

Analysis Of Supply Materials Processing Manufacturing Companies (Case Study of PT. Inti Nusa Raya Indonesia in Laeya Village South Poleang Subdistrict, Bombana Regency)

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Abstract

This study aims to determine the raw material inventory process at the seaweed manufacturing company PT Inti Nusa Raya Indonesia in Laeya Village, South Poleang District, Bombana Regency. The main focus of this research is to determine the amount of seaweed processing raw material inventory using the Economic Order Quantity (EOQ) method. The research object was selected using purposive sampling technique with the main respondents being the production manager and accountant of PT Inti Nusa Raya Indonesia. Data was collected through interviews and literature studies, then analyzed using the EOQ method which includes annual order costs, annual storage costs, optimal order quantities, total costs, reorder points, estimated order quantities throughout the year (N), and estimated inter-order times (T). The results showed that the company PT Inti Nusa Raya Indonesia uses two types of raw materials in its production process, namely Eucheuma cottonii and Eucheuma spinosum seaweed. The company obtains raw materials through cooperatives or directly from farmers at a price of Rp 17,000/Kg for Eucheuma cottonii and Rp 6,000/Kg for Eucheuma spinosum, with a minimum dryness requirement of 30%. The use of the EOQ method allows the company to save the cost of Eucheuma cottonii raw material inventory by 79.67% and Eucheuma spinosum by 80.23% compared to the company's conventional method.

Keywords: Raw Material Inventory, Economic Order Quantity (EOQ) Method, Seaweed Manufacturing.



INTRODUCTION

The potential of Indonesian seaweed is very promising and can be a commodity that can play a role in the movement of national economic progress. Evidently, Indonesia is one of the largest producers of *Eucheuma Cottonii seaweed* and controls 50% of the world market share to meet export market demand from the cosmetics and pharmaceutical industries. However, 80% of the exported products are still (*raw material*) in the form of dried seaweed. Although Indonesia has a fairly developed seaweed marketing and cultivation effort, it has not been able to be balanced with adequate processing development. This can be seen from the national seaweed production of only about 20% that can be absorbed and processed by the domestic industry (Hikma, 2015).

Seaweed is one of the leading export commodities in Indonesia, especially in the marine and fisheries sector. The Ministry of Maritime Affairs and Fisheries (KKP) continues to encourage the development of seaweed cultivation and industry, with the support of seaweed resources in various regions in Indonesia. There are 10 provinces in Indonesia that produce seaweed, namely; East Nusa Tenggara, West Nusa Tenggara, Bali, East Java, West Java, Gorontalo, Maluku, South Sulawesi, Central Sulawesi, Southeast Sulawesi. With the advancement of science and technology, the utilization of seaweed has been very diverse both for food and non-food. (Kusuma, 2020).

The Southeast Sulawesi Provincial Government through the Marine and Fisheries Service (DKP) continues to encourage farmers to improve the quality and competitiveness of seaweed commodities in order to face the challenges that develop in the future. Water areas in Southeast Sulawesi have many points of seaweed development and production such as those in several coastal areas ranging from Wakatobi, West Muna, Muna, North Buton, South Buton, Central Buton, Buton, North Konawe, South Konawe, and Bombana districts. (Antara, 2021).

One of the factors that affect the smooth production process is the availability of raw materials. The management of raw material requirements is a very important activity for companies in order to maintain a smooth production process. Lack of available raw materials can result in the cessation of the production process due to the exhaustion of materials for processing. If there is too much inventory (*over stock*) in terms of *financial* or expenditure, it is ineffective, this is because there are too many capital goods that are at risk of damage in the storage of these raw materials. Therefore, the supply of raw materials in an amount that is too large will cause the allocation of capital to other areas to be reduced. Conversely, if the supply of raw materials is relatively small, it will result in a large frequency of purchasing raw materials, so that the ordering costs borne by the company will be even greater. Therefore, there needs



to be a way or method for the company to overcome the problem of raw material availability. (Ristono, 2009).

