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MOTORCYCLE SPARE PARTS MANAGEMENT USING THE EOQ METHOD

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ABSTRACT

In the 1960-1970s, Indonesia was in a period of massive development, to support this development, several important factors were needed, namely transportation, and immediately the Indonesian people really wanted to have a practical and economical two-wheeled motorcycle. The high demand for two-wheeled motorcycles created many new technologies attached to every motorcycle in Indonesia. The specifications of two-wheeled motorcycles sold on the market also vary from 100cc-200cc, and have different motorcycle models from underbones, automatic underbone motorcycles, injection automatic scooters and sport bikes. The number of two-wheeled motorcycle enthusiasts in the country, gives its own meaning and trend to two-wheeled motorcycle manufacturers, no longer only used by men but women also now use motorcycles in supporting their daily activities. Inventory management is the process of planning, controlling, and supervising the stock of goods or materials owned by an organization that aims to ensure the availability of the right goods or materials, in the appropriate amount, location, and timing, with efficient costs. This study aims to analyze the inventory data of consumable motorcycle spare parts which are supporting products for motorcycle repair activities at PT. Y. The research method used is descriptive analysis use the method of economic quantity ordering (EOQ). The findings of this investigation indicate that PT. Y has the most economical number of orders of 6,324 units, with orders that must be made 48 times per year, and the company places orders once every 8 days in one year. With a total cost of Rp 9,486,833.02.

Keywords: *inventory management, economic ordering quantity (EOQ)*

ABSTRAK

Pada tahun 1960-1970-an, Indonesia mengalami pembangunan yang luar biasa, untuk mendukung pembangunan ini dibutuhkan beberapa komponen penting, seperti transportasi, dan seketika itu pula masyarakat Indonesia sangat menginginkan untuk memiliki sepeda motor roda dua yang efisien dan murah. Permintaan sepeda motor roda dua meningkat, yang menghasilkan banyak teknologi baru pada setiap sepeda motor di Indonesia. Karena banyaknya peminat sepeda motor roda dua di tanah air, sepeda motor ini kini digunakan oleh kaum wanita dan pria, dengan spesifikasi yang beragam mulai dari 100cc hingga 200cc dan model yang berbeda-beda mulai dari skuter matic injeksi, bebek, hingga motor sport. Manajemen persediaan merupakan proses perencanaan, pengendalian, dan pengawasan terhadap stok barang atau material yang dimiliki oleh suatu organisasi yang bertujuan untuk menjamin ketersediaan barang atau material yang tepat, dalam jumlah yang tepat, di tempat yang tepat, dan pada waktu yang tepat, dengan biaya yang efisien. Penelitian ini bertujuan untuk menganalisis data persediaan suku cadang sepeda motor habis pakai yang merupakan produk pendukung kegiatan reparasi sepeda motor di PT. Y. Penelitian ini menggunakan analisis deskriptif dan pemesanan kuantitas ekonomis (EOQ). Hasil penelitian ini menunjukkan bahwa PT. Y memiliki jumlah pesanan paling ekonomis yaitu 6.324 unit, dengan pemesanan yang harus dilakukan sebanyak 48 kali per tahun, dan perusahaan melakukan pemesanan setiap 8 hari sekali dalam satu tahun. Dengan total biaya sebesar Rp 9.486.833,02.

Kata Kunci: manajemen inventaris, kuantitas pemesanan ekonomis (EOQ)

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INTRODUCTION

In economics, trade is conventionally defined as a mutual exchange process based on the voluntary will of each party. Those involved in trade activities can freely determine the profits and losses from these trade activities. Trade-related activities are inextricably linked to the demand for goods, which is a crucial factor in assisting a company's marketing initiatives. With timely delivery of merchandise, The company can function efficiently and accomplish its objectives. A company runs the danger of being unable to satisfy client demands if it does not have a enough inventory of goods.Therefore, a stable inventory of merchandise is necessary because without it, the community's needs cannot be met in a timely manner (Haslindah et al., 2020).

Every growing and developing company, whether a service, trading, or manufacturing company, always requires inventory. A business runs the danger of not being able to satisfy client demands without inventory. This is because procurement of goods requires some time in the ordering process. Therefore, companies must be able to manage inventory optimally. With optimal inventory, companies can streamline costs, such as ordering and storage costs. Optimal control can ensure the company's inventory needs are met and total inventory costs can be minimized (Manik & Marbun, 2021).

Inventory procurement control is crucial because it directly impacts the costs a company incurs as a result of inventory. Therefore, inventory must be balanced with demand, as excessive inventory will result in the company facing the risk of damage and high storage costs, in addition to significant investment costs. However, a shortage of inventory will disrupt the smooth sales process. Therefore, a balance in inventory procurement is essential to minimize costs and streamline the sales process (Haslindah et al., 2020).

