that the average inventory of fish raw materials that must be provided by the company is 25.6 kg/day, with a minimum inventory of 10 kg/day and a maximum inventory of 12.8 kg/day. Determining the average inventory stock that must be met in order to anticipate risks that may occur in the company are as follows:

1. There is a risk of delays in delivery of raw materials or goods needed by the company.
2. Eliminates the risk if the fish raw materials ordered are not of good quality.
3. There is a risk of rising raw material prices or fluctuating inflation.

C. Inventory Turn Over

Based on the calculation data above, the company's Inventory Turn Over (ITO) is 6.83. This value shows the speed of inventory turnover. This shows that the higher the inventory turnover rate, the higher the level of costs that can be saved by the company, thereby affecting the company's profits. Therefore, if the inventory of goods sold or produced changes quickly, the better the company's sales performance will be, so it can be known or determined whether inventory management has been carried out well or vice versa.

D. Reorder Point

Based on the data above, the ideal number of reorders that the company must make according to calculations is 10 kg of fish/day so that the company does not experience a stock shortage of materials that must be produced.

E. Economic Quantity Order (EOQ) as an Inventory Solution

Based on the calculations above using the EOQ model approach, the following results were obtained:

1. The optimal amount of raw materials that must be ordered to minimize storage, purchasing and inventory ordering costs is 25 kg per order if using the Economic Order Quantity (EOQ) method approach.
2. The total cost required by the company if using the Economic Order Quantity (EOQ) method is IDR 12,320,000 / month.
3. In a year the economic frequency of orders is 122 orders per year or orders of 10.21 kg per month if using the Economic Order Interval (EOI) method approach.

By implementing the EOQ model, the company can know how much inventory must be ordered, and when the order must be made. If this is implemented, the company can reduce the uncertainty factor in terms of demand because the amount of safety stock has been determined. However, this model has weaknesses in terms of suppliers, especially suppliers who cannot meet the company's needs because the amount of demand for raw materials is not in accordance with the supplier's requirements, which results in disruption to the production process due to the company's relationship with the company's suppliers which is not based on a strong cooperative relationship.

CONCLUSION

Based on the calculation results when viewed from the inventory side, the following conclusions are obtained:

1. The largest composition of the main raw material in food canning is fish. Then the average fish production requirement was recorded at 5.6 kg/day in the July 2023 period with the total fish production requirement recorded at 175 kg/month.
2. Based on the EOQ calculation, it was found that the purchase of economical raw materials (fish) was 25 kg per order with a total cost of IDR 12,320,000/month with an economic ordering frequency of 12.2 orders per month.
3. The number of reorders (ROP) that the company must make is 10 kg of fish per order with Safety Stock being 4.4 kg/day before the next order arrives so that the company does not experience a shortage of stock of materials that must be produced.

Based on the results and conclusions in this research, there are several inputs and suggestions, including the following:

1. In activities to fulfill main and supporting raw materials, companies should prioritize production planning and real-time stock control.
2. Forecasting future needs is quite important to anticipate future needs or demands, so that when there is a surge in demand the company can anticipate in advance.
3. Determining the size of economic orders in this research uses calculations and basic EOQ theory, but in implementation in companies, company owners use orders based on large scales and discount prices. In the next research, research will be discussed again using the same approach according to the activities occurring in the field, so that ordering results are obtained that are more economical and profitable in terms of units**.**

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