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ANALYSIS OF RAW MATERIAL INVENTORY CONTROL USING THE ECONOMIC ORDER QUANTITY METHOD IN THE TAHU TEMPE JAGOR TOLITOLI BUSINESS

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Abstract

This study aims to find out and analyze the Control of Raw Material Inventory in the Tofu Tempeh Jagor Toli Business, This study uses a quantitative research design. Data sources are in the form of Primary and Secondary data, Primary data is data collected directly from the main source such as interviews and so on, and secondary data is the data of a research taken from existing sources in the form of evidence, records or historical reports that have been compiled or the recording process carried out by the party concerned. The data collection techniques used are observations, information or explanations expressed in numbers or in the form of numbers, then drawing conclusions and quantitative data in the form of questionnaire data are analyzed with quantitative data analysis techniques. Based on the results of the study and discussion, it was concluded that it can be known that the comparison of soybean raw material inventory between company policies and the use of the EOQ method can be known. Based on the results of the inventory cost analysis, it can be seen that the Company's calculation results for 2021 amounted to Rp.293,190 while according to EOQ amounted to Rp.206,983 so that with the implementation of EOQ, a savings of Rp.86,207 was obtained, then in 2022 the Company's value was obtained of Rp.315,840 according to the EOQ of Rp.221,524 a saving of 94,316 and in 2023 the Company's value was obtained of Rp.333,000 according to the EOQ of Rp.231,991 a saving of Rp.101,009. analysis can be said that with the implementation of EOQ, the company can obtain inventory cost savings.

Keywords: *Inventory Control; raw materials, Raw Material Inventory; EOQ*

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INTRODUCTION

Every company in carrying out its business activities always wants to grow, which results in more and more problems faced by the company. For companies to earn profits and maintain survival is the main goal that companies want to achieve. To be able to achieve these goals, companies need to make a good plan that can be used as the basis for the company in carrying out its activities (U. Yusuf, Annisarahmawati et al., 2021).

With the rapid development of the business world as it is today, it causes fierce competition between businessmen so that entrepreneurs are looking for the right strategy to be able to grow their products. When it comes to creating and retaining loyal buyers. Therefore, every business actor who has sensitivity to changes in business competition conditions must have sensitivity to changes in business competition conditions that occur in their environment and place an orientation towards the ability to attract purchasing decisions in order to successfully run their business.

Currently, there are many similar industries that result in the emergence of competition. Increasingly fierce competition and slow economic growth result in problems, especially in obtaining profits, therefore it requires every company to prevent faster by being more proactive in implementing strategies so that consumers remain interested and satisfied. Deli Aulia (1:2021) in (Efendi et al., 2022).

The working capital should be available in a large enough amount to enable the company to operate economically and not experience financial difficulties, for example being able to cover losses and overcome crisis or emergency situations without endangering the company's financial condition. (Mardiana & Rahim, 2021)

Raw materials play a key role in the smooth production process, so companies need to have adequate supplies of raw materials to support their production activities. If the supply of raw materials is hampered, the production process will be constrained, potentially affecting the level of output produced. Therefore, the function of inventory control and planning is crucial and must be implemented by every company. Companies must be able to determine the needs of raw materials optimally to avoid ordering raw materials in quantities that are too small or too large. For this reason, it is necessary to control raw materials in a business management.

According to Wijayanti & Sunrowiyati, (2019) what is meant by inventory control is the sequence of production activities in accordance with the planning of quantity, time, quality or cost which has a relationship between one and the other. Inventory is the stock of an item or resource used in the company's organization. An inventory system is a collection of policies and controls that monitor inventory levels, determine which levels should be maintained, when stocks should be replenished, and how much should be ordered. Manufacturing inventory generally consists of items that contribute or will be part of a company's product output. In the context of analysis in the manufacturing of service stock administration funds, the goal is to determine when the order will be placed and how much should be ordered (Assauri 2016 in Fitriyah 2018).

