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SUPPLY CHAIN MANAGEMENT: BULLWHIP EFFECT MINIMIZATION AND EFFECTIVE ORDERING SYSTEM ON OPTIMAL INVENTORY

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ABSTRACT
Consumer awareness of proper shipping handling as well as increasing prevalence of product resale in stores. The purpose of this study is to analyze the supply chain of goods to ensure that goods are delivered on time and in the right quantity to prevent lead time misinformation and to improve the delivery system. The bullwhip effect is a term used to describe how supply chain variability increases over time. Bullwhip's impact can be reduced in the supply chain to a relevant level, enabling the collection of useful information which can then be combined to reduce the Bullwhip effect and improve business operations. The Bullwhip Effect was observed in Lima as a result of data elaboration and in-depth analysis, according to the results. retail and at Distributors, caused by: According to unconfirmed information about retailer-distributor transactions, the lead time for the current transaction is 5 days, but it could be shortened to 1 day in the future as there is a high probability that the product will be damaged during transit. Based on the results of these calculations, it is determined that the reordering system has provided more optimal results, which is indicated by the smaller N and T values compared to the initial conditions, which makes inventory costs more accurate than before. once. It was determined that the reordering system had given more optimal results, which was indicated by the smaller N and T values compared to the initial conditions, which made inventory costs more accurate than before. once. It was determined that the reordering system had given more optimal results, which was indicated by the smaller N and T values compared to the initial conditions, which made inventory costs more accurate than before. once.

Keywords: Supply Chain, Bullwhip Effect, Inventory

INTRODUCTION

KUD Aris, located in Banyumas, is one of the official distributors of rice in Banyumas Regency. Rice can be categorized as the main need for the community, so that the availability of rice in sufficient quantities when needed at an affordable price. However, in reality, on the contrary, the supply of rice cannot meet the needs of the community. Therefore KUD Aris is needed, but what is often experienced is the lack of fulfillment of community or retailer requests. The condition of fluctuating demand for goods and the absence of definite and possibly incomplete sales data will result in an uneven distribution of rice and the timing of meeting the demand that the customer wants is not appropriate. So that retailers or even customers will feel less satisfied.

This problem can increase the level of customer satisfaction if no suitable solution is found, so it is necessary to find the right solution to overcome the problems that arise from these problems before. By reducing the Bullwhip effect in the supply chain and building a sound system for reassembly, it will be possible to collect useful information, increase the effectiveness of the distribution system to reduce the Bullwhip effect, obtain optimal unit costs, and increase the efficiency of the ordering system.

LITERATURE REVIEW

1. Supply Chain Management.

A supply chain is a system that allows an organization to ship finished goods and customer orders to other parties. In addition, the Chain is a network of organizations that work together and have the same goal, which is to ensure that barging and procurement are completed. (2002) (Indrajit).

Supply chain can also be described as a business process that involves the participation of retailers, manufacturers, distributors, and consumers. Because each element concerned has a unique function related to the occurrence of trade law, the chain in question is no longer limited to eight chains. It is possible for this rant to develop, as shown by

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distributors, tertiary producers sourced from suppliers, and other examples. However, the function of the chain is changed to four.

1.1 Supply Chain Components

Supply chain is Network. In the logistics network there are several components that have a close relationship, namely (Indrajit, 2002)

Chain 1: Suppliers

This SC network is called supplier which is the first supplier of raw materials, raw materials, commodities, spare parts, etc.

Chain 1-2: SupplierManufacture

The first chain is connected to the second chain, namely producers or other types of businesses that carry out work to make, manufacture, assemble, or even sell goods (finishing). The connection with the first chain mat has the potential to make savings. The targets of this investigation include the distribution of raw materials, semi-finished materials, and finished materials at suppliers, factories, and transportation centers. Not infrequently 40%–60% or even more savings on inventory holding costs in this market. Savings can be achieved by implementing a supplier partnership strategy, for example.