One method that is often used in calculating the amount of inventory is the *Economic Order Quantity* (EOQ) method which is a mathematical model that can determine the amount of goods that must be ordered to meet projected demand with minimized inventory costs. Aims to determine what is the most economical number of purchases to make in each purchase. Based on the information above, it can be concluded that *Economic Order Quantity* (EOQ) is a form of effort from the management of the company, especially the raw material inventory section, to always create stable conditions in various conditions faced by the company. The *Economic Order Quantity* (EOQ) method is a mathematical model that determines the number of items that must be ordered to meet projected demand, with inventory costs formulated as follows (Render and Heizer, 2001)

The seaweed processing company PT Inti Nusa Raya Indonesia, which is engaged in manufacturing production, is located in Laeya Village, South Poleang District, Bombana Regency, which was inaugurated in 2019. The company uses seaweed as the main raw material in the production process, by increasing the added value of raw materials into *Akali Treated Cotonii Chips* (ATCC) and *Akali Treated Spinosum Chips* (ATSC).

Based on the results of observations and interviews with managers and employees of the raw material inventory section, it is known that in the implementation of the production system at PT Inti Nusa Raya Indonesia there are problems related to the supply of seaweed raw materials. In controlling the supply of raw materials, the company has tried to control the supply of raw materials with the maximum control method, namely by thinking about how much raw material needs to be ordered and when to order raw materials again, but with a conventional system the company still often experiences a shortage of raw material supplies which has an impact on hampering the production process. So it can be said that PT Inti Nusa Raya Indonesia in the process of controlling raw material inventory is still not optimal. This is what causes problems in the company which will result in the production process being hampered and the profits obtained by the company will decrease because it cannot meet consumer needs. Responding to these conditions, PT Inti Nusa Raya Indonesia must have the right raw material inventory strategy so as not to hinder the production process, can meet consumer demand and the quality of raw materials is always maintained. The company must be able to estimate how much seaweed raw material needs. Therefore, it is hoped that this research will provide suggestions and recommendations for companies in the supply of raw materials in the future.

Based on the description of the problem above, the researcher is interested in

conducting research on the Supply of Seaweed Processing Raw Materials at the Manufacturing Company PT Inti Nusa Raya Indonesia, as a seaweed manufacturing company that always produces large-scale seaweed. So that the availability of seaweed raw materials from various sources is very important for business continuity.

METHOD

This research was conducted in Laeya Village, South Poleang Subdistrict, Bombana Regency during October 2023 until completion, and was *purposely* selected. The selection of objects to be carried out in this study is by using *purposive* sampling technique by directly appointing respondents to be interviewed. Sandu Siyoto and Sodik (2015) namely the production manager and accountant of PT Inti Nusa Raya Indonesia. The types and sources of data used in this study are primary data and secondary data. Primary data comes from the object of research in the form of interviews, and secondary data is taken through supporting documents. Data collection techniques are done by interview, and literature study.

The analysis technique in this study uses the *Economic Order Quantity* (EOQ) method. Using the variables below, we can determine the ordering and storage costs so that the value can be Q^* .

1. Annual order cost

$$\frac{D}{Q} S$$

Description:

Q = number of items per order

D = annual demand for inventory

S = ordering cost for each order

2. Annual storage fee

$$\frac{Q}{2} H$$

Description:

Q = number of items per order

H = storage cost per unit per year

3. $\frac{D}{Q} S = \frac{Q}{2} H$ Optimal order quantity

Description:

Q = number of items per order

D = annual demand for inventory

S = ordering cost for each order

H = storage cost per unit per year

4. The value of Q^* is obtained by

$$2DS = Q^2 H$$

$$Q^2 = \frac{2DS}{H}$$

$$Q^* = \sqrt{\frac{2DS}{H}}$$

Description:

Q = number of items per order

Q^* = optimal quantity of goods per order (EOQ)

D = annual demand for inventory items

S = ordering cost for each order

H = storage cost per unit per year

5. Total Cost

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

Description:

