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SCHEDULING OF RAW MATERIAL SUPPLY FOR PRODUCTION EFFICIENCY (CASE STUDY PT. TRI JAYA TANGGUH GORONTALO)

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Abstract:

Supply of raw materials is the most important thing in the activities of the production process. This study aims to determine whether the scheduling of raw material supply has been running efficiently in order to optimize the time of supply of materials to avoid production delays at PT Tri Jaya tough. This study uses the EOQ method where the scheduling of raw material supply is designed based on the optimal purchase amount, safety stock and is determined by the point where an order or purchase of raw material inventory is made.

The results showed that the supply of raw materials at Tri Jaya Tangguh has not been implemented effectively, because the company has not done a good scheduling, the supply of raw materials is only done on the supply of coconut raw materials from suppliers, so the company has not been able to cover the delay in the production process for the raw material inventory. which is not optimal. Thus, the company's production process has not been effective and efficient.

Keywords: Scheduling; Raw Materials; Efficiency; Production

INTRODUCTION

Companies in carrying out the production process often experience ups and downs. The success or failure of a production process is caused by a lack of careful planning regarding these activities and ineffective control, so that production activities do not run properly and efficiently. This of course can result in production delays, decreased product quality, and increased implementation costs. The delay in the completion of the production itself is a very undesirable condition, because it can harm both parties in terms of time, effort, and cost. In relation to production time and costs, companies are required to be as efficient as possible in the use of time in each activity or activity in order to minimize the costs that will be used from the original plan. The production process generally has a deadline, which means that the production must be completed before or on time that has been determined from the start. One of the main parts of production planning is scheduling or scheduling

Scheduling in general, can be interpreted as a translator of a production activity plan into a work schedule that shows the sequence of implementation of various activities and the start and end time of each production activity carried out. Scheduling or making a schedule is one of the most important activities in the production process or work on a project, because with scheduling a production process can run well and efficiently. Scheduling is used as the basis for allocating plant resources, such as machinery and production equipment, planning human resources to be used, purchasing materials and planning the production process. With good scheduling, it can have a positive impact on the smooth production process and minimize production time and costs. Consumers will be satisfied with the distributor's service, if the product arrives on time, in the right quantity and with good quality of production. This results in a policy for controlling product inventory at a certain location is very important for management in coordinating scheduling and distribution planning from the marketing department so that the company's profits remain stable.

For example, in the production process, good scheduling management is needed in the supply of the main raw materials in making the product. What we all know is that raw materials are one of the main and most basic needs in making a product. If the raw materials needed experience problems or delays in delivery, of course this can have a bad effect on continuity in the production process, so the factory can experience losses and of course this is highly undesirable by the company. To avoid this unwanted thing, it needs to be handled with careful and thorough calculations. With this scheduling, the company can identify what resources will be used at a certain stage of production based on the estimated schedule made so that the company does not lack resources during production. The production process can be said to be good if the completion of the production runs efficiently, in terms of time and costs and achieve work efficiency, both in terms of human resources and tools. With this, it is hoped that with good planning and scheduling of distribution activities, success in fulfilling customer demands will be more optimal, sales performance will increase in fulfilling orders on time and in the right quantity so that distribution costs can be kept to a minimum.

PT. Tri Jaya Tangguh is one of the largest coconut producers in Indonesia. The products produced include the best dry coconut, coconut cream, and coconut water. The company is committed to exploring the benefits of coconut

and sharing it around the world. Pt. Tri Jaya Tangguh was founded in 2006 by three friends who share the same dream. After discovering the potential of Gorontalo and its abundant coconut plantations, the three founders realized that coconut is the basic ingredient of Indonesia's rich culinary heritage and must be preserved. The company is proud of its commitment to supporting coconut farmers by using direct transactions to create mutual benefits with them. After gaining positive international recognition in 2012, PT. Tri Jaya Tangguh started to expand its business by opening their second factory. In 2015, the company discovered that there was more potential in the industry than just desiccated coconut. Therefore, the company expanded its product line into coconut cream and coconut water, namely Santan Acc Coconut Cream and Yamacoco Coconut Water. In carrying out the production process, PT. Tri Jaya Tangguh requires at least about 80 tons of coconut. This company supplies coconut raw materials from around the Province of Gorontalo, North Bolaang Mongondow, Bintauna, Central Sulawesi, and several other areas. The number of raw materials obtained in one shipment from several areas that supply these raw materials varies, between 70-80 tons. The longest raw material delivery time is in a day. For the raw material itself, it comes in every day and in a day the company can produce approximately 80 tons with 13% flour yield. The problem that is often faced by companies in the delivery of raw materials, one of which is the weather factor, if it is the rainy season the coconut farmer workers cannot work optimally and of course this can disrupt the process of sending the raw materials.

RESEARCH METHOD

This research is quantitative research, the scheduling of raw material supply is inseparable from the inventory system, scheduling and inventory are interrelated with each other, so the researcher uses the EOQ formula to determine the raw supply. To determine the scheduling of raw material supply, you must first look at the Safety Stock, Lead Time, and Re-order Point in the company.