Inventory, plays a vital part in business operations as a firm asset. Therefore, companies must be capable of handling their inventories appropriately to facilitate operational continuity and maintain smooth operations. Therefore, inventory management is crucial, as successful inventory planning and monitoring significantly impacts a company's success, including determining profitability. Controlling inventory will ensure customer satisfaction by meeting demand (Manik & Marbun, 2021).

Inventory management plays a role in determining the strike a balance between client service and inventory investment. This balance between inventory investment and customer service can determine a company's long-term competitive advantage. Another important role of inventory management is anticipating various possibilities that could threaten a company's operational activities. Furthermore, inventory management is necessary for companies to make accurate decisions to optimize product availability. Companies can optimize the role of inventory management by considering inventory expenses, such as setup, ordering, holding, and shortage expenses. These costs can certainly impact a company's performance in implementing inventory management. If managed properly, costs are economical, ensuring smooth company operations. Conversely, if not managed properly, it can result in high costs, which can disrupt company operations (Sanjaya & Purnawati, 2021).

Production disruptions due to inventory shortages show how important inventory is to business operations.The amount of buffer stock is influenced by the magnitude of demand and the timing of supply orders. Overstocking, or having too much inventory, can result in excessively high storage and maintenance costs for materials during storage, even though these items still have an opportunity cost (funds that could be invested in more profitable activities). The company's goal is not to reduce or increase inventory, but to maximize profits.

Inventory control is a series of processes that can be related to planning, coordinating, and controlling all activities related to incoming inventory. Efficient purchasing requires inventory

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control management. Maintaining adequate inventory is crucial for businesses. This is done to ensure the smooth and efficient running of a company's operations or production processes. Inventory management is an activity that must be carried out to achieve sufficient inventory. Because the quantity of inventory affects the manufacturing process's efficiency, effectiveness, and smooth operation as well as the caliber of the goods the business produces, inventory management is essential. The amount or level of inventory required varies from company to company, depending on production volume, type of equipment, and processes (Brahmantyo et al., 2023).

The purpose of this study is to ascertain the quantity of inventory that a company should have in an effort to improve cost effectiveness.

LITERATUR REVIEW

Operations management is a set of tasks that transform input into output to create value in the form of products and services. Operational Management is a task to organize and plan how resources, including human resources, are used, equipment resources and financial resources, and materials in an effective and efficient manner to produce and increase the utility of a good or service. Operational management as decision making with all other operational functions can be seen as a transformation system that changes inputs into outputs (Suhardi, 2024). We study operations management for four reasons: 1) We study how individuals organize themselves to build a productive organization through operations management; 2) We learn how commodities and services are created through operations management; 3) We can comprehend what operations managers perform because to operations management; and 4) The most expensive aspect of a company is operations management (Suhardi, 2020).

Inventory management is a company's activity in determining inventory composition so that the company can organize and execute orders and store goods needed by the company based on the quantity and timing required at the lowest cost. Each type of inventory has its own characteristics and management methods. Inventory can be distinguished as follows : 1) The inventory of tangible items utilized in the production process, such as iron, wood, and others, is known as the raw material inventory. 2) inventory of purchased parts and components, which is the inventory of products made out of parts acquired from other businesses that can be put together to create a finished good. 3) Supplies inventory, which is the inventory of items required for manufacturing but not included in the final product. 4) Work-in-process inventory is the stock of products that are the result of each step in the production process or that have undergone some processing but still need to be treated further to become finished items. 5) Inventory of finished goods, which is the stock of products that have undergone factory processing or preparation and are prepared for sale or delivery to clients (Manik & Marbun, 2021).

Management of inventories will be even better if the analysis process is continued using the Economic Order Quantity (EOQ) model. One inventory control method that reduces overall ordering and holding costs is the EOQ model. Applying the EOQ method can determine the most economical ordering frequency and product order quantity according to the company's needs. Therefore, this economical ordering will help the company provide a high level of service with minimal total costs. Things to consider when applying the EOQ method are the reorder point, lead time, and safety stock (Sanjaya & Purnawati, 2021).

There are three functions of inventory, including: 1) Decoupling is inventory used to anticipate unpredictable fluctuations in consumer demand; 2) Economic Lot Sizing is savings reflected by the reduction in costs per unit obtained by the company due to purchases in certain lots; 3) Anticipation is inventory held to anticipate seasonal changes with the aim of

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smoothing the production process. Inventory costs consist of Four categories, including: 1) Storage costs, also known as carrying or holding costs, are expenses that change in direct proportion to the amount of inventory. Expenses included as storage expenses are : storage facility expenses, capital costs, obsolescence costs, physical count costs and report consolidation, inventory insurance costs, inventory tax costs, theft costs, damage or robbery, inventory handling costs, and so on. Inventory holding costs usually range from 12 to 40 percent of the cost or price of goods; 2) Ordering costs are costs borne by the company each time an order is placed. The costs included in ordering costs are: order processing and shipping costs, wages, telephone costs, correspondence expenses, packing and weighing costs, inspection costs for receipt, shipping costs to the warehouse, current debt costs and so on; 3) Setup costs are costs incurred by the company in preparation for producing a product. Components of setup costs consist of: costs of idle machines, direct labor preparation costs, scheduling costs, shipping costs and so on; 4) Costs of running out or shortages of materials. These costs arise when inventory is insufficient to meet demand for materials. Costs included in shortage costs include the following: lost sales, lost customers, special ordering costs, shipping costs, price differences, disruption of operations, additional managerial activity expenses and so on (Sanjaya & Purnawati, 2021).

