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Analysis of Inventory Control Using the Eoq (*Economical Order Quantity*), Lfl (*Lot For Lot*), and Poq (*Period Order Quantity*) Methods for Cost Optimization (A Study on Warehouse Goods at PT Eco Baby Indonesia)

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ABSTRACT

This study analyzes inventory control at PT Eco Baby Indonesia with the main objective of minimizing total inventory costs. The research focuses on two questions: what is the current inventory cost and which method is most effective among Economic Order Quantity (EOQ), Period Order Quantity (POQ), and Lot for Lot (LFL). A quantitative approach was used through the calculation and comparison of the Total Inventory Cost (TIC) of the three methods based on actual data for 2024, which included ordering costs, storage costs, and lead time variations. The results showed that the LFL method provided the lowest TIC compared to EOQ and POQ. This method adjusts the order quantity to the actual needs of each period so that it does not incur excessive storage costs. Although LFL increases the frequency of orders and has an impact on increased ordering costs, the overall impact still results in lower total costs. This advantage is very relevant to PT Eco Baby Indonesia as a distributor of perishable baby food products, because minimal inventory can reduce the risk of expiration and loss. In conclusion, the LFL method is considered the most optimal in reducing inventory costs at PT Eco Baby Indonesia. These findings emphasize the importance of adaptive inventory control strategies in the distribution business. Further research is recommended to examine the application of digital inventory management technology and lean inventory approaches to further improve efficiency.

Keywords *: Inventory Control; EOQ; POQ; LFL; Inventory Costs; PT Eco Baby Indonesia.*

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INTRODUCTION

Effective and optimal inventory control is an important factor in supply chain management to maintain smooth operations and reduce production costs. Inventory plays a central role in the continuity of company operations because it is directly related to the company's ability to meet customer demand. The main objective of a company is to achieve optimal profits, and in the process, good inventory management is required to fulfill the important elements of procurement (Ekakitie et al., 2022). However, in practice, there is often a gap between the ideal conditions and reality, namely companies facing problems of overstocking and out-of- stock (Tamaputra & Farmaciawaty, 2025). If inventory is too large, storage and maintenance costs increase. Conversely, if inventory is too low, companies will have difficulty meeting customer demand on time. Thus, balance in inventory control is a strategic factor for companies to achieve their business objectives.

PT Eco Baby Indonesia, a private company engaged in retail and distribution of complementary foods for infants (MPASI), is currently facing serious problems related to inventory control. Baby food products have a relatively short shelf life of around 8 months, and within the first 6 months, these products can no longer be marketed to modern trade, distributors, or resellers. As a result, companies often face unsold products that end up expiring. The problem is exacerbated because procurement planning is based solely on historical purchase and inventory data, without considering fluctuations in demand and product shelf life (Feng et al., 2024). This situation leads to a buildup of goods in warehouses, increased storage costs, and the cost of destroying unsold products.

Company operational data shows a downward trend in the procurement of key products in 2023– 2024, such as Apple, Mango and Banana Puree (R.02), which fell from 873 cartons to 580 cartons, Chicken and Corn Soup (R.09) from 780 cartons to 660 cartons, and Cookies Mixed Berries (R.17), which fell dramatically from 1,285 cartons to 620 cartons. Although the average lead time was recorded at around 35 days, fluctuations in demand caused stock imbalances, risking overstocking and stockouts (Tadayonrad & Ndiaye, 2023). This has resulted in significant financial losses, such as purchase order cancellations worth IDR 583,664,635.00 in 2023 and IDR 383,954,126.00 in 2024, as well as a decline in annual sales from IDR 3.71 billion to IDR 2.84 billion. Average monthly sales only reached IDR 300 million, far below the target of IDR 500 million, indicating a gap between market demand and stock availability.

In addition, data on product destruction due to expiration also shows a significant increase. Total destruction costs rose from IDR 47,796,600 in 2023 to IDR 73,699,753 in 2024. This condition highlights the weakness of the inventory control system at PT Eco Baby Indonesia, which has a direct impact on high operational costs. According to Anner (2022), order cancellations can occur due to excess stock, fluctuations in demand, or ordering errors. Supplier issues such as late deliveries also contribute (Din et al., 2022). A strong relationship between the company and its suppliers has been proven to improve supply chain success and minimize the risk of cancellations (Shamsuzzoha & Jaakkola, 2024). Thus, a more appropriate inventory control strategy is needed to balance supply and demand.

