

Raw Material Inventory Control Analysis in The Rubber Production Process at PTPN XII Persero Kebun Kotta Blater

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ABSTRACT

Objective: This study aims to evaluate the raw material control system in the rubber production process at PTPN XII Persero Kebun Kotta Blater using the Economic Order Quantity (EOQ) method. **Method:** Employing a quantitative descriptive analysis approach, the EOQ model was applied to analyze inventory management practices related to rubber latex processing into RSS sheets. **Results:** The 2023 inventory data revealed that the company's actual inventory issuance exceeded the optimal EOQ value of IDR 2,883.19, indicating inefficiencies in raw material control. Implementing the EOQ model demonstrated potential cost savings amounting to IDR 885,133,971,190,639 by optimizing order quantities and reducing excess inventory. **Novelty:** This research highlights the significant financial benefits of applying EOQ in rubber agribusiness, specifically within PTPN XII Kebun Kotta Blater, by providing an empirical assessment of inventory management optimization in the agricultural processing sector. The findings contribute to enhancing operational efficiency and sustainable resource utilization in natural rubber production.

INTRODUCTION

Every company or business entity is generally established to achieve the goals that have been set. The company's goal is to get maximum profits, to increase the company's growth rate and to achieve the goals that have been set, the company must take advantage of existing resources. The company can develop is the desire of every individual in the company, so it is hoped that with these developments the company will be able to compete and keep up with the progress of the times. Activities to produce or produce these goods and services are activities to increase the usefulness of inputs to outputs (Ringo, Martini, and Ayiek Sih Sayekti 2017). Good management will facilitate the realization of the goals of the company, employees, and society. With management, the usability and results of management elements will be improved. Management is required to carry out effective and efficient budget planning and production control in accordance with the functions of its managerial functions. So that it will produce optimal products and the right decisions for the interests and progress of the company so that the company's goals can be achieved (Bungkaes, Posumah, and Kiyai Burhanuddin 2013). As well as one of the companies that produce rubber plants in Indonesia, which is growing rapidly to date. The objectives of the determination in the production and operational divisions are related to short-term plans, in accordance with monthly forecasts, and long-term plans, in accordance with annual forecasts. Rubber plantations in Indonesia are mostly located in Sumatra (70%), Kalimantan (24%) and Java (4%) with rainfall of 1,500-4,000 mm/year, average dry months of 0-4 months/year and are located under 500 meters above sea level.

The area of Indonesia's rubber plantations is 3,445,317 ha with a total production of 2,770,380 tons. Comparison of area area according to company status, including smallholder plantations 84.66%. World rubber production and consumption are expected to grow at a rate of 2.5% per year and world trade will grow at a rate of 2.6% per year (Central Statistics Agency, 2009). Rubber plantations in East Java in 2015 were dominated by large state plantations and then large private plantations where there were no people-owned plantations. PT. Perkebunan Nusantara XII is one of the large state-owned companies in East Java. This company has an area of 81,278,474ha which includes several plant cultivations, one of which is rubber tree sap. PT. Perkebunan Nusantara XII as a state-owned company that carries out agribusiness activities which include providers of production facilities, plant cultivation, crop processing and marketing. P.T Plantation Nusantara XII Kotta Blater Jember Plantation is one of the work units of PTPN XII that carries out rubber agribusiness production. Based on observations and interviews conducted by researchers, the reduction of rubber plants in PT. Nusantara XII Plantation, Kotta Blater Jember Plantation and the switch to sugarcane crops are related to efficiency and cost savings in inventory management. The decline in the quality of rubber sap and the difficulty of selling it compared to sugarcane resulted in an increase in storage and stock management costs. In contrast, sugarcane has a more stable demand and is easier to sell, thus reducing ordering and storage costs.

These factors played a role in the company's decision to optimize the number of economical orders (EOQ) by switching to sugarcane plants that are more efficient in resource and labor management. The analysis of the International Rubber Study Group (IRSG) clearly shows that the world's demand for natural rubber continues to increase until 2035 (Atika and Afifuddin 2013). It is projected that the world's natural rubber products will still have a gap compared to consumption. The increase in natural rubber consumption is far above the world's natural rubber production. PT Perkebunan Nusantara XII, abbreviated as PTPN XII (Persero), is one of 14 Plantation State-Owned Enterprises (BUMN) engaged in the cultivation of plants, one of which is rubber.

PT. Perkebunan Nusantara XII as a state-owned company that carries out agribusiness activities which include providers of production facilities, plant cultivation, crop processing and marketing. PT. The Nusantara XII Plantation Kotta Blater Jember is one of the work units of PTPN XII that runs rubber agribusiness production. PT Perkebunan Nusantara XII (Persero), hereinafter referred to as PTPN XII, is a State-Owned Enterprise (BUMN) with the status of a limited liability company whose entire shares are owned by the Government of the Republic of Indonesia. The head office of PTPN XII is located at Jl. Rajawali No. 44 Surabaya, East Java. PTPN XII Kotta Blater is located in Kotta Blater Hamlet, Curahnongko Village, Tempurejo District, Jember Regency.

