

The Implementation of the Right Raw Material Inventory Control System in an Effort to Improve the Results of the Production Process in UD. R&D Handicraft Lamongan

Hanif Romadhon¹, Abid Muhtarom², Mohammad Yaskun³

Management, Faculty of Economics, Lamongan Islamic University

Email: hanifromadhon@unisla.ac.id abid@unisla.ac.id m.yaskun@unisla.ac.id

Article Info	ABSTRACT
Keywords: EOQ, Safety Stock, Re Order Point.	A company that is established has the goal of achieving the expected profit. The achievement of the company's goals is determined by the raw materials that are processed in production, so the company needs proper control of the raw material inventory. This is very important for the company because it greatly affects the profit earned by the company. In analyzing the data, the author uses quantitative methods . The data analysis determines the control of raw material inventory by using the EOQ method to determine the optimal amount of purchase, the Safety Stock method to determine the safety inventory and the Re Order Point method to determine when the company has to reorder raw materials. The results of the calculation of the total average purchase of raw materials using the EOQ method are more efficient than the company's policy. In addition, the inventory costs incurred by the company if using the EOQ method are lower.
This is an open access article under the CC BY-NC license 	Corresponding Author: Hanif Romadhon Management, Faculty of Economics, Lamongan Islamic University hanifromadhon@unisla.ac.id

INTRODUCTION

The increasingly fierce competition between companies encourages each company to establish precise control over the supply of raw materials so that the company can continue to exist to achieve its desired goals. But achieving this goal is not easy because it is influenced by several factors. One of the influencing factors is the problem of smooth production. Production problems are very important problems for companies because they have a great influence (Putri Wijayanti, 2019:181) on the company's profits. If the production process does not run smoothly, the company's goals will not be achieved.

The smooth production process is influenced by raw materials. Every company needs supplies. Without supplies, entrepreneurs will be faced with the risk that their company at some point will not be able to meet the needs of their customers. One of the most important managerial functions is inventory control. If a company invests too much of its funds in inventory, this will lead to excessive storage costs and may have *opportunitiy costs*. All companies have the same goal, which is to smooth the production process of the company

concerned so that it is expected to meet the demand from consumers at the most efficient cost possible.

Sufficient raw material inventory can facilitate the production process and the finished goods produced must be able to ensure the effectiveness of marketing activities, namely providing satisfaction to customers. With a sufficient supply of raw materials available in the warehouse, it is also hoped that it can facilitate production activities or services to the company's consumers and can avoid a shortage of raw materials. As a manufacturing company engaged in the production of handicrafts from water hyacinth, UD. R&D HANDICRAFT requires very large raw materials as production materials, so inventory control is required.

Research conducted by Kristina, Badriyah, and Yulia (2020) regarding the control of raw material inventory at Faizam Beton Sugio Lamongan shows that the application of the Economic Order Quantity (EOQ) method can help companies determine the number of raw material orders that are economical, reduce inventory costs, and ensure the availability of raw materials for the production process. In addition, the use of Safety Stock and Reorder Point is able to reduce the risk of raw material shortages that can hinder the production process. The results of the study prove that the right inventory control system can increase production cost efficiency and support the smooth running of the company's operational activities. This finding is relevant to research on the application of a raw material inventory control system in UD. R&D Handicraft Lamongan because they both discuss efforts to increase the effectiveness of the production process through optimal management of raw material inventory.

Literature Review And Problem Statement

One of the important aspects in the operational activities of manufacturing companies because it plays a role in ensuring the smooth production process. According to Putri Wijayanti (2019), the smooth production process greatly affects the company's ability to achieve goals and obtain profits. Therefore, companies need to effectively control raw material inventory so that the production process can run smoothly.

Raw material inventory control is an activity that aims to determine the optimal amount of inventory so that production needs can be met at an efficient cost. Too large an inventory will increase storage costs, damage risks, and capital costs embedded in inventory. On the other hand, too little inventory can lead to a shortage of raw materials (stockout) which results in the inhibition of the production process and the company's inability to meet consumer demand. Therefore, companies need to implement proper inventory control methods to maintain a balance between the availability of raw materials and the cost of inventory.

