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ANALYSIS OF RAW MATERIAL INVENTORY CONTROL BASED ON ECONOMIC ORDER QUANTITY METHOD AT PT. SAWITINDO MAS TANJUNG RAJA SAKTI, LAMPUNG

Henokh Xaverius Winata[1*], Iskandar Ali Alam[2]
[1.2]Faculty of Economics and Business, Bandar Lampung University, Indonesia
*Corresponding Author:
henokh.20011086@student.ubl.ac.id

Abstract
This research aims to determine the price difference used with the EOQ method, save production costs, and produce maximum results. The research uses random sampling techniques, the method in this research uses qualitative methods and secondary data sources, data collection methods namely observation and interviews. Population In this research, there were all 40 employees of PT Sawitindo, the sample used was 3 employees who were directly interviewed. The data analysis technique used in this research was using the EOQ and total cost methods. The contribution of research using the EOQ method is that it can save production costs at PT and produce optimal quantities. The results obtained by calculating the EOQ method are in September IDR 2,935,749 in October IDR 3,501,849, in November IDR 3,945,896. After using the EOQ method there is a large price difference, namely in September IDR 814,251, in October IDR 1,748,151, and in November IDR 804,104, In general, research using the EOQ method can produce maximum results with more cost effective.

Keywords: Raw Material Inventory, Inventory Control, EOQ Method

1. Introduction

It is undeniable that the future of the palm oil industry continues to find bright spots, domestically and even abroad/world. This industry is said to be more strategic because it has a good opportunity to play a bigger role and become an engine of economic growth and energy absorption. Domestically, government regulations in the development of nabatti fuel (BBN) as an alternative to fuel oil (BBM) provide good opportunities for further development of the palm oil industry. According to the government's achievements, about 10% of domestic fuel demand in 2010 will be supplied by biofuels, of which 7% will be made from palm oil or biodiesel. This required additional supply or large quantities of palm oil, and the project has been successfully restored. Shortly thereafter, all parties signed 60 agreements, 14 PMA and 26 PMDN.

The value of biofuel development projects in 2010 is estimated at $9 billion-$10 billion, plus bank funds of around Rp 34 billion. Employment absorbed amounted to 3.5 million people. Meanwhile, the use or consumption of palm oil in the global market has increased by an average of 8%-9% per year over the last 10 years. Going forward, this growth will continue and may increase depending on the use of alternative fuels such as vegetable oil or biodiesel. Palm oil is one of Indonesia's main commodities according to the 2021 Mundi Index, with 29.5 million tons of palm oil exported.

Trade in palm products is important for Indonesia because it provides foreign currency in the form of rupiah. 300 million. At the beginning of 2021, the price of crude palm oil (CPO) experienced drastic changes, even being in the range of $1,000 at the end of January, and rising to $1,196/ton in October. Fresh fruit bunches (FFB) rose to the highest

price of Rp 1,800-2,000 per kilogram. Industries that trade crude palm oil and palm kernel are vegetable oil absorbent industries, bath soap, basic oleochemicals, biodiesel and other vegetable oil industries. The profit potential of the palm oil industry creates fierce competition between companies, requiring them to optimize their resources to generate the best profits. Indonesia has 163 state-owned palm oil companies established in 15 provinces. 16.2 million Indonesians work in the palm oil sector, either directly (4.2 million people) or indirectly (12 million people).

The production of crude palm oil in palm oil mills goes through several stages. Overall, the FFB selection process involves oil extraction, oil refining, and separation of palm kernel and grain. The production process of crude palm oil involves a number of different combinations of processes. The FFB selection process uses a push device to perform lifting and pushing operations, while the oil removal process takes place through two process stations which include pull, lift and push operations.

The following is data on the income and expenditure of PT Sawitindo Mas Tanjung Raja Sakti in September.