Several inventory control methods that are considered include Economic Order Quantity (EOQ), Lot for Lot (LFL), and Period Order Quantity (POQ). EOQ helps determine the optimal

order quantity by minimizing ordering and storage costs (Alnahhal et al., 2024; Gunawan & Setiawan, 2022; Maharani, 2025; Yuningsih, 2024). The LFL method emphasizes ordering according to actual needs within a certain period, in line with the Just in Time concept (Sesilia et al., 2024; Farhan & Purnomo, 2025). Meanwhile, the POQ method combines the advantages of EOQ and LFL by placing orders in fixed periods, making it more flexible in responding to demand fluctuations (Nuraini et al., 2023; Ghiffari, 2024; Izzati, 2024).

Based on these conditions, research on the application of optimal inventory control methods at PT Eco Baby Indonesia is important. This is not only aimed at reducing losses due to overstocking and stockouts, but also ensuring that the company can achieve cost efficiency, maintain business sustainability, and increase competitiveness in the premium baby food market.

LITERATURE REVIEW

Operational Management

To implement operational management, a management system is needed that is capable of integrating the functions of planning, organizing, mobilizing, and controlling the utilization of organizational resources. According to Stevenson (2021).

Inventory Management

Every company, whether industrial, manufacturing, trading, or service-based, has inventory. If a company does not have inventory, Indonesia will experience a significant shortage of goods needed to meet customer demand, resulting in losses for the company. Inventory is the amount of materials, parts provided, and materials in process that are available in a company for the production process, as well as finished goods or products provided to meet demand from components or customers at any time (Gunawan, 2020).

Economic Order Quantity (EOQ)

According to Heizer J et al., (2023) defines Economic Order Quantity (EOQ) as an inventory control technique that minimizes the total costs of ordering and storage. Meanwhile, according to Prasetyo & Putra (2021), Economic Order Quantity (EOQ) is an inventory control method that aims to determine the optimal order quantity so that total inventory costs, which include ordering costs and holding costs, can be minimized.

Lot for Lot (LFL)

Lot for Lot (LFL) is an order size determination technique that sets the order quantity equal to the net requirement for a given period. Thus, the number of planned order receipts generated will be equal to the net requirement value, thereby avoiding excess inventory. This concept is in line with the Just in Time (JIT) philosophy, where ordering or production is carried out only when needed to meet actual demand. With this approach, companies can reduce storage costs to near zero and reduce the risk of waste due to excess inventory or expired products (Tan et al., 2024).

Period Order Quantity (POQ)

Period Order Quantity (POQ) is an inventory management method that determines order quantities based on fixed periods rather than fixed quantities. This approach is particularly useful in environments where demand varies, allowing companies to align their ordering schedules with production cycles or supplier schedules. Orders are placed at fixed intervals,

allowing companies to synchronize inventory replenishment with production schedules, reducing the risk of stockouts or excess inventory. This is particularly useful in manufacturing environments where production processes are planned in advance (Satrio et al., 2024).

METHOD

Research Time and Place

This research was conducted in June 2025 at PT Eco Baby Indonesia, located at Bizpark3 Blok D05, Jl. Sultan Agung, RT.003/RW.005, Bekasi City, West Java Province. This location was chosen because it is the company's operational center as well as the main storage warehouse that is the object of research related to inventory control.

Research Design

The research data was sourced from secondary data in the form of PT Eco Baby Indonesia's operational records for one year. The research population included all 19 items of inventory in the company's warehouse, while the sample focused on three products with the highest levels of procurement and control errors, thereby providing a more representative picture of inventory issues in the company.

Data Collection Techniques

Data collection was carried out using several techniques, namely:

1. Observation, which is direct observation of inventory management activities at PT Eco Baby Indonesia. Observations can be conducted in a structured manner using specific guidelines or in an unstructured manner according to the dynamics in the field.
2. Documentation, which involved collecting data from company records, procurement reports, warehouse inventory, and other internal documents related to inventory management.
3. Literature Study, which is a review of literature from written sources such as scientific journals, books, and research reports relevant to the topic of inventory control. This study was conducted to strengthen the theoretical basis and analytical framework of the research.

