

ANALYSIS OF INVENTORY CONTROL OF RAW MATERIALS FOR OYSTER MUSHROOMS PLANTING MEDIA IN UMKM AQSHA GUNUNG LINGKAS URBAN VILLAGE, EAST TARAKAN

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ABSTRACT

UMKM Aqsha is a Small and Medium Enterprise that produces oyster mushrooms in Tarakan City. In the implementation process, the inventory for oyster mushrooms has yet to use the calculation method of EOQ analysis. In this case, there might be a media shortage of raw planting materials. The objectives of the research were to (1) describe the system of controlling the inventory for oyster mushrooms planting media raw materials based on actual conditions at UMKM Aqsha, (2) analyze the system of controlling the inventory for oyster mushrooms planting media raw materials using economic order quantity analysis, buying frequency, safety stock, reorder point and maximum inventory. The technique of taking informants was conducted by selecting the key informants, namely business owners and workers who know the information needed in the research. The analysis method used economic order quantity analysis, buying frequency, safety stock, reorder point and maximum inventory. The results of the research showed that the inventory control of UMKM Aqsha required all three raw materials totaling 3,345 kg in a year, with a one-time order quantity for the three raw materials totaling 1,115 kg. The inventory control implemented by UMKM Aqsha was not optimal yet and also has not yet implemented a reorder point. So that it was not possible to prevent a shortage of the three raw materials during the production process. EOQ analysis was given an optimum order for all three materials with 1,655.9 kg of raw materials, no safety stock for all three materials, a reorder point for all three materials with 526,17 kg of raw materials, and for the maximum inventory for all three materials with 1655.9 kg of raw materials.

Keywords: Inventory Control; Planting Media; Raw Materials; UMKM Aqsha

INTRODUCTION

The business world is growing more and more rapidly, so it requires entrepreneurs to work more vigorously in order to be able to face competition in keeping business operations running. In the process of producing a product, it must be preserved. In order for planning in the production process to go well, it must be supported by the presence of adequate raw materials supplies [1]. Raw material supplies are goods purchased from suppliers of raw materials to be used as input in the production process. Raw materials supply provides a considerable cost contribution, so this cost component must be controlled [2]. Raw material control is meant as a measure to ensure the availability of raw materials regularly and effectively, along with the increased demand for mold mushrooms.

White oyster mushroom (*pleurotus ostreatus*) is one of the types of wood fungus that can be consumed, including the group *Basidiomycota* and the class *Homobasidiomycetes* [3]. The name of the oyster mushroom is given because of the shape of the mushroom shell, which is rather rounded, long, and curved, resembling the shell of tiram (*Ostreatus*), while the growth of the side fungus shell,

pleurotus, belongs to the sapient that grows on the wood, and in its free nature, pleurotus can live on the tissue of wooden plants that are alive or dead [4].

A planting medium that is widely used for the cultivation of moldy mushrooms is sawdust. The best sawdust as the medium material for planting mushrooms stems from the hard type of wood and does not contain much rubber, such as sil trees and dark wood. In addition, the chosen sawdust must be clean and dry [5]. UMKM Aqsha is one of the UMKM that manufactures fungi baglogs in Tarakan City. Baglog is a planting medium where the seeds are planted. The main ingredient is sawdust because the mushrooms include wood mushrooms. Baglogs are wrapped in cylinder-shaped plastic, one end of which has a hole. The raw material used by UMKM Aqsha in the production of baglogs is meranti sawdust, which is the main raw material, and its auxiliary material is rice brain and dolomite lime. Raw materials supply allows companies to cope with fluctuations in supply and demand. Markets are always fluctuating, and sufficient supplies allow them to continue producing despite disturbances in supply or a sudden surge in demand. Thus, the company can maintain operational continuity without having to stop production suddenly. Raw materials supply also plays a role in securing price and quality. By having sufficient stocks, the company can negotiate with suppliers for better prices and participate in mass purchasing opportunities. In addition, a sufficient supply provides the opportunity to choose raw materials of the best quality, which in turn will affect the quality of the final product.