Table 1. Palm Oil Income Data 2023

Date	Number of palms	Price per KG	Palm oil revenue
September 1-5	350ton	IDR 2,000	IDR 700.000.000,-
September 6-10	370ton	IDR 2,000	IDR 740.000.000,-
September 11-15	330ton	IDR 2,000	IDR 660.000.000,-
September 16-20	320ton	IDR 2,000	IDR 640.000.000,-
September 21-24	240ton	IDR 2,000	IDR 480.000.000,-
September 25-27	190ton	IDR 2,000	IDR 380.000.000,-
September 28-30	200ton	IDR 2,000	IDR 400.000.000,-

Total income in a month Rp.4.000.000.000

Source: data processed

Table 2. Price Difference

Moon	TIC by company	TIC according to EOQ	Savings
September	IDR 3,750,000	IDR 2,935,749	IDR 814,251
October	IDR 5,250,000	IDR 3,501,849	IDR 1,748,151
November	IDR 4,750,000	IDR 3,945,896	IDR 804,104

Source: processed data

Formulation-How does the waiting time affect the control of the Company? (The effect of time is very influential in production waiting time, if enough raw materials are available, processing will run according to production targets, otherwise if raw materials are lacking, there will be stuck in palm oil processing and other production.) -How to improve optimal quality with the lowest possible cost? (By reducing production costs and minimizing unnecessary cost overruns, and still employing diligent human resources who are able to meet daily production targets)-How to increase palm oil production? (By increasing the stock of palm oil raw materials and increasing one-day production targets by hiring overtime employees)

Limitation of problems research id conducted on the inventory of raw materials at P.T.Sawitindo Mas Tanjung Raja Sakti only discusses the raw material prices and costs contained in PT Sawitindo Mas Raja Sakti.

Purpose of the study is to determine the time gap for inventory control at PT Sawitindo Mas Tanjung Raja Sakti know the comparison of inventory costs from the Company's actual data with research that has been done -Know the waiting time distance on fresh fruit bunch inventory orders.

2. Theoretical Background

2.1. Understanding The Concept of Inventory

In all sectors in the company, inventory is the main factor for the sustainability of a company. Without a reserve inventory, companies can face risks that cannot provide fulfillment of consumer desires. There are three reasons why a company or organization needs supplies, namely uncertainty of demand (sudden demand) and uncertainty of the order cycle. According to Assauri (2008: 237), inventory is goods that are assets owned by a company that is stored. Inventory is an asset of provided in the sales process at normal business;b. It is in the production process or in the distribution; orc. In the form of materials or supplies used for the production process or procurement of services. Inventory is one of many types of lancer assets that are large in the company." While Alexandri (2009: 135) said: Inventory is wealth in the company that is intended to be purchased in a business period or inventory that includes merchandise or raw material inventory waiting to be used in the production process or production process.

2.2. Definition of Raw Materials

Procurement of raw materials refers to raw materials or stored materials owned by a company, which are used for production processes. Material inventory is the main ingredient of the product. Procurement of raw materials is the main thing in the company because the inventory of raw materials has a very influential influence on the smooth production. In addition, the supply of raw materials is the material used in production process activities, because the inventory of raw materials has a very large influence in the production process activities.

2.3. Factors Affecting Raw Material Inventory

According to Ahyari from Damayanti (2012: 16), there is a factor that can affect the procurement of raw materials, and has a relationship when managing raw material inventory in the implementation of the production process in a company.

2.3.1. Price

Price of raw materials if a company wants to save raw materials in a certain amount, then the cost of raw materials that must be incurred in the production of these materials is used as a determining factor in the amount of costs that must be incurred. The higher the cost of raw materials, the higher the capital that must be spent by a company, in reaching that level of inventory. Therefore, the cost of capital for raw material inputs will be higher.

2.3.2. Raw material estimation

Before purchasing raw materials, a company is required to estimate the raw materials to be used in the production process. This is done based on the production plan that has been designed before. The amount of raw materials a company must purchase can be calculated by adding those raw materials to the final inventory plan and subtracting the company's initial inventory.

2.4 . Raw Material Planning Using The EOQ Method

The designing sufficient raw material procurement plans is very helpful for the smooth production process. The smooth production process is very important for a company, because it will affect the sales and profits obtained by a company. The factor that affects the smooth production process is the availability of raw materials which will then be processed in the production process. PT. PT. Sawitindo Mas Tanjung Raja Sakti is a palm

oil manufacturing company whose main sales focus is palm oil production. The staple ingredient in making palm oil is palm oil. And to be able to continue the production process, raw materials must be available so that it can run smoothly.