Data Analysis Methods

Data analysis in this study compares company inventory policies with three main methods, namely Economic Order Quantity (EOQ), Periodic Order Quantity (POQ), and Lot for Lot (LFL). The EOQ method is used to determine the most economical order quantity by minimizing total inventory costs, which include ordering and storage costs (Heizer et al., 2023). Furthermore, the POQ method is applied to determine the optimal ordering cycle by combining the EOQ principle and average usage per period, so that companies can plan ordering intervals more accurately. The LFL method emphasizes that the order quantity must match the net requirement, so that companies only order according to actual demand and avoid stockpiling.

Additionally, the analysis also includes calculations of purchase frequency, safety stock, and reorder point (ROP) to determine when companies need to reorder. Finally, the total inventory cost is calculated as a combination of storage and ordering costs, with the optimal point achieved when both costs are balanced. With this approach, companies are expected to be able to find the most efficient inventory control method to support their operations.

RESULTS AND DISCUSSION

Results

Data Analysis

This study aims to provide a portfolio on inventory management and planning at PT Eco Baby Indonesia, as well as to evaluate current inventory costs by comparing various inventory control methods to optimize costs. In this study, three main products were selected as the objects of study, namely R.02 Apple, Mango and Banana Puree (110g), R.09 Peachy Chicken and Corn Soup (125g), and R.17 Peachy Multigrain Cookies Mixed Berries (50g). The selection of these three products was based on a strategic analysis of the company's internal data, which showed the high contribution of these three products to sales as well as the frequency of problems in inventory control. The research data used secondary data from PT Eco Baby Indonesia during 2024.

PT Eco Baby Indonesia's product portfolio consists of various variants of purees, soups, smoothies, cookies, and multigrain snacks. The table shows that R.02, R.09, and R.17 are among the main products representing important categories, ranging from purees to healthy snacks. This reinforces the reason for selecting these three products as the focus of the study due to their relevance to the company's business strategy of providing healthy and nutritious food for children.

Furthermore, the data shows a significant decline in procurement. R.02 fell from 873 cartons in 2023 to 580 cartons in 2024, R.09 from 780 cartons to 660 cartons, and R.17 from 1,285 cartons to 620 cartons. Although the average lead time is stable at 35 days, there is variability with a standard deviation of 8.56 days. This variability poses the risk of an imbalance between supply and demand, which can lead to stockouts or inventory buildup. In the context of baby food products with a limited shelf life, this risk is even more crucial because it is directly related to the potential for product damage and expiration. Therefore, the Lot for Lot (LFL) method, which is in line with the Just in Time (JIT) principle, is considered relevant because it can reduce storage costs, although it still requires a mitigation strategy to anticipate lead time uncertainty.

Table 1. Out of Stock Products

Description	2023	2024
Purchase Order Cancel	IDR 583,664,635.00	IDR 383,954,126.00
Goods Sales	IDR 3,715,330,240.00	IDR 2,849,735,133.00
Monthly Goods Sales	IDR 309,610,853.33	IDR 195,583,603,00
Cancellation Rate	15.7	13.5
Annual Sales	7,968 Cartons	7,277 Cartons
Average Monthly Sales	664 Cartons	606 Cartons

Source: PT Eco Baby Indonesia

In addition, Table 1 reinforces the reasons for product selection by displaying data related to out- of-stock incidents. The value of order cancellations due to stockouts in 2024 was recorded at IDR 383,954,126.00, which is still quite high despite a decrease from IDR 583,664,635.00 in 2023. The order cancellation rate also remains at 13.5%, exceeding the maximum tolerance limit of 10%. This condition has implications for a decline in sales performance, where total annual sales fell from IDR 3,715,330,240.00 in 2023 to IDR 2,849,735,133.00 in 2024. There was also a decline in average monthly sales, from IDR 309,610,853.33 to IDR 195,583,603.00.

This data indicates a close relationship between the availability of leading products and the company's overall sales performance, making inventory control a strategic aspect.