Chain 1-2-3: SupplierManufacturing Distributors

Items already produced by manufacturers should now begin to be distributed to customers. While there are other ways to deliver goods to customers, the most common method is through distributors, and this method is usually supported by a number of supply chains. Goods by manufacturers are distributed to distributors, wholesalers, or wholesalers in large quantities, and in time wholesalers flow in small quantities to retailers or retailers.

Chain 1-2-3-4: SupplierManufacturing Distributors Retail Outlets

Wholesalers usually have warehouses that are used to package goods before they are sent to the purchasing organization. In this environment, there is an opportunity to manage inventory levels and build costs by redesigning the shipping process, either from the manufacturer's warehouse or the retailer's store.

Chains 1-2-3-4-5:Suppliers Manufacturing Distributors Retail Outlets Consumers

Off the shelves, these retailers offer goods to customers or consumers directly. Terms of outlet include "shop", "warung", "convenience store", "supermarket", "mall", and other similar terms. Despite the fact that this can be characterized as a final rant, there is only one rant remaining, and that is rants from buyers (who enter the store) to genuine customers or real users, because buyers are not necessarily users. . in question. After items that need repair fail to be purchased quickly (or, more often, at all), supply lines are suddenly fully operational.

1.2 Principles of Supply Chain Management

The basic principle of supply chain management is the coordination and synchronization of activities within and across organizations that have a direct relationship with the flow of materials or goods. The principles of Supply Chain Management consist of:

1) Use a logistics network to reach different types of customers.
2) Obtain market signals and use these signals as the basis for planning needs to obtain consistent forecast results and allocation of funding sources.
3) Tailor the product point to be closer to the consumer and maintain smooth conversions across the rant.
4) Use strategic supply sources to reduce the cost of ownership of materials or services.
5) develop a technology strategy for the entire supply chain of hierarchical decision-making and provide a clear picture of the flow of products, services, and information.
6) Adopt overall performance measurement for a single supply chain with a focus on maximizing customer service for returning customers.
7) Segmentation of consumers based on their needs.

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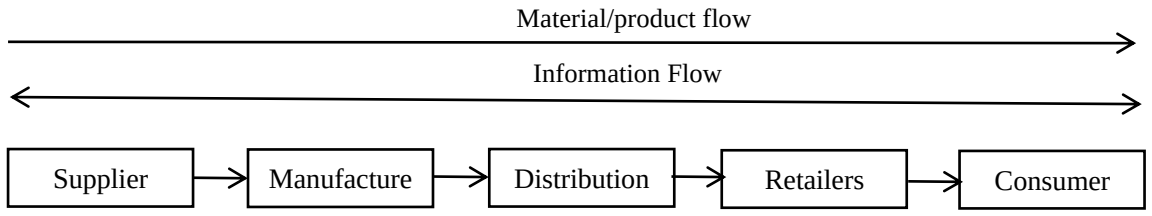

1.3 Functions of Supply Chain Management

Supply chain management has two functions, according to Zabidi (2001):

1. According to strict physical principles, supply chain management converts raw materials and transfers them to final consumers. This function is related to physical costs, such as material costs, production costs, transportation costs, and other costs.
2. Supply Chain Management as a Market Media, which includes Pay-Per-View Market Surveys, Product Announcements, and Pay-Per-View When Consumer Aspirations Are Not High Enough for Products Offered by Passenger Carriers. The costs in this case can be in the form of markdown costs, which is a reduction in the price of a product that cannot be sold at regular prices, or shortage costs, also known as out-of-stock costs.

1.4 Supply Chain Management Problems

Each of the main elements in a distribution system (supplier, wholesaler, retailer, and customer) has its own function and role. When information is distorted from one party to another, it can result in great inefficiencies, such as excessive inventory, etc. One of the problems that arise is the Bullwhip effect, which distorts demand information from the lower chain (end customer) to the upper chain.