PT. The Nusantara Plantation of Kotta Blater Jember carries out rubber agribusiness activities which include the cultivation of rubber plants to produce rubber sap or latex which is then processed into RSS (Ribbed Smoked Sheet) sheets. Sheet RSS is one of the rubber products that has high added value because of its complex processing process.

RSS sheet processing involves several stages, including coagulation, grinding, fumigation, and drying, which aims to improve the quality and marketability of the final product. The phenomenon that is happening today is a decline in rubber production and the quality of rubber sap in the region. This decline is influenced by several factors, such as climate change, pest attacks, and suboptimal cultivation practices. As a result, the rubber production results are not as good as in previous years, which has a direct impact on the quality and quantity of RSS sheets produced. In the context of RSS sheet processing, this research is important in understanding the entire production process and the challenges faced. Through research activities at PTPN XII Kebun Kotta Blater Jember, students can learn efficient and innovative processing techniques to increase the added value of rubber products. This research can also help identify solutions to address the decline in rubber sap production and quality, thereby supporting the sustainability of rubber agribusiness in the future. In addition, this research will provide insight into the right inventory management strategies, such as the implementation of EOQ (Economic Order Quantity), to optimize the production and storage costs of RSS sheets. Thus, rubber agribusiness activities at PT. The Nusantara Plantation of Kotta Blater Jember can continue to develop and contribute positively to the local and national economy.

RESEARCH METHOD

The application of scientific methods in a research requires a type of research that is in accordance with the conditions of the research. Where this type of research uses a quantitative descriptive method, it is a type of research that aims to explain something that uses research with numbers and conducts data analysis with statistical procedures. (Sugiyono 2020). According to (Latipah 2014) this research is in the form of descriptive, namely analyzing and presenting facts systematically so that it can be easier to understand and conclude, and the conclusions given are always clear on their factual basis so that everything can always be returned directly to the data obtained. Interviews are data collection techniques conducted through face-to-face and direct questions and answers between researchers and resource persons. Along with the development of technology, interview methods can also be carried out through certain media, such as telephone, email, or video call via Zoom or skype. Interviews are divided into two categories, namely structured and unstructured interviews. The interview I conducted was conducted by the Head of PTPN XII Batter Kotta. The author uses a quantitative descriptive analysis method in obtaining data, which is a step in simplifying the data into a form that is easier to understand and interpret. Some of the analysis methods applied in the study aim to make the results can be interpreted easily and understandably, including Economic Order Quantity (EOQ).

RESULTS AND DISCUSSION

To make it easier for business actors to carry out production activities in accordance with the company's goals, supervision is needed to support the success of production implementation so that it has an influence on profits. One of the objectives of

implementing raw material control in the rubber production process is to make it easier for business actors to increase the efficiency of the use of raw materials, especially in rubber production, and to support the achievement of rubber production targets. In relation to the description above, rubber production targets at PTPN XII Persero Kotta Blater Plantation will be presented from January to December 2023. What is presented through the tabulation table is as follows: To find out the number of orders that contain the smallest amount of fees is the number of economical orders. In conjunction with the description above, it can be calculated as follows:

Table 1. Number of needs, order fees, and storage fees for January to December 2023.

Frekuensi (Bulan)	Jumlah Kebutuhan (Q)	H	S	Q/2	Total H TH = H × Q/2	Total S TS = F × S	Total Cost TC = TH + TS
1	152.925	599.750.342	1.141.823.922	76.462	45.858.110.650.00 4	1.141.823.922	45.859.252.473.92 6
2	211.786	591.435.992	1.099.092.282	105.893	62.628.931.500.8 56	2.198.184.564	62.631.129.685.42 0
3	268.067	741.095.402	1.469.979.275	134.033	99.331.240.016.26 6	4.409.937.825	99.335.649.954.09 1
4	196.882	897.984.489	1.472.152.942	98.441	88.398.491.081.64 9	5.888.611.768	88.404.379.693.41 7
5	192.738	803.875.690	1.359.550.140	96.369	77.468.696.369.61 0	6.797.750.700	77.475.494.120.31 0
6	252.948	776.149.913	1.274.696.355	162.474	98.162.784.096.76 2	7.648.178.130	98.170.432.274.89 2
7	203.775	634.305.811	1.167.994.262	101.887	64.627.516.165.35 7	8.175.959.834	64.635.692.125.19 1
8	213.638	691.093.900	1.209.133.069	106.819	73.821.959.304.10 0	9.673.064.552	73.831.632.368.65 2
9	250.455	852.291.005	1.444.477.309	125.227	106.729.845.683.1 35	13.000.295.78 1	106.742.845.978.9 16
10	156.303	696.160.414	1.160.410.341	78.151	54.405.632.514.51 4	11.604.103.41 0	54.417.236.617.92 4
11	146.626	656.312.610	939.778.838	73.313	48.116.246.376.93 0	10.337.567.21 8	48.126.583.944.14 8
12	168.569	776.997.406	1.266.049.111	84.284	65.488.449.367.30 4	15.192.589.33 2	65.503.641.956.63 6
Total	2.414.713	8.717.452.974	15.005.137.846	105.894.137.460	885.037.903.126.487	96.068.067.036	885.133.971.193.523

Table 1 is data on the number of needs, order costs, and storage costs for rubber production at PTPN XII Persero Kebun Kotta Blater which shows that the amount of raw materials issued by the company in 2023 is IDR 2,414,713, then in carrying out the rubber production process, an order fee is also required by the company for 1 year, which is IDR 15,00,137,846, then the storage fee is Rp 8,717,452.97 for each delivery.