UMKM Aqsha is an UMKM that produces mushrooms in the city of Tarakan. One of the raw materials used in the production of moldy mushrooms is the planting medium. In this case, UMKM Aqsha, in the process of implementation of its preparation, has not used the method of calculation of the analysis of EOQ; UMKM Aqsha, in the execution of the preparation of raw materials for the planting media, only uses estimates in determining the quantity of each raw material ordered. Control of raw material supplies is essential to ensure that production is not interrupted. In addition, a shortage or delay of raw materials can reduce production and harm the company's reputation [6]. The raw material control is also important to minimize high operating costs, anticipate changes in demand, and plan raw material supplies wisely to be able to respond quickly without experiencing unwanted shortages or surpluses of supplies [7].

However, while raw material stocks have significant benefits, it is also important to manage them wisely. Too much inventory can lead to high storage costs and the risk of shrinkage, while too little inventory may lead to a shortage of raw materials and disruption of production. Therefore, good planning and careful monitoring are necessary to maintain the right balance between adequate supply and cost efficiency. By understanding the importance of raw material supplies and managing them effectively, companies can ensure smooth operations and better customer satisfaction. Therefore, this study aims to describe the control system for the supply of raw materials for mold planting media as well as analyze and evaluate the system for control of the supply of materials for planting mold media in the UMKM Aqsha, Gunung Lingkas Urban Village, East Tarakan using the analysis of economic order quantity, purchase frequency, safety stock, reorder point, and maximum supply. With a deeper understanding of the ongoing supply control process, this research is expected to provide input and recommendations for UMKM Aqsha in improving the efficiency and effectiveness of raw material supply management. Thus, UMKM Aqsha is expected to improve its

operational performance, minimize the risk of shortages or surpluses, and ensure smoothness and business success in competitive market.

Recent research in this field has incorporated advanced technologies such as the Internet of Things (IoT) for real-time inventory monitoring, artificial intelligence-based data analysis to predict inventory needs, and digital image processing techniques to identify and classify scab mushrooms with high precision. In addition, sustainable approaches to the management of the supply of mushroom raw materials have been an important focus, including efforts to reduce waste and optimize the overall supply chain. With these latest innovations, research into the analysis of the stockpiling of raw materials for mushrooms continues to develop ways in which we understand, manage, and exploit the potential of mushrooms in the food and agricultural industries more efficiently.

MATERIALS AND METHODS

Research sites

The study was conducted at UMKM Aqsha Tarakan. Samples in this study were determined by non-probability sampling using the method of purposive Sampling. Information processing is done by selecting key informants. Key informants are business owners and employees who know the information needed for the research. Research data sources are divided into two types: primary and secondary data. The primary data obtained is all the data mentioned in terms of the type of research data [8]. Secondary data is data that is first collected by people outside the researcher himself, such as theories listed by authors in a library review. This data collection technique utilizes interviews and questionnaires addressed to the owner of UMKM Aqsha, which contain questions related to the type of data the researcher will collect. As well as observations and documentation to know what happened as an observation data amplifier to support the research results.

The method of data analysis used in this study is the descriptive method used to answer the first question and the quantitative method to meet the second goal of this research, as follows :

1. EOQ is an analytical tool used to determine the most economical purchases in a given time [9].

The EOQ formula is as follows [10]:

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

Description :

EOQ = Economic Order Quantity (Kg)

D = Requirements of raw materials per year (Kg)

O = Cost of raw materials by message (Rp)

H = Cost Storage of raw Materials (Kg per year)

In applying previous EOQ data analysis, several cost data formulas are specified as follows [11]. The total ordering cost (toc) is used as follows :

$$TOC = \frac{D}{Q} \times O$$

Description :

TOC = Total Order Cost for a year (Rp)

D = Amount of time required one year (Kg per year)

Q = Number of items each time the order is placed (Kg)

O = Cost of each order (Rp)

Storage costs, or total carrying costs (TCC), are the following :

$$TCC = \frac{Q}{2} \times H$$

Description :

TCC = Cost of storage one year (Rp)

Q = Number of items each time the order is placed (Kg)

H = Storage cost per kg (Rp)

Total cost of inventory, or total inventory cost (TIC), by summarizing orders and storage costs.