2.5 Factors affecting inventory

In order for each company to achieve the predetermined target, the company must be able to fulfill several factors regarding the supply of raw materials. Economists try to explain all the rules about law. According to Handoko (2012: 369), factors that affect orders include:

1) Strict control is required.
2) Proper storage, receipt of information and use of materials.
3) Based on the calculation of needs.
4) Strong checking.
5) Monitor regularly.
6) Security backups are missing or limited.

In accommodating a function of material availability, the company has 4 types of procurement, including:

1) Raw material inventoryPurchased to accommodate production, but not yet produced supplies are used in separating supplies in the production process. However, the best practice is to eliminate supplier variability.
2) Semi-Finished Goods Inventory The procurement of half-baked materials (WIP inventory) is a raw material that has gone through a conversion process, but has not yet ended. WIP is generated by the time used in the preparation of a product. Reducing cycles can reduce supply.
3) Finished Goods InventoryFinished goods inventory is a product that has been completed and is just waiting for the understanding time. Finished goods may be kept in stock because future customer demand is unknown.

Each company is required to be able to carry out control of its supply. With raw material inventory control, the company's performance can be improved. Herjanto (2008: 238), stated, inventory control is several control policies in determining the level of inventory that is required to be maintained, the time to increase an inventory and also the amount of orders that must be seen, the quantity or level of supply needed by different companies in the company. According to Assauri (2008: 176) inventory control is one of various activities among a series of activities that are in accordance with the company's overall production according to prejudices such as time, quantity, quantity and price.

According to Rangkuti (2009: 25), inventory control is only one of various management functions that can be used in quantitative measurement methods. Usually, problems with the supply of raw materials owned by a company often arise. Controlling the inventory of raw materials in the company will certainly be able to support the company's internal operations so as to minimize costs and reduce future risks.

3. Method

In this study qualitative method, qualitative method is the technique used is random sampling used in processing the data studied, the object of this study is PT Sawitindo Mas Tanjung Raja Sakti located on Jl.Lintas Sumatra Tanjung Raja Sakti village, Blambangan Umpu District, Way Kanan. The data collection techniques in this study are in the form of observation is a data collection technique carried out by means of observation in the field, paying attention to the process carried out, listening to the advanced process, and

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smelling the characteristics of a material that will be used as a research variable, then interview according to Sugiyono (2017: 410) an interview is the meeting of two people who provide information or ideas to each other in a forum through question and answer process, The technique used is random sampling focused on a certain topic, in this study the population that is sampled is all employees of PT Sawitindo Mas

4. Results and Discussion

4.1 Storage Costs

Storage costs are costs that must be used when providing materials. Storage costs are obtained from the calculation results between average inventory and storage costs, at PT Sawitindo Mas consisting of electricity costs and security costs. The following is the storage cost per unit.

Table 3. Storage costs

Cost component	2021	2022	2023
Electricity Cost	125	140	220
Security costs	2250	4570	8500
Total	2375	4710	8720

Based on the table above, the total cost of storing FFB per ton in 2021 is IDR 2375 / ton, in 2022 it will increase by IDR 4710 / ton, and in 2023 it will increase rapidly at IDR 8720 / ton.

4.2 Calculation with EOQ Heizer and Render method (2017) Economic Order Quantity can be formulated as follows: Q= $\frac{\sqrt{2DS}}{H}$

Table 4. Economic Order Quantity

Expedition	2021	2022	2023
Phone charges	7000	6000	7000
Weighing costs	325.000	355.000	400.000
Sorting fee	615.000	720.000	710.000
Total	IDR 947,000	IDR 1,081,000	IDR 1,117,000

Q* = Optimal number of units/orders (EOQ)
S = Order cost (RP/order)
D = Annual demand for unit inventory items
H =Storage cost (rupiah/unit/year
Based on the above formula, EOQ can be taken as follows
-In 2021, FFB needs are 58,500 tons

$Q = = \frac{\sqrt{2DS}}{H} \frac{\sqrt{2.\ 58.500\ .\ 947.000}}{2375}$

$Q = \sqrt{46.652.210{,}5}$

Q = 6,830.2 tons

N =Number of expected requests $= \frac{58.500}{6.830{,}2}$

= 8.56 rounded up to 9 orders in a year

-Expected time between orders (T) = $\frac{\text{Jumlah hari kerja (H)/tahun}}{N} = \frac{285}{9}$ 31.6