The Economic Order Quantity approach is needed because of the relevance of the issue of controlling the supply of raw materials. The EOQ technique shows a way to determine the optimal amount of raw material requirements. However, to adopt EOQ,

ordering and storage fees are required. The relationship with the above description can be counted as follows:

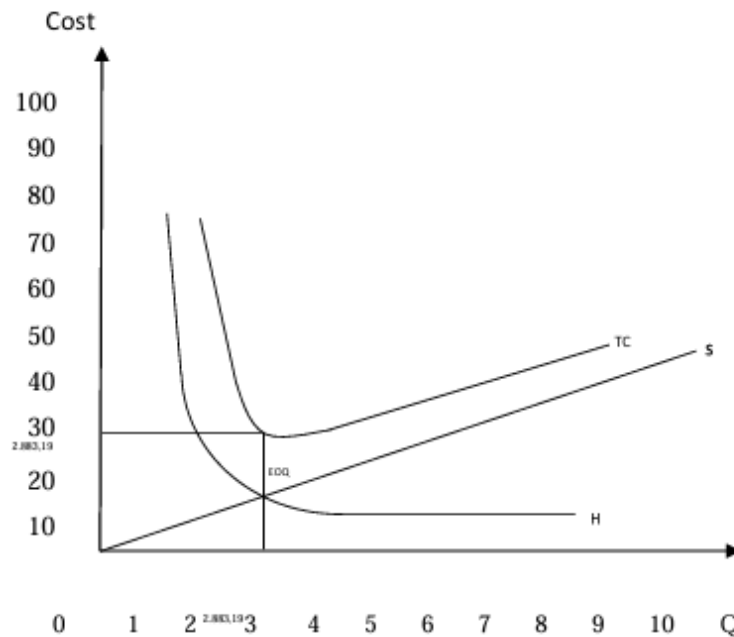


Figure 1. EOQ Chart Results.

Based on the results of the study, it is shown that using the EOQ method can streamline inventory costs at PTPN XII Persero Kebun Kotta Blater so that it can maximize profits. However, before determining the amount of quantity each time the most economical order, it is necessary to pay attention to the steps that underlie the calculation of EOQ, namely the identification of variables D (Demand): The number of goods requested in a certain period (e.g., year) the second S (Ordering Cost): Costs incurred every time an order is placed (administrative costs, shipping) and the third H (Holding Cost): The cost of storing goods per unit per period (warehouse rental costs, damage, capital interest).

The analysis used to determine the number of orders that can result in economical purchasing savings, Quantity (EOQ). With the EOQ method, it can be known the most economical amount of purchases that must be made at the time of purchase. Based on the inventory model above, it shows a formula approach model with the use of the Economic Order Quantity (EOQ) method. The inventory model with a formula approach is a method to determine the optimal amount of orders or inventories to be held, so that the total inventory cost can be minimized. It is better to use the Economic Order Quantity (EOQ) method so that the cost of ordering and storage decreases, so that it can minimize the costs incurred at PTPN XII Persero Kebun Kotta Blater and can maximize the profits obtained. safety stock used as safety supplies that must be in the warehouse for one 1 year, which is 2,883.19 Kg and the implementation of EOQ obtains savings of Rp 885,133,971,190,639 so that from the analysis it can be said that with the implementation of EOQ, the company can get savings.

CONCLUSION

Fundamental Finding: The analysis of raw material control at PTPN XII Persero Kebun Kotta Blater using the Economic Order Quantity (EOQ) method revealed that the company's total inventory issuance remains significantly high, amounting to IDR 885,133,971,193,523, while EOQ calculations suggest a substantially lower optimal inventory cost of IDR 2,883.19, indicating potential savings of approximately IDR 885,133,971,190,639. However, the implementation of EOQ has not yet resulted in achieving the rubber production targets. **Implication:** This suggests that although EOQ can effectively reduce inventory costs and improve financial efficiency, other operational factors may influence production output, requiring a more integrated approach to inventory and production management. **Limitation:** The study is limited to quantitative inventory data without incorporating qualitative factors such as supplier reliability, production scheduling, or demand variability, which may affect the EOQ model's effectiveness in practice. **Future Research:** Further research is recommended to explore the integration of EOQ with comprehensive supply chain and production planning systems, including real-time demand forecasting and supplier performance metrics, to optimize both inventory costs and production outcomes.

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