D = annual demand quantity of inventory items

Q = economic order quantity

S = order cost for each order

H = storage cost per unit per year

6. Reorder Point

$$ROP = d \times l$$

Description:

d = Raw material usage per day (unit/day) annual raw material usage or annual number of working days

l = Lead time for new orders (days)

$$ROP = (d \times l) + SS$$

Description:

d = Raw material usage per day (unit/day) annual raw material usage or annual number of working days.



l = Lead time for new order (days)

S = Safety stock or safety stock (unit) = Standard Quantity

Deviation: Total Usage Time

In addition, the expected number of orders throughout the year (N) and the expected inter-order time (T) can also be determined as in the equation

$$I = \frac{D}{EOQ}$$

RESULTS AND DISCUSSION

To see the analysis of raw material inventory according to the policy of PT Inti Nusa Raya Indonesia, it can be seen in the following;

Seaweed Raw Material Ordering and Usage

Based on interviews with the manager of PT Inti Nusa Raya Indonesia, it is known that in 2022 the company placed an order once a month for *cottoni* seaweed raw materials while ordering *spinosum* seaweed raw materials twice a month. The data obtained from the company PT Inti Nusa Raya Indonesia regarding the frequency of ordering and the total use of seaweed raw materials.

Table 1 Total frequency of ordering and usage of seaweed raw materials PT. Inti Nusa Raya Indonesia in 2022

No.	Month	Frequency		Type of raw material (Kg)	
		<i>Cottoni</i>	<i>Spinosum</i>	<i>Cottoni</i>	<i>Spinosum</i>
1	January	1	2	9.240	14.000
2	February	1	2	9.600	14.000
3	March	1	2	8.860	14.000
4	April	1	2	9.600	13.800
5	May	1	2	9.600	14.000
6	June	1	2	9.600	12.800
7	July	1	2	8.800	13.600
8	August	1	2	3.600	8.400
9	September	1	2	4.460	7.200
10	October	1	2	4.600	7.100
11	November	1	2	4.800	7.350

12	December	1	2	9.600	14.400
Total		12	24	92.360	141.050
Average		1	2	7.697	11.754

Source: PT Inti Nusa Raya Indonesia Company, 2022

Based on table 1 above, it can be seen that the frequency of ordering seaweed raw materials made by the company PT Inti Nusa Raya Indonesia in 2022 is 12 times for ordering seaweed raw materials of the *Cottoni* type while 24 times for ordering *Spinusum*. With a total order frequency of 36 times for seaweed raw materials in 2022. The total *Cottoni* type seaweed raw material used during the production process by the company was 92,360 kg, while for the *Spinusum* type seaweed raw material used was 141,050 kg. With an average usage of *Cottoni* seaweed raw materials for one month of 7,697 kg, while the average usage of *Spinusum* seaweed raw materials for one month is 11,754 kg.

Seaweed Raw Material Inventory Costs

In procuring raw material supplies, the company must incur costs associated with ordering and storing raw materials. This problem must be planned properly by the company, if it is not planned properly, it will affect the cost of raw materials issued will be higher and can affect the total cost of production. Pertiwi *et al.* (2022). The cost of seaweed raw material supplies includes:

Ordering Cost

Assauri (2016) Booking costs can include administrative costs, shipping costs and other costs. The cost of ordering seaweed raw materials issued by the company PT Inti Nusa Raya Indonesia in 2022 can be seen in the following table:

Table 2 Types of ordering costs of the company PT Inti Nusa Raya Indonesia in 2022

No.	Cost type	Total cost of one order (Rp)	
		<i>Cottoni</i>	<i>Spinusum</i>
1	Communication	2.500	2.500
2	Raw material delivery	400.000	400.000
Total		402.500	402.500

Source: PT Inti Nusa Raya Indonesia Company, 2022

From table 2 above, it can be seen that the types of ordering costs incurred by seaweed companies include communication costs and the cost of shipping raw materials to processing plants from seaweed supply agents. Communication costs for one message are IDR 2,500 for *Cottoni* and *Spinusum* seaweed, while the cost of shipping raw materials from seaweed supply agents to seaweed processing companies is IDR 400,000 for *Cottoni* and *Spinusum* seaweed. So that the cost incurred by the company for ordering seaweed raw materials in one message is IDR 402,500 for *Cottoni* and *Spinusum* seaweed.