The total cost of the supplies used is as follows :

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

Description :

D = Amount of time required 1 year (Kg per year)

Q = Number of items each time the order is placed (Kg)

O = Cost of each order (Rp)

H = Storage cost per kg (Rp)

2. Purchase Frequencies

The determination of the frequency of purchase of raw materials is based on the demand for raw materials per year and the quantity of ordering or purchasing economically [12], using the following formulas for purchase frequencies :

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

Description :

F = Frequencies of materials purchase

D = Requirements of materials per year (kg)

EOQ = Economic Order Quantity (Kg)

3. Safety Stock

Safety stock is the inventory proposed as a safeguard for the survival of the production process. According to [12] security inventory is an additional inventory stored to prepare for demand fluctuations. The safety stock is as follows: The size of the safety stock, according to previous research [13], is determined by the formula :

$$SS = (\text{pemakaian maksimum} - AU) \times LD$$

Description :

SS = Safety Supply Of Raw Materials (Kg)

AU = Average Length Of Use In One Month (Kg)

LD = Lead Time Or Waiting Time (Day)

4. Reorder Point

The reorder point of raw materials according to [14] is determined by the formula:

$$ROP = (\text{Rata - rata pemakaian per hari} \times LD) + SS$$

Description :

ROP = Reorder Point

SS = Safety Supply Of Raw Materials (Kg)

LD = Lead Time Or Waiting Time (Day)

5. Maximum Inventory

Maximum inventory is determined by counting safety stock with EOQ [12]. Maximum inventory is as follows :

$$MI = EOQ + SS$$

Description :

MI = Maximum Inventory

EOQ = Economic Order Quantity (Kg)

SS = Safety Supply Of Raw Materials (Kg)

RESULT AND DISCUSSION

1. Control System of Oyster Mushroom Material Supply in UMKM Aqsha

UMKM Aqsha, in carrying out business activities, has yet to take control of the supply of raw materials for plant media because the raw materials purchased at the time of direct production are spent at the time of production. Production is carried out considering temperature and humidity because they are crucial for the sustainability of the growth of patches [15]. Mushroom mushrooms require a humid environment with low temperatures to grow well, compared to high temperatures. According to Lisa et al research [16], the temperature is one of the influences on the productivity of the mold fungus. The ideal temperature for the growth of the fungus is a temperature ranging from 19 to 24°C. UMKM Aqsha made all purchases of raw materials with the same amount every four months in 2022; that is, in February, June, and October, the amount purchased on each raw material is as follows: sawdust is purchased in quantities of as many as 1000 kg, paddles in 100 kg, and dolomite limestone in 15 kg. As for the needs of the three raw materials and plant media used by UMKM Aqsha in 2022, they are presented in the following table.

Table 1. Needs of Media Plant Materials in 2022

Purchase To	Sawdust (kg)	Rice Bran (kg)	Dolomite Lime (kg)
1	1000	100	15
2	1000	100	15
3	1000	100	15
Total	3000	300	45
Average	1000	100	15

Source: Primary Data, 2023

The cost of ordering is the cost issued by UMKM Aqsha for ordering the raw materials of the planting media, which are three types of sawdust, paddle paddles, and dolomite caps. The booking charges are transportation and telephone charges. This is in line with the statement of [17] that transportation costs are included in the booking cost. The cost of ordering raw materials and plant media carried out by UMKM Aqsha is presented in Table 2.

Table 2. The cost of sending raw materials to the media plant in UMKM Aqsha

Raw Material	Cost Type	Biaya sekali pesan (Rp)	Jumlah biaya sekali pesan (Rp)
Serbuk kayu	Transportation	100.000	105.000
	Telephone	5.000	
Rice Bran	Transportation	100.000	100.000
Dolomite Lime	Transportation	33.000	38.000
	Telephone	5.000	

Total	243.000
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Source: Primary Data, 2023

Holding costs are the costs associated with storing or bringing inventory for a certain period. Therefore, storage costs also include the cost of obsolete goods and storage-related costs such as insurance, additional employees, and interest payments [11]. In storing raw material supplies, UMKM Aqsha does not perform maintenance or issue certain costs because the raw material can be given without special care. As for the storage costs carried out by UMKM Aqsha, calculated from the raw material to the place of the enterprise until the material is processed into the planting media, the cost of land rental where the raw materials are stored. Although land is personal property, if it is rented, it can reduce the cost incurred by UMKM Aqsha. This is called opportunity cost, which is the amount of potential costs to lose or the cost of sacrificing something in order to obtain something else [18]. For more clarity about the cost of storage of UMKM Aqsha raw materials in 2022, see Table 3.