Usually companies base production forecasting, capacity planning, control, and production scheduling on sales data. As a result there is greater variance in this demand data, as resellers often overestimate demand orders to suppliers and suppliers also produce in exaggerated quantities to avoid government events. In a period the product does not reach its sales target, then it is the supplier who becomes the victim when the inventory swells.

2. Bullwhip Effect

The "Bullwhip Effect" was first used by Procter & Gamble (P&G) employees when they had amplified negative feedback about their "spoiled" product. The bullwhip effect is defined as the increase in supply chain variability at any point in time. Misunderstood information from one source to another can contribute to widespread financial instability. Examples include too much inventory or backroom storage, problems with ordering products, poor customer service, low production capacity, low productivity, unreliable payment methods, and inefficient transportation.

Bullwhip effect is the distortion of information sent from end users (customers) to other end users. Its business model is based on production quality, capacity planning, inventory analysis, and production planning with respect to data collected from the downstream arc. According to what is happening now, resellers often increase orders placed with distributors, and distributors often produce in larger quantities than usual to stop delivery of orders. If for any reason the product in question does not meet the desired sales volume, this will result in the supplier being the problem, similar to overstocking an inventory.

The bullwhip effect is very important for manufacturers, distributors and retailers because:

1. Each facility should be used to increase the level of safety stock for individual orders to provide a level of service.
2. If a lot of goods are imported, the price increase becomes important.
3. Ineffective use of everyday tools, labor laws, and transportation.

The bullwhip effect is described by Fransoo (2000) as a distortion of information about current consumer demands. As a result, the emphasis on the work being done is now being placed on the work that the downstream business will soon be doing. This has the effect of amplifying the variability of the work performed, so that the downstream business has more variability than the upstream business.

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Concerns to consider when evaluating the Bullwhip effect include those connected to data aggregation, data integrity, data isolation, and demand for larger supply chains. The impact of bullwhip in the supply chain can be reduced by reducing all kinds of information distortion. Other improvements include reducing Lead Time (Lt), increasing back-to-backdelivery flow, reducing price fluctuations, and integrating performance monitoring and auditing.

The retailer-reported demand variability is significantly higher than the consumer-reported demand variability. In order for wholesalers to provide a level of service comparable to retailers, wholesalers typically keep more safety stock than retailers. This practice can also result in wholesalers having a larger capacity than retailers. This analysis can also be applied to distributors or even retailers, which will ultimately result in higher inventory.

2.1 Identify the Causes of the Bullwhip Effect

The bullwhip effect is the variation of downstream demand which is measured against the standard deviation of downstream demand by using the ratio of variations in upstream demand to variations in downstream demand. Bullwifp's impact is significant as costs and levels of resilience in the supply chain increase. According to Simchi (2000), the following are the main causes of the Bullwhip Effect:

1. Demand Prediction

Additional ordering inhibits more intense forecasting demand. One solution that makes this possible is to provide information about consumer demand for information slowly to upstream companies with more complex supply chains.

2. Lead Time

Lead time is defined as the longest period of time during which the store will receive payment. Lead time can enhance the Bullwhip effect by significantly increasing the variability of demand forecasting, including long lead times (Lt) and primary demand thresholds.

3. Batch Order

At that time, the manufacturer evaluates the order as a whole, as well as the orders that came before and after it. Manufacturers then observe extreme order deviations and variables.

4. Supply Deficit

The cause of the Bullwhip effect is to anticipate a supply shortage, by anticipating the item will shorten supply, perhaps this inflation will treat supply.

5. Price Difference

The third cause of the Bullwhip effect is the variation in the frequency of goods prices throughout the supply chain. For example, many merchants charge high fees for promotion and sales.

2.2 Bullwhip Effect Measurement

There are two problems with the Bullwhip effect:

1. Unlawful data aggregation.
2. Highlights the many causes of the Bullwhip effect
3. Inconsistency with the basis of demand due to the belief that the chain being taught is always drawn from a larger network.