In addition to losses due to stockouts, overstocking also has a significant financial impact. Increased costs of destroying expired goods. Total disposal costs rose from IDR 47,796,600 in 2023 to IDR 73,699,753 in 2024. This increase confirms that the accumulation of unsold stock is a serious problem for the company, not only in terms of storage costs but also because of additional losses due to product disposal. This condition further reinforces the urgency of implementing a more optimal inventory control system so that PT Eco Baby Indonesia can reduce costs overall while maintaining business continuity.

Inventory Costs at PT Eco Baby Indonesia

PT Eco Baby Indonesia's total ordering costs throughout 2024 reached IDR 555,199,974.96, with a monthly average of IDR 42,707,690.38 and a cost per carton of IDR 76,295.17. The highest costs were recorded in February, April, and October, while there were no orders at all in June and December. This fluctuating pattern indicates irregular procurement, which can affect stock stability and the effectiveness of the company's inventory management.

More specifically, the ordering costs per product for the three main products, namely R.02 Apple, Mango and Banana Puree, R.09 Chicken and Corn Soup, and R.17 Multigrain Cookies Mixed Berries.

Product R.02 is relatively more stable, although there were no orders in several months, such as March, July, September, and December. Product R.09 shows a more fluctuating ordering pattern, with the highest costs in March and November, and no orders in October and September. Meanwhile, product R.17 also shows irregularities with significant ordering costs in February, May, and November. This data confirms the instability in the ordering system, which has an impact on costs and product availability.

Furthermore, the annual storage costs consist of electricity costs of IDR 18,618,400, water costs of IDR 5,798,758, and pest control costs of IDR 580,000. The company's total storage costs reached IDR 24,997,158 per year, with storage costs per carton amounting to IDR 3,435.09. This figure provides an overview of the additional costs incurred due to warehouse operational requirements, apart from ordering and purchasing costs.

In terms of procurement accuracy, monthly lead time data throughout 2024 shows an average of 35 days and a standard deviation of 8.56 days. The highest value occurred in May with 58 days, while the lowest was recorded in November with 22 days. These fluctuations in lead time are a significant risk factor, as they can cause a mismatch between supply and demand, which ultimately leads to the risk of stockouts or overstocking.

Table 2. Safety Stock per Product at PT Eco Baby Indonesia

No.	Component	R2	R09	R17
A	Maximum Usage (Carton)	100	120	100
B	Average Usage (Carton)	48.3	55	51.7
C	Average Lead Time (Days)	35	35	35
D	**Safety Stock (Cartons)**	**1,809.5**	**2,275**	**1,690.5**

Source: PT Eco Baby Indonesia documents (processed)

To anticipate this uncertainty, safety stock calculations are performed as shown in 2. The calculation results show that product R.02 requires a safety stock of 1,809.5 cartons, R.09

requires 2,275 cartons, and R.17 requires 1,690.5 cartons. This reserve amount is adjusted based on the difference between maximum and average usage per period, multiplied by the average lead time. With safety stock, the company can reduce the risk of stock shortages even if there are supply delays or spikes in demand. Next, the results of the Reorder Point (ROP) calculation for the three main products. Product R.02 has an ROP of 1,887.2 cartons, product R.09 has an ROP of 2,363.2 cartons, and product R.17 has an ROP of 1,773.45 cartons. These values are obtained by calculating the average daily usage multiplied by the lead time, plus the safety stock amount for each product. This calculation provides a clear basis for the company in determining when to reorder, so that product availability is maintained during the lead time period without causing stock shortages.

Overall, the data confirms that PT Eco Baby Indonesia faces challenges in irregular ordering, high warehouse operating costs, and significant lead time variability. However, through the application of accurate safety stock and reorder point calculations, the company can reduce the risk of supply and demand imbalances, while supporting the implementation of more efficient inventory control methods.

Inventory Costs at PT Eco Baby Indonesia Using the *Economic Order Quantity* (EOQ) Method

Annual inventory cost calculations for products R.02, R.09, and R.17 based on the Economic Order Quantity (EOQ) method (Table 11). These three products have the same ordering frequency, which is four times a year, with EOQ values of 161 cartons for R.02, 172 cartons for R.09, and 166 cartons for R.17. The highest storage cost is for product R.17, while the ordering costs for all products are the same because the calculation method is uniform. In terms of total inventory cost (TIC), product R.09 recorded the highest figure at IDR 53,985,160.00, followed by R.17 at IDR 51,489,837.78, and R.02 at IDR 47,946,813.11. These findings indicate that although EOQ is able to maintain order quantity stability, storage costs remain a dominant factor affecting TIC for products with higher demand.