Table 3. The cost of sending raw materials to the media plant in UMKM Aqsha

Raw Material	Type of Cost	Opportunity Cost (Rp)	Total of Raw Material (kg)	Saving Cost (Rp)
Sawdust	Land Rental Cost	800.000	3000	283,33
	Rice Bag	50.000		
Rice Bran	Land Rental Cost	800.000	300	2.667
Dolomite Lime	Land Rental Cost	800.000	45	17.778
Total				20.728,33

Source: Primary Data, 2023

2. Analysis of Economic Order Quantity (EOQ)

a. EOQ Analysis

To find out the optimal ordering quantity of the three raw materials for the manufacturing of planting media, see Table 4.

Table 4. Optimum ordering quantity of plant media raw materials

Raw Material	D (kg)	O (Rp)	H (Rp)	EOQ (kg)
Sawdust	3000	105.000	283	1492,03
Rice Bran	300	100.000	2.667	150
Dolomite Lime	45	38.000	17.778	13,87

Source: Primary Data, 2023

Based on the results of Table 4, it can be seen that the data used in the table include the annual raw material needs (Demand), the cost of ordering each time the order is placed (Ordering Cost), and storage costs per kg (Holding Cost). Calculate the Economic Number (Economic Order Quantity) using EOQ. UMKM Aqsha will be able to determine the amount of economical raw material over a certain period. And can determine the total cost of inventory for a period of time. Thus, the judgment will be determined under the circumstances. Next, calculate the minimum inventory cost presented in Table 5.

Table 5. Total Cost of The Minimum Supply of Raw Materials and Plant Media

Raw Material	TOC (Rp)	TCC (Rp)	TIC (Rp)
Sawdust	211.122	211.122	422.244
Rice Bran	200.012,5	200.012,5	400.025
Dolomite Lime	123.289,1	123.289,1	246.578,2
Total			1.068.847,2

Source: Primary Data, 2023

Based on the results of Table 5, it is known that the data used in the table includes the total cost of ordering (Total Ordering Cost) and the total Cost of storage (Total Carrying Cost) and Total Inventory Cost). Where TIC is the total of TOC and TCC. The most enormous cost comes from sawdust (422,244).

b. Frequency of Purchase

The demand for raw materials per year and the economic quantity of orders or purchases are based on the determination of the purchase frequency so that the amount of ordered raw materials according to EOQ can be known. Frequency calculations are as follows:

Table 6. Frequency of Purchase of Plant Media Raw Materials

Raw Material	D (kg)	EOQ (kg)	F (Time)
Sawdust	3000	1492,03	2,01
Rice Bran	300	150	2
Dolomite Lime	45	13,8	3,24

Source: Primary Data, 2023

From the calculations in Table 6, the data used in the table includes the demand for raw materials per year and the amount of economic orders (Economic Order Quantity) and frequencies.

3. Safety Supplies

It is necessary to make calculations to ensure supply stability to determine whether UMKM Aqsha needs a safety stock to anticipate changes in demand during lead time. The quantity of safety stock in raw materials will be presented in Table 7.

Table 7. Calculation of The Safety Stock of Raw Materials

Raw Material	Maximum Usage (1)	Average Usage (2)	Lead time (3)	Safety stock (1-2)x3
Sawdust	1000	1000	14 day	0
Rice Bran	100	100	14 day	0
Dolomite Lime	15	15	14 day	0

Source: Primary Data, 2023

Based on the calculation results in Table 7, it is known that the quantity of security supplies or safety stocks of raw materials used for planting media of zero kg is obtained from the maximum use reduced to the average use of raw material for cultivation media and then multiplied by the waiting time (Lead time), which means the amount for the safety supplies of crude materials used for planting media in a year is 0 kg. Safety stock is the supply we prepare to anticipate uncertainty (19). In other words, if the uncertainty is absent or all of them are inevitable or constant, the safety stock is unnecessary (safety stock = 0).