According to Wijayanti & Sunrowiyati, (2019) which is the purpose of inventory control, among others: (1) Keeping consumers who buy in small quantities can be avoided, because it can result in large order costs; (2) To meet the needs and demands of consumers quickly; (3) Inventory in emplacement can be maintained so that storage

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costs do not increase; (4) To increase and maintain profits and sales in the company; (5) To keep the production process from being stopped due to delays in the required inventory. The reason for all these things is that it is possible that auxiliary materials and raw materials are scarce which makes it difficult to obtain them and suppliers are slow to send materials that have been ordered by the company

Excess raw material inventory or overstock can have a negative impact on the company, reducing profits due to increased costs. The impact is not only limited to a decrease in profits, but also incurs additional costs such as storage costs and raw material maintenance costs. Storage costs can include the cost of raw material storage, which is increasingly complex due to the adverse impact of overstocking of raw materials. In-depth handling of inventory problems, especially raw material overstocking, is indispensable to overcome negative consequences for companies. For this reason, the method of controlling raw materials can be carried out using the *economic order quantity* (EOQ) method.

The Economic Order Quantity (EOQ) method is one of the most well-known methods in inventory management and is a classic and simple method. In theory, the EOQ concept is the simplest setup model. Economic Order Quantity (EOQ) is the number of orders that can minimize the total cost of inventory, optimal purchase. To find out how much total materials remain to be purchased in each purchase to cover the needs for a period. (Trihudiyatmanto, 2017).

The Tofu Tempe Jagor business is one of the businesses engaged in manufacturing which is located in Kalangkangan, Galang District, Tolitoli Regency The products produced are tofu and tempeh. As for the results of the interviews I got from business owners, the problem in this study is due to the purchase of raw materials that are carried out continuously, which only relies on unclear forecasting and calculation methods, which can result in significant waste of inventory costs and have a negative impact on the company's profits. Therefore, it is necessary to implement the right methods, such as Economic Order Quantity (EOQ), to optimize the management of raw material inventory and prevent inaccuracies in purchasing. To overcome the risk of production activities being hampered, companies need to develop raw material inventory control as a determinant of effectiveness and efficiency in raw material management. Although the tofu and tempeh jagor business has not applied analysis using the EOQ method and is more likely to use simple calculations, the adoption of this method is expected to help overcome the problem of inability to control inventory. A comparative analysis of the company's method with EOQ will provide a clear picture of the advantages and disadvantages of each approach in managing raw material inventory.

Based on the above background, the author is interested in conducting a research entitled "Analysis of the dependence of raw material inventory using the Economic Order Quantity method in the tofu tempeh jagore business". From the background that has been stated, the purpose of this research is "How to control the supply of raw materials using the Economic Order Quantity method in the Tofu Tempe Jagor Tolitoli Business in 2021 to 2023?

METHODOLOGY

Economic Order Quantity (EOQ)

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The magnitude of EOQ can be determined in various ways, and among others the widely used is the use of the formula According to Heizer and Render in (Seran et al., 2016) as follows:

$$EOQ = \sqrt{(2SD/H)}$$

Information:
EOQ : Optimal Quantity (EOQ Unit)
D : Demand in units (usually on an annual basis)
S : Order Fee (Purchase Order Cost)
H : Storage Fee (Cost Per unit or Per year)

Total Investory Cost
According to Heizer and Render (2011) in Sri Suharti (2018) the formula for the total cost of inventory is as follows:

$$TIC = \sqrt{(2.D.S.H)}$$

Information:
D : Sales quantity per period (kg/year)
S : Cost per message (Rp/year)
D : kg storage fee (Rp/kg/year)

Safety Stock
Irham Fahmi (2014) in Fitriyah, (2018) Safety Stock is the Company's ability to create inventory conditions that are always safe or full of security in the hope that there will never be a shortage of inventory. The formulation of the saftey stock calculation can be seen as follows:

Safety Stock = (maximum usage – average usage) X Lead time

Re Order Point
The calculation of the number of Re Order Points (ROP) can be calculated using the formula according to Handoko (2014) in Daud (2017) is:

ROP = (Lead Time × Usage per day)

RESULTS AND DISCUSSION

Data on Purchase and Consumption of Soybean Raw Materials
The tofu tempe jagor business purchases soybeans from one of the soybean suppliers that provides soybeans that have been its partners so far.