-In 2022, the FFB needed is 65,700 tons

$Q = = \frac{\sqrt{2DS}}{H} \frac{\sqrt{2\ .\ 65.700\ .\ 1.081.000}}{4710}$

$= \sqrt{30.157.834,3}$
= 5,491.6 tons
N = Number of expected requests = 11.9 rounded up to 12 orders in a year.$= \frac{65.700}{5.491,6}$
-Expected time between orders (T) =
$\frac{\text{Jumlah hari kerja (H)/tahun}}{\text{N}} = \frac{285}{12}$ 23.75
-In 2023, the FFB needed is 83,560 TonQ = = = = = 13,662.8 Tons$\frac{\sqrt{2ds}}{H}\frac{\sqrt{2.83.560\ .\ 1.117.000}}{8720}\sqrt{186.673.040}$
N = Number of expected requests = 6.11 rounded up to 7 orders in a year = $= \frac{83.560}{13.662,8}$
$\frac{\text{Jumlah hari kerja (H)/tahun}}{\text{N}} = \frac{285}{7}$ 40.7

4.3 Inventory Cost Calculation

The total cost of supplies is the sum of order costs and deposit costs. The formula of the calculation according to the LOQ method is:

TIC S + H$= \frac{D}{Q}\frac{Q}{2}$

Remarks: TC = Total of Inventory CostsTIC = Total of Inventory Cost
C = Unit storage cost/year
P = Order/order cost
F = Frequency in Purchases

From this formula, below is the result of calculating the total cost of inventory at PT Sawitindo Mas Tanjung Raja Sakti for the 2021-2023 period using the Economic Order Quantity (EOQ) method, which is as follows:

-Period in 2021 TIC S + H = 947,000 + 2375 = Rp.8,110,963 + 8,110,862.5 = Rp.16,221,825.5
$= \frac{D}{Q}\frac{Q}{2}\frac{58.500}{6.830,2}\frac{6.830,2}{2}$
-Period 2022TIC S + H = 1,081,000 + 4710 = Rp.12,932,788.2 + 12,932,718 = Rp.25,865,506.2$= \frac{D}{Q}\frac{Q}{2}\frac{65.700}{5.491,6}\frac{5.491,6}{2}$
-Period 2023TIC S + H = 1,117,000 + 8720 = Rp.6,831,434.2 + 59,569,808 = Rp.66,401,242.2$= \frac{D}{Q}\frac{Q}{2}\frac{83.560}{13.662,8}\frac{13.662,8}{2}$

Before using the EOQ method, the costs required each year were in 2021 RP.30,600,760, Year 2022 RP.53,155,000, in 2023 RP.112,950,000. After using the EOQ method there is a considerable price difference, therefore the company can streamline costs with the EOQ method on raw materials per year.

4.4 Purchase of Fresh Fruit Bunches (FFB)

PT Sawitindo Mas is a company whose main focus is the plantation industry. The main focus of this company is the processing of palm oil into 2 producers, palm oil and palm kernel. Every day, the company processes FFB of 30 tons / h by taking 20 hours / day, so it can be said that this company can produce approximately 650 tons per day. In fulfilling daily needs, the company gets FFB supplies sourced from plantations owned by the company and others from purchases from third parties. Based on existing data, the amount calculated in purchasing FFB based on the policies that have been implemented by the company is 250 times a year as follows:

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-In 2021 FFB purchases = = $\frac{\text{Kebutuhan TBS}}{\text{Frekuensi pembelian}}$ 234 tons-In 2022 FFB purchases = $\frac{58.500}{250}$ = $\frac{\text{Kebutuhan TBS}}{\text{Frekuensi pembelian}}$ 262.8$\frac{65.700}{250}$
-In 2023 FFB purchases
$\frac{\text{Kebutuhan TBS}}{\text{Frekuensi pembelian}}$ = $\frac{83.560}{250}$ = 334.2

4.5 Raw material needs within a month period September-November
Table 5. Storage costs

Cost component	September	October	November
Electricity Cost	130	175	190
Security costs	575	590	615
Total	705	765	805