Measuring BE according to Fransoo & Wouters (2000):

BE = CV (message) / CV (Sell)
CV (message) = STD (message) / AVR (message)
CV (Sell) = STD (Sell) / AVR (Sell)

Information :

CV = Coefficient of variance
STD = Standard deviation = $((x1-\bar{x})\ 2 + (x2-\bar{x})\ 2 + (xi-\bar{x})2\ )/(n-1))$
AVR = Average Sales
CV (Message) = Total Order
CV (Sell) = Total Sales

BE greater than 1 indicates that there has been an increase in demand, which means sales to distributors are greater than to consumers. Instead, you can compare the variability reported by manufacturers with the variability reported by

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researchers to reduce the level of variability in each supply chain. If the variation of consumer direct retailer questions is Var (Q), with respect to consumer demand satisfaction then (Simchi-Level, 2000):

$\frac{var\ Q}{var\ D}1 + +\frac{2L}{P}\frac{2L^2}{P^2}$

Where:

L : Lead Time

P : Period

2.3 Bullwhip Effect Reduction Method

To identify and measure the cause of the bullwhip effect, we encourage you to take several ways to reduce or eliminate the bullwhip effect, these ways are:

To identify and address the root cause of the bullwhip effect, which you can do in various ways, follow these steps:

1. First Subtraction Uncertainty

Reducing uncertainty along the supply chain by gathering consumer information. The bullwhip effect may increase slightly with results obtained with incomplete information, but will not increase significantly.

2. Variability Reduction

We can reduce the Bullwhip effect by reducing the variability during the consumer demand process. If we can measure consumer-retailer demand variability, then producer demand variability can change if the bullwhip effect occurs.

3. Reduction of Lead time (Lt).

The results show that Lead time (Lt) is useful for increasing the variability threshold for managing demand and reveals dramatic evidence that Lead time (Lt) has variability across each supply chain threshold. Therefore, an increase in Lead Time (Lt) is believed to significantly reduce the Bullwhip Effect through the supply chain.

4. Workplace strategic alliance

The bullwhip effect can be eliminated by using several strategic work alliances. This strategic working relationship improves the flow of information shared among the parties and the processing of orders by the supply chain, which can reduce or eliminate the negative effects of the Bullwhip effect. Other business related tools can be used to mitigate the effects of Bullwhip. For example, using per-demand information can significantly reduce the variability seen in the size of the upstream supply chain. In this case, the upstream threshold would be beneficial for strategic collaborative relationships that provide persuasive evidence for

3. Inventory

Inventory as a key attribute of an organization carries significant business risks. Inventories in a manufacturing environment can include spare parts inventory, raw materials inventory, auxiliary materials inventory, work in process inventory, and finished goods inventory.

Every business must be able to maintain inventory at a certain level just right to determine the needs of their core business initiative in the right quantity and quality and at a reasonable price. In order to achieve the best possible inventory level, which can fully meet the needs of the organization in terms of quantity, quality, timeliness and quality and quantity of revenue, an inventory monitoring system is needed.

3.1 Definition of Inventory

Inventory is a collection of data and analysis that tracks the inventory level of a resource. The purpose of the system is to capture and validate the current state of the resource in an appropriate amount and timeframe. Inventory is a general method for solving problems related to a company's policy in the procurement of raw materials and finished goods in connection with a particular activity.

The hallmark of the inventory model is that it is the best solution to constantly focus on ensuring that inventory is maintained at a reasonable cost. According to the inventory system problem analysis consists of two things:

1. The number of goods or products that must be produced (ordered).
2. The time it takes to deliver any item or product must be completed.

3.2 Inventory Function

The function of inventory is divided into three, namely:

1. Decoupling Function

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Features that enable seamless internal and external business operations so that demand can be met without having to rely on suppliers.

2. Economical Lot Sizing Function

It may be some function where, through a persuasion process, the company can produce or purchase power in quantities that can increase the cost per unit.

3. Anticipation Function

Any action taken to address unresolved issues, whether related to customer requests, supplier inquiries, or timing of purchase or delivery.