1). EOQ (Economic Order Quanty) is an inventory level that minimizes the total cost of holding inventory and ordering costs. This is one of the oldest models of classical production scheduling. This framework used to determine order quantity is also known as the Wilson EOQ Model or Wilson Formula

2). Safety Stock is additional inventory held to protect or maintain the possibility of a stock out. Safety stock is an inventory that is held to prevent a shortage of inventory when demand is uncertain or because the factors that determine the amount of this inventory are the average use of raw materials during a certain period before the goods ordered arrive and the waiting time varies (Assauri 2018).

3). Lead time is the time required between the time of ordering raw materials and the arrival of the raw materials themselves. This waiting time can be constant and can also be probabilistic. Lead Time arises because every order takes time and not all orders can be fulfilled instantly, so there is always a time lag. Lead Time is very useful for companies, namely when inventory reaches zero, orders will immediately arrive at the company.

In EOQ, the lead time is assumed to be constant, meaning that it is constant from time to time and repeats itself in each period. However, in practice the lead time changes a lot, to anticipate this, companies often provide safety stock.

4). As the name implies, the re-order point is the point where the goods should be requested by the warehouse. Re-order point refers to the amount of inventory in the warehouse, where if the inventory has reached that amount, the warehouse department is required to report to the purchasing department to be able to process the purchase of goods. According to Heizer and Render (2011: 75) the re-order point is the time (point) of inventory where action needs to be taken to fill the shortage of inventory on the item. The results of data processing through the analysis are described or described about the variables raised. This method can be done with the aim of being able to analyze the variable supply scheduling of raw materials in an effort to produce efficiency.

RESULTS AND DISCUSSION

PT Tri Jaya Tangguh produces flour with coconut as raw material. Where this company has become a large-scale industrial company in the Gorontalo Regency area. The production activities of PT Tri Jaya Tangguh are carried out according to the company's production standards where they prioritize quality over the products produced. Apart from being marketed locally, the company also sends their products abroad and exports them abroad. Therefore, companies are required to always improve product quality and work productivity in order to meet the demands of local, overseas and overseas markets. To meet the market demand, the company can produce 75-80 tons of flour in 1 day of production.

In the implementation of the production process, PT Tri Jaya Tangguh purchases or orders raw materials from its suppliers. Most of the raw materials, namely coconut, are supplied from local areas in the province of Gorontalo. PT Tri Jaya Tangguh supplies raw materials every working day, Monday to Friday. But this has not been able to meet the standard requirements for the implementation of the production process because the company in each production has determined the target product that must be produced, namely 75-80 tons per production. Therefore, the raw needs provided must also be in large quantities. To calculate whether the supply of raw materials to meet production needs has been scheduled effectively and efficiently or not, the researchers conducted a study by obtaining data in 2020, the supply of raw materials within 1 year increased monthly. but in meeting the needs of raw materials, the implementation of the production process still often occurs so that the production process delays and waits for the supply of raw materials from other suppliers to fulfill it. To be able to overcome this problem, the company needs to schedule based on the EOQ method to see the optimal number of purchases and at what time the company must request raw materials or order raw materials back. Calculating the optimal purchase amount (EOQ) is as follows:

EOQ = Q = (2DS/C)

Description: R = number of purchases during one period
C = Annual saving cost in rupiah / unit
S = cost per order
Q = optimum order quantity

Raw material inventory can be calculated using EOQ 2020

EOQ = Q = ((2(16,203.483x3.442.950))/1)
Q = 10,562,933 kg (rounded up)

So the optimal amount of purchases that must be made by PT Tri Jaya Tangguh is 10,562,933 Kg. Then calculate the optimal total cost of raw material inventory, namely:

Optimal total cost of raw material inventory

TIC = Q/2 x C+ R/Q x S

TIC = 10,562,933/2 x 1 + 16,203,483/10,562,933 x 3,442,950
= 5,281,466.5 + 5,281,466.97
= 10,562,933.47 or Rp 10,562,900 (rounded up)

To determine safety stock:

Safety stock = Z^σ
= 1.65 x 45,190,26
= 74,563.929

From the calculation of the safety stock in 2020 it can be seen that the amount of safety raw material inventory for the PT Tri Jaya Tangguh company in the implementation of the production process to meet the need for raw materials is 74,563 Kg of coconut.

Reorder point analysis

Reorder point is the level of reordering or the point or limit of the amount of inventory available at the time the order must be held again. Companies in placing orders must know when the raw material inventory has started to decrease and reorders must be made to prevent running out of raw materials. To calculate the ROP, it must be known in advance the grace period or lead time required between the time of ordering materials Raw materials are carried out with the arrival of the ordered raw materials. It is known that the lead time of PT Tri Jaya Tangguh in placing an order until the order arrives at the warehouse is 3-5 days. The use of raw materials is used the number of working days in one year, which is an average of 300 days. Thus, the ROP can be calculated with the following formula:

ROP = d x L + SS
d = average use of raw materials
L = Lead Time
SS = Safety Stock