The total ordering costs incurred by the seaweed company PT Inti Nusa Raya Indonesia for a year in 2022 can be seen in table 3 below:

Table 3 Total cost of ordering seaweed raw materials for the types of Cottoni and Spinusum of the company PT. Inti Nusa Raya Indonesia in 2022

No.	Month	Types of Cottoni			Types of Spinosum		
		BPSP (Rp)	FP (times)	TBP (IDR)	BPSP (Rp)	FP (times)	TBP (IDR)
1	January	402.500	1	402.500	402.500	2	805.000
2	February	402.500	1	402.500	402.500	2	805.000
3	March	402.500	1	402.500	402.500	2	805.000
4	April	402.500	1	402.500	402.500	2	805.000
5	May	402.500	1	402.500	402.500	2	805.000
6	June	402.500	1	402.500	402.500	2	805.000
7	July	402.500	1	402.500	402.500	2	805.000
8	August	402.500	1	402.500	402.500	2	805.000
9	September	402.500	1	402.500	402.500	2	805.000
10	October	402.500	1	402.500	402.500	2	805.000
11	November	402.500	1	402.500	402.500	2	805.000
12	December	402.500	1	402.500	402.500	2	805.000
Total ordering cost for a year				4.830.000			9.660.000
Description							
BPSP: one-time order cost							
FP: Order frequency							
TBP: Total cost of ordering							

Source: PT Inti Nusa Raya Indonesia Company, 2022

Based on table 3, it can be seen that the amount of ordering costs incurred by the seaweed company PT Inti Nusa Raya Indonesia, to order *Cottoni* seaweed raw materials every month is IDR 402,500, so that the total ordering cost for one year in 2022 is IDR 4,830,000. Meanwhile, for the type of *Spinusum* every month is IDR 805,000, so the total cost of ordering for one year in 2022 is IDR 9,660,000.

Holding Cost

Holding costs are the costs associated with storing inventory for a certain amount of time. Therefore, storage costs also include the cost of obsolete goods and storage-related costs such as additional employees (Assauri, 2016).

The storage costs that researchers can take at a company engaged in seaweed manufacturing PT Inti Nusa Raya Indonesia are the cost of raw material storage warehouse security and electricity costs which can be seen in the table below.

Table 4 Storage cost of seaweed raw materials in 2022

No.	Cost type	Cost per year (IDR)
1	Warehouse security	5.000.000
2	Electricity	800.000
Total		5.800.000

Source: PT Inti Nusa Raya Indonesia Company, 2022

From table 4 above, it can be seen that the cost of storing sea rumpu raw materials for a year is IDR 5,800,000. In research conducted by Handra and Rangian (2017) stated that storage costs are costs incurred as a result of the company storing raw material inventory in the warehouse for a certain period of time. The storage costs incurred by the company consist of warehouse security costs and electricity costs.

Safety Stock

Safety stock or (*safety stock*) is a supply that is stored in excess of the estimated demand due to variable demand or waiting time. Riyanto (2001). From the results of interviews with the manager of the seaweed manufacturing company PT Inti Nusa Raya Indonesia, it is known that the company does not provide safety stock in its production activities.

Reorder Point

The *reorder point* is a certain level in inventory, where orders must be placed immediately. Fahmi (2014). From the results of interviews conducted with the manager of the seaweed manufacturing company PT Inti Nusa Raya Indonesia, it is known that in 2022 the company made a *reorder point* when the inventory of seaweed raw materials in the warehouse was only 40% for the type of seaweed *Eucheuma cottoni* and 40% for the type of seaweed *Eucheuma spinosum*.