3.3 Inventory Costs

In making any decisions that will affect the amount of inventory, the following cost components must be considered (Rosnaini, 2007):

1. Purchase Cost is the currency used to purchase goods or materials.
2. Order Cost is the cost required to prepare goods or materials for delivery.
3. Storage costs are costs that arise as a result of the expansion of an item or material.
4. Shortage costs, or all incoming payments, are not sufficient to meet demand because they are too high.

4. **EOQ (Economic Order Quantity)**

The most common and widely recognized inventory control technique is EOQ (Economic Order Quantity), which is the most important inventory model. Ford W. Harris developed this technique in 1915. The goal of EOQ is to minimize overall annual expenses; These expenses can be classified as preparation costs, ordering costs, and storage costs. As long as we keep total costs as low as possible, every cost in inventory is a stable cost. For example, the transaction quantity function, or Q, is shown on a graph of the total transaction cost, and the transaction quantity that produces the lowest total transaction cost is Q. (Rosnaini, 2007). The following are the results of using this method (Rosnaini, 2007):

a. Calculator Total cost/cost of inventory per year:

$TC = DC + H + \frac{Q}{2}\frac{DS}{Q}$

b. Calculating Economic Order Quantity (EOQ):

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

c. Calculating the number of orders per year:

$N = \frac{D}{Q*}$

d. Calculate the average interval between orders:

$T = \frac{Q*}{D}$

e. Ordering Cost / year = Number of orders x order cost per order

= D/Q x S

f. Holding cost / year = Average inventory level x Holding cost

= Q/2 x H

g. Purchase Fee / year

= D x C

Information :

D = annual demand (units)

S = order cost per one order

H = holding cost per unit per year

C = Price of goods per unit

Q* = Economic Order Quantity (EOQ)

N = number of orders per year

T = average interval between orders

TC = Total cost per year

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METHODOLOGY

Data collection is greatly facilitated by data processing equipment, data processing techniques, or data processing procedures, both used for initial data and final data, which consist of:

1. Primary data

Primary data is data obtained from long and continuous observations. Using this method

a. Observation: By introducing a continuous dialogue between distributors and retailers regarding the supply chain as a whole.

b. Interview with company leaders by constantly asking questions.

2. Secondary Data

Secondary data is the complete version of primary data. The data in question was not obtained using field-based observations.

a. Internal Data

Data about the supply chain derived from common data in the business, such as:

1. General company data
2. Goods distribution system to retailers.
3. Number of retailers or retailers.

b. External Data

Depends on journals or alternative sources currently used by the company.

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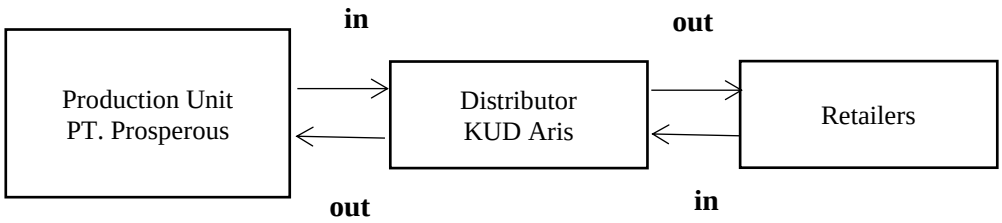
However, in reality, on the contrary, the supply of rice cannot meet the needs of the community. Therefore KUD Aris is needed, but what is often experienced is the lack of fulfillment of community or retailer requests. The condition of fluctuating demand for goods and the absence of definite and possibly incomplete sales data will result in an uneven distribution of rice and the timing of meeting the demand that the customer wants is not appropriate. So that retailers or even customers will feel less satisfied.