Table 6. Monthly costs

Expedition	September	October	November
Phone charges	2500	3000	2900
Weighing costs	150.000	175.000	175.000
Sorting fee	255.000	280.000	300.000
Total	407.500	458.000	477.900

4.6 Calculation of monthly EOQ method
-In September 2023, FFB needs are 15,000 tons Q= = Q = =
=4,164.18$\frac{\sqrt{2DS}}{H}\frac{\sqrt{2.\ 15.000\ .\ 407.500}}{705}$
N = Expected number of requests $\sqrt{17.340.425}$
= = 3.60 rounded up to 4 orders in a month-In October 2023, FFB needs are 17,500 tons Q
= = $\frac{15.000}{4.164,18}\frac{\sqrt{2DS}}{H}\frac{\sqrt{2.\ 17.500\ .\ 458.000}}{765}$
Q = = 4,577.58 rounded up to 6 orders a month-In November 2023, FFB needs of 20,000 tons Q= = Q = = 4,372.18 rounded $\sqrt{20.954.248,36}\frac{\sqrt{2DS}}{H}\frac{\sqrt{2.\ 20.000\ .\ 477.900}}{805}$
up to 5 orders a month $\sqrt{19.116.000}$

4.7 Inventory costs

September 2023 Period TIC S + H = 407,500 + 705 = 1,467,876.02 + 1,467,873.45 = RP.2,935,749.47-October 2023 Period TIC S + H = 458,000 + 765 = 1,750,925.16 + 1,750,924.35 = RP.3,501,849.51 - November 2023 period TIC S + H = 477,900 + 805 = 2,186,094 + 1,759,802.45 = RP.3,945,896.45= $\frac{D}{Q}\frac{Q}{2}\frac{15.000}{4.164,18}\frac{4.164,18}{2}$
= $\frac{D}{Q}\frac{Q}{2}\frac{17.500}{4.577,58}\frac{4.577,58}{2}$
= $\frac{D}{Q}\frac{Q}{2}\frac{20.000}{4.372,18}\frac{4.372,18}{2}$

Before using the EOQ method, the cost required every month is September RP.5.600.765, October RP.7.805.500, November RP.8.950.600. After using the EOQ method there is a considerable price difference, therefore the company can make cost efficiency with the EOQ method on raw materials.

Moon	TIC by company	TIC according to EOQ	Savings
September	IDR 3,750,000	IDR 2,935,749	IDR 814,251
October	IDR 5,250,000	IDR 3,501,849	IDR 1,748,151
November	IDR 4,750,000	IDR 3,945,896	IDR 804,104

5. Conclusion

Based on the research that has been done, several conclusions are obtained as follows:

1) PT Sawitindo Mas is a company engaged in the plantation industry. The main focus of this company is the processing of palm oil by making 2 producers, palm oil or FFB and palm kernel. From the results of research that has been done, it can be seen if the cost of ordering using EQQ is cheaper, because the frequency of ordering supplies is reduced, therefore the cost of ordering can be reduced when ordering supplies. However, the EQQ method cannot be used in the company's palm oil supply, this is because FFB cannot be stored for more than 1 day. Meanwhile, if the company uses the EOQ method, the company is required to store FFB within 36 days until the next purchase.
2) Effective FFB purchases per order using the Economic Order Quantity method are 6,830.2 tons in 2021, 5,491.6 tons in 2022, and 13,662.8 tons in 2023, respectively.

Based on the results of research that has been conducted by researchers, there are at least 2 suggestions that will be submitted, namely:

1) From the results of the research that has been done, the researcher provides suggestions for companies to apply the EOQ method in controlling the preparation of palm oil, if the company produces palm oil and palm kernel, which is not based on orders, but based on the process method. In addition, researchers also advise companies to produce other than crude oil, but companies to be able to make cooking oil or finished materials themselves. By making these cooking oil products, it is not impossible that the company can get greater profits than before.
2) The research that has been done can be used as reference material for researchers who will be carried out next, and can also be a comparison with research of one type in reducing the error rate in taking references. The researcher also suggested that the Economic Order Quantity method could not be used in controlling supplies whose materials are not durable or cannot be stored for a long time.

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