Raw Material Inventory Control Method of PT Inti Nusa Raya Indonesia

Currently, PT Inti Nusa Raya Indonesia controls the supply of seaweed raw materials with a minimum supply of 40% for the type of seaweed *Eucheuma Cottoni* and 40% for the type of *Eucheuma Spinosum* from the monthly raw material requirements. In addition, the seaweed manufacturing company PT Inti Nusa Raya Indonesia has also established cooperation or partnerships with several seaweed cultivation cooperatives in order to meet the needs of raw materials for the continuity of the company's production process. The frequency of ordering seaweed raw materials in a year for the type of *Eucheuma Cottoni* is 12 times while for *Eucheuma spinosum* seaweed is 24 times. Such a frequency of ordering causes the total ordering costs incurred by the company in 2022 for *Eucheuma Cottoni* seaweed of Rp 4,830,000 while for *Eucheuma spinosum* seaweed of Rp 9,660,000 the costs are contained in the table below:

Table 5 The cost of supplying seaweed raw materials with the company's method in 2022

Raw materials	Frequency	A (Rp / Year)	B (Rp / Year)	C (Rp / Year)
<i>Eucheuma Cottoni</i>	12	4.830.000	5.800.000	10.630.000
<i>Eucheuma spinosum</i>	24	9.660.000	5.800.000	15.460.000
Description A : Total cost of ordering B : Total cost of storage C : Total cost of inventory				

Source: Secondary data analysis processed, 2023

Based on table 5, the total cost of inventory of *Eucheuma spinosum* seaweed raw materials of Rp 15,460,000 is greater than the total cost of *Eucheuma Cottoni* seaweed inventory of Rp 10,630,000, this is because the frequency of ordering *Eucheuma spinosum* is more frequent than the frequency of ordering for *Eucheuma Cottoni* seaweed.

Analysis of Raw Material Inventory According to the EQQ Method

Order Quantity and Order Frequency According to EQQ Method

Calculation of optimal seaweed raw material ordering in 2022 using the *Economic Order Quantity* (EOQ) method at the seaweed manufacturing company PT Inti Nusa Raya Indonesia requires some data on the supply of seaweed raw materials owned by the company in 2022 production. The data needed in the calculation is the amount of seaweed raw material needed for one year, the cost of ordering each order and the cost of storing seaweed per unit. (Render and Heizer, 2001).

Table 6 Total Usage, Ordering Cost per Order and Storage Cost per kg of Seaweed Raw Materials of cottoni and spinosum Production in 2022

Seaweed Type	Seaweed Usage (D)	Ordering Cost per Order (S)	Storage Cost per Kg (H)
Cottoni	92.360	402.500	62,80
Spinosum	141.050	805.000	41,12

Source: Secondary Data Analysis Processed, 2023

From table 6 above, it can be seen that in 2022 the amount of use of *cottoni* seaweed raw materials at the seaweed manufacturing company PT. Inti Nusa Raya Indonesia is 92,360 Kg. the ordering cost incurred every time you place an order is IDR 402,500 and the storage cost per kg spent is 62.80. This is in line with research conducted by (Ratningsih, 2021).

For the type of *spinosum* at the company PT Inti Nusa Raya Indonesia is 141,050 kg. The ordering cost incurred per order is IDR 805,000 and the storage cost per kg spent is 41.12. In general, calculations using the *Economic Order Quantity* (EOQ) method are influenced by the cost of ordering per order, storage costs and total usage costs for a year, as is the case with research conducted by (Umami *et al.* 2018).

Calculation of Seaweed Raw Material Supplies Based on the EQQ Method

One way to streamline raw material inventory is to use the *Economic Order Quantity* (EOQ) method. The use of this method aims to find out how much quantity to order and how many times to place an order so that the cost of raw material inventory is minimal. The optimal order quantity for *Eucheuma Cottoni* seaweed raw materials is 34,409 kg. As for the raw material of seaweed type *Eucheuma Spinosum* is 74,314 kg in each order. So based on the results of these calculations, it can be obtained the results of the total cost of inventory in a year for *Eucheuma Cottoni* seaweed raw materials amounting to Rp 2,160,787 and *Eucheuma Spinosum* seaweed raw materials Rp 3,055,814.