4. Reorder Point

[20] define a reorder point as a point or limit of the amount of inventory that exists at a time when the ordering of raw materials must be held again. This ensures that the production process can run smoothly. The calculation of the reorder point of raw materials and planted media is presented in Table 8.

The reorder point is the total order made by UMKM Aqsha to meet the needs of mushroom production. All three ingredients require a 14-day wait, and the most significant amount in a single order is sawdust which is the main ingredient in this activity.

Table 8. Reorder Point

Raw Material	Lead Day (Day)	Average Requirements/Day (kg)	SS (kg)	ROP (kg)
Sawdust	14	33,71	0	471,9
Rice Bran	14	3,37	0	47,19
Dolomite Lime	14	0,51	0	7,08

Source: Primary Data, 2023

5. Maximum Inventory

Maximum inventory is the maximum amount of raw materials the company possesses [21]. The company should not store excess raw materials that could cause losses to the company. The maximum supply is presented in Table 9.

Table 9. Maximum Inventory

Raw Material	SS (kg)	EOQ (kg)	MI (kg)
Sawdust	0	1492,03	1492,03
Rice Bran	0	150	150
Dolomite Lime	0	13,87	13,87

Source: Primary Data, 2023

Based on Table 9, we can see the size of the maximum supply required by UMKM Aqsha to consistently meet the requirements of raw materials in producing squid mushrooms. A comparison of the control of the supply of sawdust raw materials according to the UMKM Aqsha method with the EOQ method can be seen in Table 10.

Table 10. Comparison of inventory control for plant media raw materials according to the UMKM AQSHA method with the EOQ method

No	Description	UMKM Aqsha Method (Kg)			EOQ Method (Kg)		
		Sawdust	Rice Bran	Dolomite Lime	Sawdust	Rice Bran	Dolomite Lime
1	Number of Orders per Time (Kg)	1000	100	15	1492,03	150	13,87
2	Purchase Frequency (Time)	3	3	3	2	2	3,24
3	Safety Stock (Kg)	100	10	1,5	0	0	0
4	Reorder point (Kg)	0	0	0	471,91	47,19	7,08
5	Maximum Supply (Kg)	1000	100	15	1492	150	13,87

Source: Primary Data, 2023

From the table above, it can be seen that the quantity of ordered raw material media planted according to the EOQ method is greater than the UMKM Aqsha method. According to the UMKM Aqsha EOQ method in 2022, it must make reservations for sawdust as many as 2 times, paddle dredge 2 times, and dolomite lime 3 times, with a reservation quantity for sawdust of 1.492,03 kg, Paddle of 150 kg, and Dolomite calf of 13,87 kg. According to the UMKM Aqsha method of ordering sawdust raw materials, paddle paddles and dolomite caps were made as many as three times, with the ordering quantities for sawdust as high as 1000 kg, 100 kg, and 10 kg.

CONCLUSION

Based on the results, the following conclusions can be drawn:

1. The control system for the supply of raw materials for planting media in UMKM Aqsha requires 3000 Kg of sawdust during a year with a total supply cost of Rp 456.500, 300 Kg of paddle debris

during the year with a total supply cost of Rp 433.350, and 45 Kg of dolomite limestone for a year. The control of supplies in UMKM Aqsha is not actually optimal; it is due to the absence of reorder points and still uses the same estimate for each order. there is no increase in production.

2. The quantity of ordering raw materials according to the EOQ method in applying inventory control is 1492,03 Kg for sawdust, 150 Kg for paddle debris, and 13,87 Kg for dolomite limestone, with a minimum supply cost of Rp 422.244 for sawdust, Rp 400.025 for paddles, and Rp 246.578 for dolomite limestone. Aqsha should not use safety stock. UMKM Aqsha only needs to use reorder points and maximum supplies to prevent the occurrence of deficiencies.

RECOMMENDATION

1. For UMKM Aqsha, it is better to record the period of ordering raw materials so as not to rush on the purchase of the same raw materials every year by reviewing the policy of control of the supply of raw materials used so that the production process can run smoothly.
2. It is necessary to keep the environment of the mushrooms moist so as not to reduce the harvest by routinely spraying water on each growing medium to keep its moisture awake.

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