RESULT



Information :

⟶ : Distribution Chain

⟵ : Information Chain

The results of the Economic Order Quantity (EOQ) model will be profitable with the following assumptions:

1. Demand for goods is continuous with a uniform level, but this model is still quite good to use because the variation in demand is not too large. The variation in demand on this particular barge is not too large and can be assumed to be consistent based on the level of demand for goods from year to year.
2. Long waiting time is still mentioned, in this case for delivery of goods to the buyer's address or constant lead time, which is five days.
3. Inventory costs are deemed to have been understood beforehand. The inventory costs of the current study, such as ordering costs, purchasing costs, and holding costs, are well understood.
4. No volume discount No potentiometer for the purchase price made in any quantity or quantity.

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The data needed to facilitate data processing are as follows:
Data on Sales Volume and Revenue at KUD Aris Distributors in 2020

Product	Month													amount	average
Rice		1	2	3	4	5	6	7	8	9	10	11	12		
	P Sell	178	220	919	170	557	103	645	777	708	251	226	157	1013.8	8127.28
	P Message	178	308	915	170	557	103	645	795	718	253	228	161	1021.7	8127.17

Lead Time

Data on lead time, which is a period of five days that must be owned by distributors to send goods from distributors to retailers, can be obtained from this study. However, PT. Makmur took two days to complete the process, starting with the delivery of bars to the distributor and ending with receiving a surcharge notice sent from the distributor organization to Gudang Makmur.

Product Price Data

Rice Price : 57,500/Sac

Cost Data – Cost

Ordering Fee

- Administrative costs

: IDR 2,500,-/order.

- Storage Costs (a): Annual holding costs are calculated as a percentage of the costs of maintenance, warehouse, electricity, and labor.

The data needed is oriented to high fluctuations in consumer demand. This product has a high fluctuating demand level because the product is a consumer product and is a necessity commonly used by farmers. In the supply chain system at PT. Makmur, from the factory will be distributed to distributors. Where KUD Aris which is a distributor for the Banyumas area will serve requests from retailers in the Blora area. And for this research, 5 retailers were taken, namely:

Retailer 1: Hidup
Retailer 2:Berkah
Retailer 3: Usaha Jaya
Retailer 4: Mulyo Beras
Retailer 5: Rezeki Beras

The measurement of the Bullwhip effect value from retailers to distributors is:

CV (Sell) = STD (Sell) / AVR (Sell)
= 22.3437 / 149.17
= 0.1497

CV (message) = STD (message) / AVR (message)
= 24.4329 / 158.33
= 0.1543

BE (ω) = CV (order) / CV (sell)
= 0.1543 / 0.1497
= 1.030

The measurement of the Bullwhip effect value at the distributor level is:

CV (Sell) = STD (Sell) / AVR (Sell)
= 8127.28 / 10135.8

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= 0.8018

CV (message) = STD (message) / AVR (message)

= 8127.17 / 10291.67

= 0.7896

BE (ω) = CV (order) / CV (sell)

= 0.7896/ 0.8018

= 0.985

Based on the results of the investigation, it was found that the distribution of orders from retailers to distributors and from distributors to retailers increased. This means that the variability of the regular distribution throughout the supply chain is also increasing. In addition, the bullwhip effect in a particular supply chain can be identified by comparing the estimates of distributors and retailers about the variance of orders placed, as well as estimates of the variance of orders made by taking into account the function of time and lead time.

Solution models:

Retailer level measurement.

$\frac{var\ Q}{var\ D}1 + +\frac{2L}{P}\frac{2L^2}{P^2}$

$\frac{499.2424}{596.9697}1 + +\frac{2(0,16)}{12}\frac{2(0,16)^2}{12^2}$

0.8362944 1.030385802

Measurement at Distributor level

$\frac{var\ Q}{var\ D}1 + +\frac{2L}{P}\frac{2L^2}{P^2}$

$\frac{66052608}{66050852}1 + +\frac{2(0,06)}{12}\frac{2(0,06)^2}{12^2}$

1.000027 1.011172

If the above conditions persist, the bullwhip effect will not occur, i.e. if the ratio of variation in supply to variation in demand is greater than or equal to the ratio of period and lead time.