ROP calculation for 2020

Average use of raw materials = (16,203,483)/300
= 54,011.61

ROP = (54,011.61 x 3) + 74,563
= 162,034.83 + 74,563
= 236.597

So the point of reordering that must be done by PT Tri Jaya Tangguh is when the supply of raw materials is 236,597 coconuts

Maximum inventory (maximum inventory)

Determining the maximum inventory is useful for companies in carrying out raw material inventories. Where from the calculation of this maximum inventory will determine the amount of inventory in the warehouse will not be excessive so that there will be no waste of working capital. Maximum inventory can be calculated by the following formula:

Maximum inventory = safety stock + EOQ
Maximum inventory in 2020 = 74,563 + 10,562,933
= 10,637,496

Comparative data of research results and research objects

PT Tri Jaya Tangguh	Hasil Penelitian
The layout applied is the product layout (Line Layout)	Layout based on the layout pattern, namely the product layout (Line Layout)
There is no ordering/scheduling of material supply	The supply of raw materials must have an ordering system based on continuous scheduling (make to stock)
Raw material supply is waiting for raw material supply from suppliers.	Scheduling of raw material supply based on ROP, by looking at EOQ, Safety Stock and order lead time.

DISCUSSION

Based on data analysis of PT Tri Jaya Tangguh in 2020 that with the amount of raw material needed of 16,203,483 it still needs to design a good schedule to fulfill the implementation of the production process. So far, PT Tri Jaya Tangguh in supplying raw materials is only based on suppliers who enter and orders are made when the need for raw materials increases due to increased production targets with increasing demand as well. Another factor also occurs from the presence of raw materials entered by suppliers that are not suitable at the time of sorting and the presence of products that do not meet the quality of the company. So the company often runs out of stock and delays the implementation of the production process. This must be considered by PT Tri Jaya Tangguh because it will have a negative impact on the company's production activities.

PT Tri Jaya Tangguh in carrying out the supply of raw materials by taking into account the above factors, must carry out a schedule designed based on data processed using the EOQ method. From the calculation of EOQ (Economic Order Quantity), the company can determine the optimal number of purchases made by PT Tri Jaya tough so that there is no shortage or excess in supplying raw materials. Then the company can make a safety stock, namely safety stock so that the raw needs when some of the above factors occur, the company is still able to produce using the safety stock. Furthermore, the company is able to determine when PT Tri Jaya Tangguh can request raw materials from suppliers by looking at the amount of ROP (Reorder Point). With this calculation, PT Tri Jaya Tangguh makes a schedule in ordering or supplying raw materials so that it can cover the inhibiting factors of the production process.

In this study, it can be seen that the scheduling of raw material supply implemented by PT Tri Jaya Tangguh has not been effective and efficient. Based on the data above, the company should schedule the supply of raw materials more than 12 times on average according to the frequency of purchases made so far. if the company implements an effective scheduling based on the value of EOQ, safety stock and ROP then the production implementation of PT Tri Jaya Tangguh can be maximized and effective and is able to meet the company's targets and also market demand for coconut flour products. Scheduling that should be done is scheduling based on the conditions experienced by the factory in receiving the supply of raw materials. In this case, pT Tri Jaya Tangguh does continuous production, only with the supply of raw materials waiting to be supplied by suppliers, so there are often delays in the production process.

From that basis, it is very important for PT Tri Jaya Tangguh to schedule make to stock where the scheduling of orders for the supply of coconut raw materials is carried out continuously for inventory by paying attention to the time of the reorder point and the waiting time for orders so that delays in the production process or delays in the production process can be avoided. Besides that, production costs can be minimized, especially the cost of storing raw materials. Besides being able to minimize production costs, this is also able to increase company profits and be able to compete in the industrial world in meeting product demand by the market.

The results of this study are also supported by previous research by Happy Fauzy Afianti in 2017 on "Control and Scheduling of Imported Raw Material Supply Using the ABC Analysis Method at PT. Unilever Indonesia". Shows that the cause of stock and inventory value inefficiency is due to not controlling and scheduling the supply of raw materials, after rescheduling, the risk of shortage can be reduced, oversatge can be reduced and overall value over value inventory can be reduced. Based on the above analysis, the hypothesis raised by the researcher is proven that the scheduling of raw material supply at PT Tri Jaya Tangguh has not been effective.

CONCLUSION

Based on the results of research and discussion of the data and information obtained, it can be concluded that the supply of raw materials for PT Tri Jaya Tangguh has not been properly scheduled. PT Tri Jaya Tangguh in stockpiling raw materials or supplying raw materials only based on input from suppliers and orders are made only when there is large production due to market demand. The implementation of the production process of PT Tri Jaya Tangguh cannot be said to be effective in terms of supplying raw materials because a company that is large enough must be able to schedule the supply of raw materials in order to meet the needs of production raw materials. Effective scheduling of raw material supply should look at the optimal number of purchases obtained from the EOQ method, then there must be a safety stock so that the production process can run continuously without running out of stock of raw materials, and then

be able to read when raw material supplies can be supplied again. In this way, scheduling the supply of raw materials will be able to improve the implementation of an effective and efficient production process

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