Table 3. EOQ Inventory Costs of PT Eco Baby Indonesia

Description	R2	R9	R17
Requirements (Cartons)	580	660	620
EOQ (Cardboard)	161	172	166
Frequency (Per Period)	4	4	4
Storage Cost (Rupiah)	3,390,433.83	3,325,167.12	3,881,651.70
Ordering Fee (Rupiah)	305,180.68	305,180.68	305,180.68
Product Cost (Rupiah)	44,251,198.60	50,354,812.20	47,303,005.40
TIC (Rupiah)	47,946,813.11	53,985,160.00	51,489,837.78

Source: PT Eco Baby Indonesia documents (processed)

Furthermore, the results of Material Requirement Planning (MRP) based on EOQ for product R.02. With a fixed order size of 161 cartons, net requirements arise in certain periods, which then prompt reorders according to the EOQ amount. This schedule shows that even though demand is not always constant, EOQ ensures that stock availability is maintained with a consistent order size.

A similar pattern is seen in the EOQ MRP for product R.09. Unlike R.02, the demand pattern for this product tends to be more volatile, with net requirements often unable to be met from initial stock. Therefore, orders of 172 cartons are placed in several periods to cover the shortfall.

This pattern effectively maintains product availability, although the data shows that the ending stock in several periods is very low, potentially causing a risk of stockout if there is no quick adjustment.

Meanwhile, MRP EOQ for product R.17. With an order size of 166 cartons, new orders are placed whenever net demand arises due to insufficient available stock. However, the irregular demand pattern makes the application of EOQ for this product potentially cause overstocking on one hand, and stock shortages on the other, if the demand interval and volume are not well anticipated.

The EOQ calculation results for the three products show that this method is capable of providing the optimal order size to reduce total inventory costs. However, its nature of setting a fixed order quantity also has disadvantages, especially for products with highly fluctuating demand. This has the potential to create stock imbalances if the company does not make further adjustments based on actual consumption patterns.

Inventory Costs at PT Eco Baby Indonesia *Periodic Order Quantity* (POQ) Method

Table 4 shows the calculation of annual inventory costs for products R.02, R.09, and R.17 using the Periodic Order Quantity (POQ) method. Similar to the EOQ method, the three products have an order frequency of four times a year. However, the difference lies in the much lower holding costs because the order quantity is adjusted to periodic needs, not a fixed amount each time an order is placed. The highest storage cost is recorded for product R.09, while the ordering cost is the same for all three products due to uniform calculations. The final result shows that the Total Inventory Cost (TIC) for POQ is lower than EOQ, making this method more efficient in reducing inventory costs.

Table 4. POQ Inventory Costs at PT Eco Baby Indonesia

Description	R2	R9	R17
Requirements (Cartons)	580	660	620
EOQ (Cartons)	161	172	166
Frequency (Per Period)	4	4	4
Storage Cost (Rupiah)	1,820,597.70	2,335,861.20	2,301,510.30
Ordering Fee (Rupiah)	305,180.68	305,180.68	305,180.68
Product Cost (Rupiah)	44,251,198.60	50,354,812.20	47,303,005.40
TIC (Rupiah)	46,376,976.98	52,995,854.08	49,909,696.38

Source: PT Eco Baby Indonesia documents (processed)

In more detail, the results of Material Requirement Planning (MRP) for product R.02 using the POQ method. The ordering pattern is adjusted based on the accumulated demand over several periods. This can be seen from the orders of 170, 200, 110, and 100 cartons made periodically. This strategy allows the company to meet demand without creating excess inventory.

Next, MRP POQ for product R.09, which has a more fluctuating demand pattern. To reduce storage costs, orders are placed in large quantities but infrequently, namely 260, 240, 40, and 120 cartons in certain periods. This approach helps ensure timely stock availability, although high demand variation remains a challenge in planning.

Meanwhile, POQ is applied to product R.17. Although the demand pattern is uneven, the company manages inventory by placing large orders in certain periods, namely 240, 180, 100, and 100 cartons. With this strategy, logistics efficiency can be achieved because the company

does not need to place orders too often, but is still able to maintain stock availability until the next period.