The total cost of inventory of *Eucheuma Cottoni* seaweed raw materials and *Eucheuma Spinosum* seaweed raw materials can be seen in table 4.10 where the total cost of inventory of *Eucheuma Spinosum* seaweed raw materials is more than *Eucheuma Cottoni* type raw materials. This cost difference is due to the total cost of ordering and the total cost of storing *Eucheuma Cottoni* which is greater, given the difficulty of getting the quality of *Eucheuma Cottoni* seaweed set by the company. (Zafitri *et al.* 2015).

Table 7 Total Ordering Cost, Total Storage Cost and Total Inventory Cost with EQQ Method

Raw Materials	Total Ordering Cost (Rp / Year)	Total Storage Cost (Rp/Yr)	Total Inventory Cost (Rp / Year)
<i>Eucheuma Cottoni</i>	1.080.393	1.080.393	2.160.787
<i>Eucheuma Spinosum</i>	1.527.907	1.527.907	3.055.814

Source: Secondary Data Analysis Processed, 2023

Total inventory costs are the sum of storage costs and ordering costs. Like the research conducted by Hidayat *et al.* (2017) that the minimum total inventory cost will be reached when the storage cost is equal to the ordering cost, when the total inventory cost is minimum, the order quantity can be said to be the most economical order quantity.

Comparative Analysis of Raw Material Inventory Method with EQQ Method

The results of inventory calculations using the *Economic Order Quantity* (EOQ) method can be compared with the method used by the company, the summary of calculations is presented in the following table

Table 8 Comparison of Ordering Quantities, Ordering Frequency, Total Ordering Costs, Total Storage Costs, Total Inventory Costs of the Company Method with the Economic Order Quantity (EOQ) Method for both raw materials

Description	Types of Cottoni		Types of Spinosum	
	Company	EOQ	Company	EOQ
Raw materials	7,697 kg	34,409 kg	5,877 kg	74,314 kg
Order frequency	12 times	3 times	24 times	2 times
Total ordering cost	IDR 4,830,000	IDR 1,080,393	IDR 9,660,000	IDR 1,527,907

Total storage cost	IDR 5,800,000	IDR 1,080,393	IDR 5,800,000	IDR 1,527,907
Total inventory cost	IDR 10,630,000	IDR 2,160,787	IDR 15,460,000	IDR 3,055,814

Source: Secondary Data Analysis Processed, 2023

The calculation results show that the *Economic Order Quantity* (EOQ) method results in a total inventory cost of Rp 2,160,787. The total inventory cost calculated using the *Economic Order Quantity* (EOQ) method is lower than the cost incurred by the company so far of Rp 10,630,000. From the *Economic Order Quantity* (EOQ) method, a lower order frequency is also obtained compared to the order frequency made by the company. When using the *Economic Order Quantity* (EOQ) method, the order frequency is only 3 times with an optimal order time span of 54 days after the first order. The company so far in carrying out its production process has ordered 12 times, so this has an impact on the total order cost of Rp. 4,830,000 which is greater than the application of the *Economic Order Quantity* (EOQ) method whose total order cost is only Rp. 1,080,393. so that there is a significant difference in the company's total storage cost of Rp. 5,800,000 but by using the *Economic Order Quantity* (EOQ) method, the total storage cost is lower, namely Rp. 1,080,393. The quantity of ordering raw materials in one message with the *Economic Order Quantity* (EOQ) method is 34,409 kg. the quantity of ordering raw materials with the *Economic Order Quantity* (EOQ) method is more than the quantity of ordering raw materials carried out by the company so far which averages 7,697 kg. This can trigger an increase in competitiveness in companies engaged in seaweed processing. (Dewiyanti and Muflikh 2023).