Identifying the cause of the bullwhip effect

From the results of this experiment it can be concluded that the Bullwhip effect occurs in almost every retail setting. This shows that the variability and variation in demand is greater than the variability and variation in supply. In addition, both at the distributor and store level, so that the Bullwhip effect can increase, it is necessary to take precautions.

Lead time for a period of time

Lead time is reduced by addressing any mature conditions, such as temporal tension between distributors and retailers, so that they can be achieved in certain situations.

1. From distributor to retailer lead time

The initial lead time is five days, but if distributor and retailer locations are considered, the lead time can be reduced to one day. If the lead time is more than one day, the main comparison between period length and lead time is as follows:

$1 + + = 1 + + = 1.005570988\frac{2L}{P}\frac{2L^2}{P^2}\frac{2(0.03333)}{12}\frac{2(0,03333)^2}{12^2}$

From the results of the above calculations, in order to minimize the Bullwhip effect, it is best to try to get the value of the variance Q to be greater than the variance D and the magnitude of the comparison between the two (Var Q/Var D) to be greater than 1.005570988

2. Factory lead time to distributor

After looking at the temporal lead time between the manufacturer and distributor which was originally 2 days, the lead time could not be shortened or minimized any further.

Improvement of the ordering system with the Economic Order method

Quantity (EOQ)

The calculation is as follows:

 Example of calculating the Economic Order Quantity for retail UD Fortune:

Order Fee = IDR 2500,-/order

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Percentage Storage cost (k) = 1.8%

From the data above, the Economic Order Quantity (EOQ) value will be calculated, with the following data preparation:

1. Saving Cost Calculation

Cost of storage/bag/year (H) = Price/bag x Percentage of cost of storage (k)
= Rp. 57500,- x 1.8%
= Rp. 1035,-/sak/year

Total Savings Cost = Q/2 x H
= (93/2) x Rp.1035,- = Rp.48.127,-

2. Calculation of the cost of product needs per year

Purchase fee/year = Demand for sacks/year x Price/bag
= D x C
= 1790 sacks/year x Rp.57500,-
= Rp.102,925,000,-

3. Ordering Cost / year = Order quantity x order cost per Order
= D/Q x S
= (1790 : 93) x 2500
= Rp.48.118,-

4. Calculation of Economic Order Quantity (EOQ)

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

$= \sqrt{\frac{2(1790)\,(2500)}{1035}}$

= 92.99 / 93

5. Calculation of Number of Orders/year

Number of Orders/year = Demand/year divided by EOQ

$N = \frac{D}{Q^*}$

$= \frac{1790}{93}$

= 19.24 / 20

6. Calculate the average interval (Optimum Order Interval) between orders:

$T = \frac{Q^*}{D}$

$= \frac{93}{1790}$

= 0.0159 x 365 days
= 18.94 / 19 days

7. Calculation of Total Cost of Inventory

Total inventory cost = Purchase cost per year + Ordering cost per year + Storage fee per year.

$TC = DC + H + \frac{Q}{2}\frac{DS}{Q}$

= 102,925,000+48.118 +48.127
= 103,021,245

IMPLICATION

In this research, observing the flow of goods and information in the supply chain of PT. Makmur (manufacturer) – KUD Aris (Distributor) – 5 retail, namely UD. Hidup, UD. Berkah, UD. Usaha Jaya, UD. Mulyo Beras, UD Rezeki Beras. All these retailers are located in the Banyumas area. The product under study is rice. The product under study is rice with the highest sales level in the Banyumas area.

Identify the Cause of the Bullwhip Effect

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From the results of the analysis using fishbone diagrams, it can be concluded that the management of the distribution system and distribution system is a factor causing the bullwhip effect. Failure of orders to be completed on time when receiving uncertain requests is a contributing factor. On the other hand, distribution system requirements for on-time delivery of goods mean that late deliveries of goods can seriously hinder production progress.