Overall, the POQ calculation results show that this method can significantly reduce storage costs compared to EOQ. This is because POQ allows companies to adjust order quantities to actual needs per period, so there is no excess stock that incurs storage costs. However, the consequence is that companies must be able to accurately plan their needs to avoid supply shortages in the middle of the period.

Inventory Costs at PT Eco Baby Indonesia *Lot for Lot (LFL)* Method

Table 5 shows the results of inventory cost calculations using the Lot for Lot (LFL) method for products R.02, R.09, and R.17. This method results in zero storage costs, because each requirement is met exactly according to the quantity requested in a given period. However, the consequence is that the frequency of orders becomes higher, namely seven times for products R.02 and R.17, and nine times for product R.09 throughout the year. As a result, the ordering cost for R.02 and R.17 reached IDR 534,066.19, while for R.09 it was higher at IDR 686,656.53. In terms of total inventory cost (TIC), R.09 still recorded the highest figure at IDR 51,041,468.73, followed by R.17 at IDR 47,837,071.59, and R.02 at IDR 44,785,264.79. This data shows that the LFL method excels in reducing storage costs, but requires efficiency in order management.

Table 5. LFL Inventory Costs of PT Eco Baby Indonesia

Description	R2	R9	R17
Requirements (Cartons)	580	660	620
Frequency (Per Period)	7	9	7
Storage Cost (Rupiah)	0	0	0
Order Fee (Rupiah)	534,066.19	686,656.53	534,066.19
Product Cost (Rupiah)	44,251,198.60	50,354,812.20	47,303,005.40
TIC (Rupiah)	44,785,264.79	51,041,468.73	47,837,071.59

Source: PT Eco Baby Indonesia documents (processed)

Furthermore, Material Requirement Planning (MRP) for product R.02 is based on the LFL method. The results show that each requirement is fulfilled immediately according to demand at that time, so that the on-hand inventory (OHI) is always depleted after use. Orders are placed in periods 2, 4, 6, 7, 8, 9, and 11, with quantities varying from 20 to 100 cartons. This pattern emphasizes high efficiency because there is no remaining stock, but it requires a fast and responsive procurement system to avoid delays.

MRP LFL for product R.09. Compared to product R.02, the ordering frequency for this product is higher, occurring in almost every period except the beginning, periods 1, 9, and 10. The order quantity varies according to demand, ranging from 20 cartons to 120 cartons. This condition indicates that the fluctuating demand pattern of R.09 requires close coordination with suppliers so that orders can always be made on time. Without reserve stock, the risk of stockouts will be very high if there are delays in delivery.

Meanwhile, the MRP LFL for product R.17 shows a relatively high demand pattern at the beginning of the period, which increases again toward the end. Orders are placed in periods 2, 3, 4, 5, 8, 11, and 12 with quantities varying between 30 and 100 cartons. As with other products, the remaining stock is always zero so that the company does not incur storage costs.

However, this system requires consistency and speed in fulfilling orders to keep distribution running smoothly.

Overall, the implementation of the LFL method at PT Eco Baby Indonesia has proven effective in eliminating storage costs and reducing total inventory costs compared to EOQ and POQ. However, this method has the drawback of higher order frequency and significant dependence on the speed and reliability of suppliers. Therefore, for this method to operate optimally, the company must strengthen its procurement system and build stronger relationships with suppliers.

Discussion

In inventory management, selecting the appropriate method to reduce costs is a crucial factor in optimizing company operations. PT Eco Baby Indonesia compared three inventory planning methods, namely Economic Order Quantity (EOQ), Period Order Quantity (POQ), and Lot for Lot (LFL), to assess the costs associated with ordering and storing the main products, namely R.02, R.09, and R.17. The analysis results show that the LFL method provides the lowest Total Inventory Cost (TIC) compared to EOQ and POQ. This finding is in line with the Just in Time (JIT) theory, which emphasizes ordering according to actual needs to avoid waste due to excess stock (Datsenko et al., 2024; Tan et al., 2024). In the context of PT Eco Baby Indonesia as a distributor of baby food products with a shelf life of only about eight months, storage costs have greater implications than companies with durable products. Any excess inventory increases the risk of expiration, so the LFL method, which always adjusts orders to net demand, has been proven to reduce storage costs to near zero and result in lower TIC than other methods.