Table of raw material purchase data for the Tofu Tempe Jagor Business

No.	Month of Purchase	Year		
		2021 (Kg)	2022 (Kg)	2023 (Kg)

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1	January	1.500	1.500	1.520
2	February	1.480	1.500	1.510
3	March	1.470	1.500	1.540
4	April	1.500	1.500	1.550
5	May	1.500	1.500	1.500
6	Juni	1.450	1.460	1.500
7	July	1.480	1.480	1.500
8	August	1.500	1.450	1.500
9	September	1.480	1.500	1.480
10	October	1.450	1.450	1.500
11	November	1.500	1.500	1.460
12	December	1.500	1.500	1.500
Total		17.810	17.840	18.080
Average		1.484	1.487	1.507

Table of Raw Materials Usage of Tofu Tempeh Jagor Business

No.	Month of Use	Year		
		2021 (Kg)	2022 (Kg)	2023 (Kg)
1	January	1.450	1.500	1.500
2	February	1.450	1.500	1.510
3	March	1.450	1.490	1.550
4	April	1.500	1.500	1.550
5	May	1.500	1.480	1.500
6	Juni	1.450	1.450	1.490
7	July	1.480	1.470	1.460
8	August	1.500	1.450	1.500
9	September	1.480	1.500	1.480
10	October	1.450	1.450	1.500
11	November	1.500	1.490	1.450
12	December	1.500	1.500	1.510
Total		17.740	17.780	18.000
Average		1.478	1.482	1.500

The use of soybean raw materials for the manufacture of tofu tempeh is adjusted to the production plan which is based on the sales forecast from the owner which is then confirmed to the production department. Based on the production plan, the Company can estimate the amount of soybean needed to be used.

Cost Table ordering of soybean raw materials

Cost Type	Year		
	2021 (IDR)	2022 (IDR)	2023 (IDR)
Telephone	11.500	11.500	11.500
Total cost per year	138.000	138.000	138.000

Table of storage costs of soybean raw materials

Types of fees Electricity	Year		
	2021 (IDR)	2022 (IDR)	2023 (IDR)
	Rp.175.500	Rp.180.000	Rp.195.000
Total cost per year	Rp.1.800.000	Rp.2.160.000	Rp.2.340.000

Biaya pengadaan atau pemesanan timbul saat dilakukan pengadaan terhadap kedelai.

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Table of Storage Fee Percentages, Price per kg, and Storage Costs

Year	Storage fee (%)	Price per Kg	Storage costs
2021	0,01	Rp. 10.500	Rp. 105
2022	0,01	Rp. 12.000	Rp. 120
2023	0,01	Rp. 13.000	Rp. 130

The storage costs needed for further analysis, are calculated in the form of a percentage, which is a percentage of the value of the inventory. The amount of inventory value is the amount of raw materials ordered per order and the price of raw materials is a variable cost whose amount depends on the amount of raw materials each time ordered. The amount of storage costs for soybean raw materials is set by the Company at 0.01% of the value of inventory.

Economic Order Quantity Calculation

Year 2021

$$\text{EOQ} = 1.971 \text{ kg} \frac{\sqrt{2x17.740x11.500}}{105} \frac{\sqrt{408.020.000}}{105} \sqrt{3.885.904}$$

Year 2022

$$\text{EOQ} = \text{kg} \frac{\sqrt{2x17.780x11.500}}{120} \frac{\sqrt{408.940.000}}{120} \sqrt{3.407.833} = 1.846$$

Year 2023

$$\text{EOQ} = 1.784 \text{ kg} \frac{\sqrt{2x18.000x11.500}}{130} \frac{\sqrt{414.000.000}}{130} \sqrt{3.184.615}$$