UD. R&D HANDICRAFT is a manufacturing company engaged in the production of handicrafts made from water hyacinth. In carrying out its production activities, the company needs the availability of sufficient and sustainable raw materials. The high demand for water hyacinth raw materials requires companies to control their inventory optimally so that there is no excess or shortage of inventory that can hinder the production process. However,

fluctuations in raw material demand and supply uncertainty are often challenges in managing a company's inventory.

Based on these conditions, an analysis of the raw material inventory control system implemented by UD is needed. R&D HANDICRAFT. This research is important to find out whether the inventory management that has been carried out has been efficient and to determine inventory control methods that can minimize inventory costs and ensure a smooth production process. Thus, the problem of this research can be formulated as follows: how to control the optimal supply of raw materials at UD. R&D HANDICRAFT to support the smooth production process and improve inventory cost efficiency.

METHOD

The type of research used in this study is quantitative research. Quantitative research is research whose research data is in the form of numbers and analysis using statistics. The population in this study is the Raw Material Inventory at UD. R&D HANDICRAFT LAMONGAN and the sample in this study is raw material data at UD. R&D HANDICRAFT LAMONGAN January – December 2021. The data types are primary and secondary data. The data of this research was obtained from *library research and field research*. In this study, the free variable used was the Raw Material Inventory from January 2021-December 2021 at UD. R&D Handicraft Lamongan. The bound variable used is to increase the results of the production process. The research methods used are *EOQ, Ordering Cost, Holding Cost. Safety Stock, Re Order Point*.

RESULTS AND DISCUSSION

The following is a table of the average purchase amount of raw materials.

Remarks	Raw Material of Water Hyacinth
Number of raw material requirements	24800
Frequency of bookings	48
Average number of purchases	516,67

Source : UD. R&D HANDICRAFT, 2021 (already processed)

Inventory costs at UD. R&D HANDICRAFT can generally be grouped into two, namely ordering fees and storage fees.

Remarks	Raw Material of Water Hyacinth
Administration Fees	87.000.000
Miscellaneous Fees	45.000.000
Booking Fee	132.000.000

Source : UD. R&D HANDICRAFT, 2021 (already processed)

From the table above, it can be known the cost of ordering raw materials at UD. R&D HANDICRAFT. To find out the booking fee for each order, it can be calculated by:

$$\begin{aligned} \text{Cost per booking} &= \frac{\text{total biaya pemesanan}}{\text{frekuensi pemesanan}} \\ &= \frac{132.000.000}{48} \end{aligned}$$

$$= 2.750.000$$

Remarks	Raw Material of Water Hyacinth
Treatment Costs	24.000.000
Miscellaneous Fees	26.000.000
Storage Fee	50.000.000

Source : UD. R&D HANDICRAFT, 2021 (already processed)

From the table above, it can be known the cost of storage of raw materials at UD. R&D HANDICRAFT. To find out the storage cost per unit of raw materials, it can be calculated by:

$$\begin{aligned} \text{Storage cost per unit} &= \frac{\text{total biaya penyimpanan}}{\text{total kebutuhan bahan baku}} \\ &= \frac{50.000.000}{24.800} \\ &= 2016,12 \end{aligned}$$

So, we can find out the total cost of raw material inventory per year by adding the storage cost with the order fee as follows:

$$\begin{aligned} \text{Booking Fee} &= x \text{ cost each time order} \frac{\text{jumlah kebutuhan bahan baku}}{\text{jumlah pembelian rata-rata}} \\ &= \frac{24.800}{516,67} \times 2.750.000 \\ &= 131,999,148.39 \end{aligned}$$

$$\begin{aligned} \text{Storage Costs} &= \frac{\text{jumlah pembelian rata-rata}}{\text{lead time}} \\ &= \frac{516,67}{2} \times 2016,12 \\ &= 520.843,36 \end{aligned}$$

$$\text{Total Inventory Cost} = 132.519.982,75$$

After knowing the amount of raw material needed, the order fee for each order and storage costs, then the optimal order quantity of water hyacinth raw materials in 2021 can be calculated with EOQ.