The advantages of LFL are also evident in its flexibility in dealing with demand fluctuations. However, the application of this method is not without risk, mainly due to its dependence on lead time. Variations in supply delays can easily cause stockouts, as the LFL system does not leave adequate safety stock. Nevertheless, this study confirms that LFL's " " is the most relevant method for PT Eco Baby Indonesia, given that the characteristics of perishable products require minimization of storage time and inventory costs.

Based on these comparative results, it is recommended that PT Eco Baby Indonesia implement the LFL method as the primary approach to inventory control. This strategy can reduce storage costs to zero, which is highly relevant for products with limited shelf life. However, for its effective implementation, the company needs to support it with the integration of an information technology- based inventory management system to monitor needs in real-time and ensure timeliness in the procurement process. In addition, periodic evaluations of supplier performance and lead times need to be conducted, as the success of the LFL method is highly dependent on the timeliness of deliveries. Consistent implementation of LFL is also necessary so that the company can be more adaptive to fluctuations in demand and logistical challenges. With this strategy, PT Eco Baby Indonesia can reduce inventory costs while minimizing the risk of losses due to expired products.

Although LFL has proven to be the most optimal in reducing costs, the analysis also found that there are significant risks due to lead time variability. The data shows that the company's average lead time is 35 days with a standard deviation of 8.56 days, which reflects a high degree of supply uncertainty. This condition makes the LFL system, which keeps inventory to a minimum, very vulnerable to delays. Even a small delay can cause stockouts, order

cancellations, and a decline in consumer confidence. This phenomenon is related to the Bullwhip Effect, a situation where small variations in demand or supply trigger large fluctuations throughout the supply chain.

To reduce this risk, several mitigation strategies are recommended. First, build long-term partnerships with suppliers to ensure greater commitment to delivery timeliness. Second, improve the demand forecasting system so that ordering schedules are more accurate. Third, implement dynamic safety stock specifically for high-risk products such as R.02, R.09, and R.17, so that the company still has reserves to withstand the impact of supply delays. With these mitigation measures, the implementation of LFL based on the JIT principle can still provide significant cost benefits without sacrificing supply continuity.

CONCLUSION AND SUGGESTIONS

Conclusion

Based on the results of the analysis, it can be concluded that PT Eco Baby Indonesia needs to take strategic steps in managing inventory costs in order to achieve operational efficiency. Currently, the company still incurs inventory costs consisting of storage costs, ordering costs, and product purchase costs. These costs arise due to fluctuations in demand and variations in lead time, which have an impact on the company's high Total Inventory Cost (TIC). Analysis using three inventory control methods, namely Economic Order Quantity (EOQ), Periodic Order Quantity (POQ), and Lot for Lot (LFL), shows that the LFL method is the most optimal approach to implement. This is because LFL allows orders to be placed according to actual needs in each period, so that the company can reduce storage costs to zero and reduce the risk of losses due to product expiration. Although this method increases the frequency of orders and has an impact on ordering costs, the advantage of LFL in reducing total costs remains more significant than the EOQ and POQ methods. Conversely, although EOQ and POQ are more stable in terms of order quantity and frequency, both still result in relatively high storage costs, making them less relevant to the characteristics of PT Eco Baby Indonesia's perishable products.

Suggestions

Based on the findings of this study, there are several suggestions that can be used as a reference for further research. First, future research can focus on a more detailed analysis of the impact of demand fluctuations on inventory costs, taking into account external factors such as market conditions, economic dynamics, and consumer behavior trends. Second, further exploration of the application of lean inventory methods, particularly the Just in Time (JIT) approach, can be conducted to assess the extent to which waste reduction techniques can improve inventory cost efficiency. Third, further research can also compare the application of EOQ, LFL, and POQ ( ) methods in other industries with different demand characteristics, thereby gaining a broader understanding of the effectiveness of these methods in various sectors. In addition, future research can be directed at the use of modern technologies, such as artificial intelligence (AI) or Internet of Things (IoT)-based inventory management systems, to improve planning accuracy and cost efficiency. Finally, research also needs to consider long-term aspects, such as warehouse maintenance costs or storage capacity upgrades, so that inventory cost analysis can be more comprehensive and sustainable.

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