RESEARCH METHODOLOGY

This research is a descriptive study using a quantitative approach to analyze existing problems at PT. Y regarding the inventory system and to determine whether the company's inventory management performance is efficient or not. The object used in this research is motorcycle spare parts inventory management at PT. Y.

Quantity of Economic Orders is a calculation utilized to ascertain the most economical product amount of the order. The following formula is used to determine the EOQ value:

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

Where:
D = demand
S = ordering cost
H = holding cost

After obtaining the quantity value for a single order, the next step is to determine the ordering frequency using the following formula. Purchase frequency in a year (F) : $F = \frac{D}{Q^*}$

Lead time for purchase in a year $= \frac{asumsi\ jumlah\ hari\ kerja\ setahun}{frekuensi}$

Total inventory cost (TIC) :

$$TIC = \frac{D}{Q^*}S + \frac{Q^*}{2}H$$

RESULT AND DISCUSSION

The analysis used in this study is the inventory method to ensure the availability of the right goods or materials, in the appropriate amount, in the appropriate location, and at the appropriate moment, with efficient costs at PT. Y. The purchase of motorcycle raw materials for 1 year is 300,000 units. The price of raw materials is Rp. 10,000. The holding cost for each order is Rp. 100,000. Meanwhile, the holding cost is 15% of the average inventory value. Calculation of EOQ, orders placed in a year, and how many days in 1 year to place orders (assuming 1 year = 360 days).

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Where :
D = 300.000 unit
Price (P) = Rp 10.000
S = Rp 100.000
H = 15% × P

Then $Q^* = \sqrt{\frac{2DS}{H}} = \sqrt{\frac{2\times300000\times100000}{10000\times15\%}} = 6324.5$ unit ≈ 6324 unit

Purchase frequency in a year (F) : $F = \frac{D}{Q^*} = \frac{300000}{6324} = 47.4 \approx 48$ kali

Lead time for purchase in a year $= \frac{asumsi\ jumlah\ hari\ kerja\ setahun}{frekuensi} = \frac{360}{48} = 7.5 \approx 8$ hari

Total inventory cost (TIC) :

$$TIC = \frac{D}{Q^*}S + \frac{Q^*}{2}H = \frac{300000}{6324}(100000) + \frac{6324}{2}(15\% \times 10000)$$
$$= 4.743.833{,}02 + 4.743.000 = 9.486.833{,}02$$

Therefore, PT. Y has the most economical order quantity of 6,324 units, with orders required 48 times per year, and the company places orders every 8 days in a year. The total cost required is IDR 9,486,833.02.

Research conducted by Brahmantyo et al. states that inventory management information systems can process incoming and outgoing goods requests according to the reorder point and safety stock techniques, thereby controlling inventory with empty stocks to decrease by 95%. Then, research conducted by Chrisna and Hernawaty states that calculating the cost of shoe products is still very simple, namely the cost elements calculated using the company method include direct costs for direct labor, raw materials, and manufacturing overhead (other costs).

Research conducted by Haslinda indicates that inventory management has not been fully implemented optimally at Toko Mega Jilbab. This is evident in the lack of special considerations by the proprietor in supplying goods for marketing on weekdays. However, to meet the expected increase in public demand leading up to holidays like Eid al-Fitr and Eid al-Adha, the proprietor supplies goods in greater amounts than typical. The time required to receive goods after placing an order is approximately two weeks using Andira sea freight. To place a new order, the owner simply orders goods based on inventory records maintained at the end of each month by his employees.

Meanwhile, research conducted by Manik & Marbun stated that implementing The EOQ technique can help companies save the entire amount inventory of IDR 69,235. This proves that the TIC before EOQ > TIC after EOQ, so it can be said to be efficient and can be used as a raw material inventory control.

Research conducted by Sanjaya and Purnawati stated that the performance of product inventory management was inefficient at Rp 43,058,137, whereas the entire inventory cost incurred using the EOQ technique was Rp 32,716,517. This indicates that the corporation can reduce inventory expenses by Rp 10,341,620, or 24.02%, by using the EOQ approach.

CONCLUSION

PT. Y has the most economical order quantity of 6,324 units, with orders placed 48 times per year, and the company places orders every 8 days in a year. With a total cost of Rp 9,486,833.02, the company uses quantitative calculations with a relevant method, in this case the EOQ method, to help make activities more effective and efficient.

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