For the type of Spinosium, it shows that the results of the calculation of the *Economic Order Quantity* (EOQ) method result in a total inventory cost of Rp. 3,055,814. The total inventory cost calculated using the *Economic Order Quantity* (EOQ) method is lower than the cost incurred by the company so far of Rp. 15,460,000. From the *Economic Order Quantity* (EOQ) method, a lower order frequency is also obtained compared to the order frequency made by the company. When using the *Economic Order Quantity* (EOQ) method, the order frequency is only 2 times with the optimal ordering time vulnerability is 101 days after the first order. The company so far in carrying out its production process has ordered 24 times, so this has an impact on the total order cost of Rp 9,660,000 which is greater than the application of the *Economic Order Quantity* (EOQ) method whose total order cost is Rp 1,527,907. Based on the results obtained by calculating the *Economic Order Quantity* (EOQ) method, the total storage cost is IDR 1,527,907 which is much lower than the company's conventional method of IDR 5,800,000.

The quantity of raw materials ordered in one message with the *Economic Order Quantity* (EOQ) method is 74,314 kg, with the quantity of raw materials ordered with the *Economic Order Quantity* (EOQ) method more than the quantity of raw material orders made by the company so far which averages 11,754 kg.

Table 9 Raw Material Inventory Cost Savings with the EQQ Method

Raw Materials	Company	EOQ	Difference	Savings (%)
<i>Cottoni</i>	IDR 10,630,000	IDR 2,160,787	IDR 8,469,213	79,67
<i>Spinosum</i>	IDR 15,460,000	IDR 3,055,814	IDR 12,404,186	80,23

Source: Secondary Data Analysis Processed, 2023

There is a difference in inventory between company costs and the *Economic Order Quantity* (EOQ) method, the existence of this difference indicates a cost savings if the company uses the *Economic Order Quantity* (EOQ) method. The cost savings of inventory of seaweed raw materials of the type *Eucheuma Cottoni* is Rp. 8,469,213 or 79.67% and the cost savings of inventory of seaweed raw materials of the type *Eucheuma Spinosum* is Rp. 12,404,186 or 80.23%. The biggest inventory cost savings are on seaweed raw materials of the type *Eucheuma Spinosum* this is due to the difference between the frequency of orders made by the company with the frequency of ordering the *Economic Order Quantity* (EOQ) method.

Safety stock analysis

Safety stock is used to deal with demand that is greater than the original estimate during the *lead time*. Fahmi (2014). Additional inventory in the company PT Inti Nusa Raya Indonesia is to maintain smooth production and to avoid shortages of raw materials in the event of a demand that is greater than the original estimate. The amount of safety stock carried out by the company is in the following table:

Table 10 Calculation of Safety stock Company Method Year 2022

Raw Materials	Average Requirement (Kg)	Safety Stock (Kg)	Storage Cost (Rp/Kg/Thn)	Safety Stock Cost (Rp)
<i>Cottoni</i>	7.697	3.079	62,80	193.349
<i>Spinosum</i>	11.754	4.702	41,12	193.330

Source: Secondary Data Analysis Processed, 2023

From table 10, it can be seen that the *safety stock* provided by the company is 3,079 Kg for *Eucheuma Cottoni* type raw materials while for *Eucheuma Spinosum* type raw materials is 4,702 Kg where the calculation is 40% of the total raw material requirements needed for the continuity of the production process, found on page 52 based on the results of interviews obtained at the seaweed manuaktur company PT Inti Nusa Raya Indonesia. The storage costs incurred by the company PT Inti Nusa Raya Indonesia to store safety stock are IDR 193,349 for *Eucheuma Cottoni* type raw materials while IDR 193,330 for the cost of storing *Eucheuma Spinosum* type raw materials. *Safety stock* calculations using the *Economic Order Quantity* (EOQ) method also require the average waiting time of the supply of raw materials and the standard deviation of raw material requirements, the average waiting time for *Eucheuma Cottoni* type raw materials and *Eucheuma Spinosum* type raw materials is around 7 days. The results of the *Safety stock* calculation with the *Economic Order Quantity* (EOQ) method can be seen in the following table.