Safety stock

The following is the calculation of safety stock for soybean raw materials:

$$\text{SS} = \text{Max average usage x} - \textit{lead time}$$

Year 2021 ; 1,500 - 1,478 x 7 = 154 kg
Year 2022 ; 1,500 - 1,482 x 7 = 126 kg
Year 2023 ; 1,550 - 1,500 x 7 = 350 kg

Reorder point

Year 2021

$$\text{Average usage} = 219 \text{ kg} \frac{EOQ}{waktu\ pemesanan} \frac{1.971}{9}$$

Lead time = 7 days.
Solutions:
ROP = Lt x Q

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7 x 219 = 1.533 kg

Year 2022

Average usage = = = 185kg$\frac{EOQ}{waktu\ pemesanan}$ $\frac{1.846}{10}$

Lead time = 7 days.

Settlement

ROP = Lt x Q

1. x 185 = 1.295 kg

1. Year 2023

Average wear = = = 178 kg$\frac{EOQ}{waktu\ pemesanan}$ $\frac{1.784}{10}$

Lead time = 7 hari.

Solutions:

ROP = Lt x Q

7 x 178 = 1.246 kg

By reordering, it is hoped that it can avoid a shortage of raw materials and excess raw materials so that the company can save a lot of costs.

Table of EOQ, Safety stock, Reorder points in 2021-2023

Year	Frequency	EOQ (Kg)	Safety stock (Kg)	ROP (Kg)
2021	9	1.971	154	1.533
2022	10	1.846	126	1.295
2023	10	1.784	350	1.246

Based on the table above, it can be seen that the quantity of purchases using the EOQ method is larger and still with less frequency compared to the method from the company. Therefore, it can be said that the purchases made by the Tempe Tofu Business are not efficient.

The following is the calculation of the total cost of raw material inventory according to the EOQ for 2021-2023:

Year 2021

TIC = $\sqrt{2x17.740x11.500x105}$

= $\sqrt{42.842.100.000}$

= IDR 206,983

Year 2022

TIC = $\sqrt{2x17.780x11.500x120}$

= $\sqrt{49.072.800.000}$

= IDR 221,524

Year 2023

TIC = $\sqrt{2x18.000x11.500x130}$

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= $\sqrt{53.820.000.000}$
= IDR 231,991

The following is the calculation of the total cost of raw material inventory by company in 2021-2023:

Year 2021
TIC = (1.478x105) + (11.500x12)
= 155.190 + 138.000
= 206.983

Year 2022
TIC = (1..482x120) + (11.500x12)
= 177.840 + 138.000
= 315.840

Year 2023
TIC = (1.500x130) + (11.500x12)
= 195.000 + 138.000
= 333.000

Comparison Table of Total Inventory Cost (TIC) between the EOQ method and the company method

Year	TIC by EOQ	TIC by company	Savings
2021	Rp.206.983	Rp.293.190	Rp.86.207
2022	Rp.221.524	Rp.315.840	Rp.94.316
2023	Rp.231.991	Rp.333.000	Rp.101.009

Based on the table above, it can be seen that by using the EOQ method it saves more total inventory costs compared to the method applied by Usaha Tofu Tempe Jagor, this can be seen from the calculation of the Total Inventory Cost (TIC) using the EOQ method is smaller than the Total Inventory Cost (TIC) that must be incurred by the company. The difference in TIC for soybean raw materials in 2021 is Rp.86,207, then the difference in TIC for soybean raw materials in 2022 is Rp.94,316 and for the difference in soybean TIC in 2023 is Rp.101,009.

CONCLUSION

From the results of the inventory control analysis with the EOQ method, it can be seen that through the implementation of EOQ, it shows that ordering soybean raw materials is more economical with less frequency so as to save inventory costs incurred by the company, In the procurement of inventory when using the company's policy, more costs are incurred due to the quantity of raw material purchases that are not in accordance with the needs and more frequently.

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