$$EOQ = \frac{\sqrt{2DS}}{H}$$

Calculation of the Optimal Quantity of Raw Materials in 2021

Remarks	Raw Material of Water Hyacinth
Request (D)	24.800
Booking Fee(s)	2.750.000
Storage Fee (H)	2016,12
EOQ	8.225,24

Source : UD. R&D HANDICRAFT, 2021 (already processed)

From the table above, it can be seen that the EOQ of water hyacinth raw materials is 8,225.24 meters.

$$\begin{aligned} EOQ &= \frac{\sqrt{2DS}}{H} \\ &= \sqrt{\frac{2 \times 24.800 \times 2.750.000}{2016,12}} \\ &= \sqrt{\frac{2 \times 68.200.000.000}{2016,12}} \end{aligned}$$

$$= \sqrt{\frac{136.400.000.000}{2016,12}}$$

$$= \sqrt{67.654.703,1}$$

$$= 8.225,24$$

So, we can find out the total cost of raw material inventory based on the EOQ method in 2021 is as follows:

$$\begin{aligned} \text{Booking Fee} &= \frac{24.800}{8225,24} \times 2.750.000 = 8.291.551,37 \\ \text{Storage Costs} &= \frac{8225,24}{2} \times 2016,12 = 8.291.535,43 \\ \text{Total Cost of Inventory} &= 16.583.086,80 \end{aligned}$$

Safety inventory or what is often called *safety stock* is very necessary in a company because it functions to avoid the occurrence of a shortage of raw materials so as to facilitate production process activities. *Safety stock* can be calculated using the following formula:

$$SS = d.Lt$$

Raw Material/Safety Stock Calculation

Remarks	Raw Material of Water Hyacinth
Raw Material Requirements (Meter)	24.800
Lead Time (Hari)	2
Safety Stock (Meter)	49.600

Source : UD. R&D HANDICRAFT, 2021 (already processed)

So, the supply of water hyacinth raw materials that must be provided by the company as a safety supply is 49,600 meters.

$$\begin{aligned} SS &= d.Lt \\ SS &= 24.800 \times 2 \\ SS &= 49.600 \end{aligned}$$

ROP calculation based on EOQ

Remarks	Raw Material of Water Hyacinth
Lead Time (Hari)	2
Average Usage per Day (Meters)	35
ROP	49.670

Source : UD. R&D HANDICRAFT, 2021 (already processed)

$$\begin{aligned} ROP &= SS + Lt \times D \\ &= 49.600 + 2 \times 35 \\ &= 49.600 + 70 \\ &= 49.670 \end{aligned}$$

This means that when the raw material inventory is completely exhausted, the raw material orders that have been ordered two days before have arrived at the warehouse. The comparison of raw material inventory costs between the company's condition and the EOQ method is:

Description	Raw Material of Water Hyacinth
I. Company Policy :	

Description	Raw Material of Water Hyacinth
1. Optimal purchase quantity	516.67 meters
2. Inventory costs	IDR 132,519,982.75
3. Safety stock	
4. Re order point	
II. EOQ Method	
1. Optimal purchase quantity	8225.24 meters
2. Inventory costs	IDR 16,583,086,80
3. Safety stock	49,600 meters
4. Re order point	49,670 meters
III. Differences	
1. Optimal purchase quantity	7708.57 meters
2. Inventory costs	115.936.895,95

Source : UD. R&D HANDICRAFT, 2021 (already processed)

CONCLUSION

From the calculation results using the EOQ method for the optimal order quantity, water hyacinth raw materials are 8225.24 meters with safety supplies that are useful to protect the company from the risk of running out of raw materials and delays in receiving raw materials ordered as much as 49,600 meters and 49,670 meters of water hyacinth raw material reordering points. The results of the calculation of the total average purchase of raw materials using the EOQ method are more efficient when compared to the company's policy which has a difference in raw materials of 7708.57 meters. As a result of calculating the total cost of raw material inventory between the company's policies using the EOQ method, the company can save inventory costs of 115,936,895.95 per year as a whole, which is lower than the inventory cost incurred by the company if the company uses the EOQ method.

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