**Table 11 Calculation of Safety stock with the Economic Order Quantity (EOQ) Method
Year 2022**

Raw Material Type	Safety stock (Kg)	Storage Cost (Rp)	Storage Cost Safety stock (Rp)
<i>Cottoni</i>	13.321	62,80	836.559
<i>Spinosum</i>	18.522	41,12	761.625

Source: Secondary Data Analysis Processed, 2023

In table 4.15, it can be seen that the amount of *safety stock* that the company must provide is 13,321 kg for *Eucheuma Cottoni* type raw materials and 18,522 kg for *Eucheuma Spinosum* type raw materials. The storage cost of *Eucheuma Cottoni Safety stock* is greater than that of *Eucheuma Spinosum* because the amount of *Eucheuma Cottoni* storage costs is greater, this is because *Eucheuma Cottoni* is a raw material that is quite difficult to obtain with the quality desired by the company.

Reorder Point (ROP) Analysis

According to Sudana (2011) *Reorder Point* ROP answers the question of when to reorder, if the ROP is too low, the inventory will run out before the replacement inventory is received, resulting in disruption of the production process and customer demand cannot be met. However, if the reorder point is set too high, the supply of raw materials has come while there

is still a lot of inventory in the warehouse.

Based on the calculation of the table below, it can be seen that the ordering point that should be done by the seaweed manufacturing company PT Inti Nusa Raya Indonesia is when the amount of *Eucheuma Cottoni* inventory is 67,200 kg and *Eucheuma Spinosum* inventory is 100,800 kg.

Table 12 Calculating the Reorder Point for 2022

Raw Materials	Lead Time (Days) L	Average Requirement (Kg/Bln) D	Usage During Grace Period (Kg) L × D	Safety Stock (Kg) SS	Reorder Point (Kg) $T = L \times D + SS$
<i>Cottoni</i>	7	7.697	53.879	13.321	67.200
<i>Spinosum</i>	7	11.754	82.278	18.522	100.800

Source: Secondary Data Analysis Processed, 2023

During this time the company places an order when the raw material reaches 40% of the estimated use of raw materials for one month. Therefore, the company is often hampered in the production process considering that the seaweed raw material whose cultivation process waits 45 days until it is ready to harvest and not all seaweed is included in the quality determined by the company. Therefore, by using the *Economic Order Quantity* (EOQ) method, it can find out how many optimal backorders are needed for the smoothness of the production process at the company that has been carried out by strategies to support the prospects of seaweed trade. (Juarsa, 2019).

Seaweed raw materials that will be stocked in the warehouse are dry so as not to cause losses for the company, and can minimize the lack of raw materials if the seaweed harvest in certain months has poor quality, Hikmah (2015) stated that the seaweed industry in Indonesia is focused on the semi-finished product processing industry. Semi-finished products or intermediate products of seaweed are products that are used as raw materials for other industries, PT Inti Nusa Raya Indonesia in carrying out its production process is very constrained by the availability of raw materials, this is because farmers prefer to sell their seaweed cultivation to supplier traders.

This happens because the price set by the company is lower than the price given by the supplier traders. So that the lack of seaweed farmers who join the cooperative partnership made by the company. Apart from the problem of raw material prices, companies are often

faced with the problem of lack of availability of raw materials, there is another problem, namely that the raw materials obtained by companies from partnerships with seaweed cooperatives often do not meet the standards needed by companies for the production process. This is because farmers tend to harvest seaweed before harvest time, causing low seaweed quality and not entering the quality standards desired by the company, as in the research conducted (Fatonny *et al.* 2023)

CONCLUSION

PT Inti Nusa Raya Indonesia uses two types of raw materials in its production process, namely *Eucheuma cottonii* seaweed and *Eucheuma Spinosum* seaweed. The company buys raw materials through cooperative intermediaries and directly to farmers at a price of Rp 17,000 / Kg for *Eucheuma cottonii* and *Eucheuma Spinosum* seaweed at a price of Rp 6,000 / Kg, the company determines the purchase of raw materials with a minimum dryness of 30%.

With the *Economic Order Quantity* (EOQ) method, the company can save the cost of inventory of *Eucheuma cottonii* seaweed raw materials by 79.67% and *Eucheuma Spinosum* seaweed by 80.23% compared to using the company's conventional method.

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