In the retail sector, the root of the problem is the delivery system that is not on time and delivery times are too long. This may result in stock restrictions on the above-mentioned products. To prevent out of stock, retail stores buy products that do not necessarily meet the needs of their customers. The next issue is with information systems; Currently, the retail industry information system is not very strong. The data is only obtained from recordings and reports from sales, so that the data on demand and supply of goods obtained is less accurate. This inaccurate information causes distortion of information.

Improvement Proposal

It is unlikely to reduce the strength or threshold of bullwhip impact on any given supply chain in the context of this study. The technique that can be used is to increase the size of the bullwhip effect. The most ideal situation is when the bullwhip effect is equal to 1, because once it deviates from that point, the product distribution will run normally or slowly. According to research using fishbone, product assembly and distribution systems are the two main causes of the bullwhip effect. It is important to conduct a more thorough analysis of their delivery and lead times, as well as the systems that manage them, to come up with improvement solutions that enable businesses to more effectively manage their internal processes.

Proposed Lead Time

The only method that can be used to reduce the magnitude of the bullwhip effect is to increase the lead time by a certain amount. Lead time is very detrimental when the bullwhip effect is applied. Due to the fact that this is closely related to the theory of the bullwhip effect, which demands a sufficient quantity of goods at the right time, the ideal situation for minimizing the bullwhip effect is when the lead time is equal to zero and there is an assumption that bars will be needed when needed and must also be available at the time. Given the lead time lead time decreased to zero, the bullwhip effect also decreased. Because the long lead time can prevent the occurrence of stock limits for products with high demand.

1. From distributor to retailer lead time

One day is the lead time for orders, which means at least one 24-hour period before the product must arrive at the retail location. One of the factors contributing to the slowdown is the fact that the time gap between distributors and retailers may widen in the timeframe between one day and twenty-four hours. This proposal can be implemented if the ordering method is changed, namely the system is changed by the retailer 1 time per week, namely with the KUD Aris step sending goods if the retailer places an order for goods.

2. Factory Lead Time to Distributor

Lead time for proposals is still 2 days; this is due to the location factor between suppliers and distributors which is too extreme and cannot be tolerated anymore. The most ideal situation is when the bullwhip effect is equal to or greater than 1, because if the effect is less than or greater than 1, the product distribution will run normally or slowly. The positive aspects of the EOQ system include its ability to reduce transaction and shipping costs. Because the frequency of transactions (N) is less frequent than in the initial state, where transactions are basically carried out once a week. However, the bullwhip effect becomes more intense when the EOQ system is applied, so it is better in the initial conditions. This can be seen from a much greater distance from angle 1.

CONCLUSION

1. a. From data collection and analysis, it was determined that the Bullwhip Effect occurred in four samples. This is the result of a number of factors, including damage to the stem marking and distribution system.

b. The methods used to reduce or eliminate the Bullwhip Effect are by: Improving the distribution system so that there is no shortage of goods. By carefully considering the lead time for delivery of goods. The lead time for distributors to reach customers, which was originally five days, was shortened to one day. Based on the test results with a lead time of five days, the average ratio of the function period to the lead time is 1.030385802. The lead time on one working day is

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the benchmark between the functional period and the lead time 1.005570988. By comparing the function period and waiting time more precisely, the two variables are also more closely related.

The second way to reduce the bullwhip effect is to ensure that there are no shortages in the ordering process so that the ordering costs do not increase because goods are often ordered once or twice a week. This was done to prevent shop staff from being distracted while both organizations were working on their respective tasks. in an effort to obtain a more favorable shipping price.

Information systems, providing the best and most efficient information systems, such as entering all records of orders or receipts of goods on a computer, to produce real information needed by consumers quickly To ensure that consumer needs for the goods they buy can be satisfied quickly and accurately. As this is likely to have an impact on the distribution system, consumer confidence may be compromised.

2. From the results of data collection and analysis, it is known that the re-improvement system has provided more optimal results, as evidenced by the smaller N and T values than the initial conditions. As a result, inventory costs are also more accurate than the initial conditions.

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