APPLYING INVENTORY MANAGEMENT THEORY TO IMPROVE SUPPLY CHAIN MANAGEMENT (SCM) IN PT. ROSYADA HERBA NATURA

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ABSTRACT. Small business is the backbone of this country, but opening a small business can be tricky. Starting a small business can either be the start of something worthwhile or a simple way to lose money. Thus, the implementation of Supply Chain Management is essential for operation in every small business. Supply Chain Management methods to be explored in this research are Inventory Management and CPFR. In order to keep the business running, many businesses establish warehouses where they stock their products. Therefore, to ensure that warehouses continue to operate successfully, businesses need to apply Inventory Management to the warehouse. Factors like Safety Stock, Inventory Tracking, and Cycle Counting can improve the company's Supply Chain Management significantly. Other than Inventory Management, another theory that could improve Supply Chain Management is Collaborative Planning, Forecasting, and Replenishment, also known as CPFR. This is considered the ideal foundation for starting a business. When applying Supply Chain Management, businesses can reduce inventory costs in the future. This creates transparency between the company and supplier due to consistent Reorder Points and EOQ. The purpose of this research is to study PT. Rosyada Herba Natura's improvement of their Supply Chain Management in terms of Inventory Management and CPFR.
Keywords: Small Business, Supply Chain Management, Inventory Management, CPFR,

1. INTRODUCTION

Small and medium businesses are becoming an integral part of the modern world and will continue to rise because of population growth. Globally, the increasing population directly impacts the unemployment rate (Dunya & Moumbark, 2020). That is why building small and medium businesses is slowly becoming the backbone of the economy; the competition for working for a big company has always increased over the years.

The value and number of small businesses are growing around the world, including Indonesia. Indonesian small businesses are Usaha Mikro, Kecil, dan Menengah (UMKM) which are slowly becoming the backbone of the country's economy, accounting for a significant portion of the total workforce (Anwar, 2015). Small businesses in Indonesia play a crucial role in society by reducing poverty and promoting social inclusion by providing job opportunities. This is especially in small urban areas where there are very few formal employment opportunities.

PT. Rosyada Herba Natura (RHN) is a pharmaceutical factory that produces various natural medical herbs. The company was created in 2021 to help their customers with all sorts of medical problems. These problems include trouble losing weight, hair loss, difficulty conceiving, and more. PT. Rosyada Herba Natura is located in Kendal, Central Java, but their storage unit is located in Malang, East Java. The company sells their products online through e-commerce and ships them to their customers from their storage unit. With the increasing business through online shipping in Indonesia, especially with the pandemic ongoing on for the last two years, PT. Rosyada Herba Natura has been receiving a lot of demand from customers. The company's medicine sales have been on the rise over the last year. This is because of the pandemic where people consume medical herbs in hopes of increasing immunity to prevent sickness (Harel, 2021).

As part of the business involved in the creation and sale of a product, the supply chain is the third party within the company that runs the

business. The third party can be an individual, an organization, resource, or technology (Lutkevich, 2021). The supply chain handles all the business from creating the product until it's delivered to the customers. The supply chain has fundamental steps to achieve the company's goals; the steps include sourcing the raw materials, refining or producing the materials into basic parts, assembling the basic parts into a finished product, selling the product to the end user, and delivering the product to consumers. In order to have the most efficient supply chain, a company must have effective supply chain management.

The first fundamental step in the supply chain is raw materials sourcing. Handling the raw materials ordered from the supplier is very critical because it is the first step towards making the finished product (Lu D. , 2011). That is why the company must ensure it is stored properly in their storage area. Inventory control refers to that area of supply chain management. Quality control of raw materials must be taken seriously because one of the risks in supply chain management is lack of transparency from the supplier, especially for a new company still searching for the most beneficial supplier partner in terms of material quality and the best price. The quality of the material is very critical, but the place to house it is equally critical. Inventory control also keeps track of where materials will be stored. This also includes the forecasting of supply and demand by customers (Wulandari & Sari, 2017). The materials cannot be stored for too long because it will reduce their quality, but the company also cannot run out of them if suddenly demand increases.

2. LITERATURE REVIEW

II.1 SUPPLY CHAIN

A supply chain refers to the network of organizations, resources, activities, and processes involved in the creation, production, distribution, and delivery of goods or services to the end consumer (Waters, 2007). It encompasses all the interconnected steps and entities that contribute to the transformation of raw materials into finished products or services.

The supply chain starts with the acquisition of raw materials from suppliers, who may source them from various locations. These materials are then transported to manufacturing or production facilities, where they undergo processing or assembly to create the final product. After production, the finished goods are typically moved to distribution centers or warehouses for storage, and then transported to retailers or directly to customers. The supply chain includes multiple stakeholders, such as suppliers, manufacturers, distributors, logistics providers, retailers, and end customers. Each participant plays a crucial role in the flow of materials, information, and funds throughout the supply chain (Waters, 2007).

II.1.1 Supply Chain Management

Supply Chain Management (SCM) is a strategic approach that involves the planning, coordination, and control of all activities and processes within a supply chain to ensure the efficient flow of goods or services from suppliers to end customers. It encompasses the management of various interconnected functions, including procurement, production, inventory management, logistics, distribution, and customer service (P & V.E, 2009).

The primary objective of supply chain management is to optimize the overall performance and effectiveness of the supply chain by aligning it with the strategic goals of the business. It aims to enhance customer satisfaction, minimize costs, improve operational efficiency, and drive competitive advantage (Waters, 2007).

Effective supply chain management involves fostering collaboration and communication among supply chain partners, optimizing processes, leveraging technology, and embracing best practices. It requires a holistic view of the supply chain and a proactive approach to adapt to market changes, customer demands, and emerging trends.

II.2 INVENTORY MANAGEMENT

Inventory management refers to the process of efficiently controlling and monitoring the flow of goods, raw materials, and finished products within a company's supply chain. It involves overseeing the acquisition, storage, tracking, and utilization of inventory to meet customer demand while minimizing costs and optimizing operational efficiency. Effective inventory management aims to strike a balance between maintaining sufficient stock levels to meet customer needs and avoiding excess inventory that can tie up capital and incur carrying costs. By utilizing inventory management techniques and strategies, companies can improve their overall supply chain performance and profitability (Vries, 2007).

Techniques like economic order quantity (EOQ) and just-in-time (JIT) inventory management help organizations strike the right balance between inventory costs and meeting customer demand efficiently. Effective inventory management can bring numerous benefits, including improved customer satisfaction through reliable product availability, reduced carrying costs through optimized inventory levels, and enhanced operational efficiency by minimizing stockouts and overstock situations. It also allows companies to identify slow-moving or obsolete items, enabling them to make informed decisions regarding product pricing, promotions, or liquidation. Inventory management plays a crucial role in supply chain operations, helping companies maintain the right level of inventory to meet customer demand while minimizing costs. By employing effective inventory management techniques and leveraging technology, organizations can optimize their inventory levels, enhance customer satisfaction, and improve their overall competitiveness in the market (Reiman & Wang, 2016)

II.2.1 Safety Stock

Safety stock is an inventory that is carried by the company to protect against the errors that have been made in forecasting and the fluctuations of demand and supply in the market. This type of stock is also known as buffer stock or reserve stock. Safety stock plays a crucial role in supply chain management as it helps to maintain a smooth and efficient flow of goods and services. In supply chain management, safety stock refers to the extra inventory that is held beyond the expected demand during a specific period. It acts as a buffer to absorb uncertainties and mitigate the risks associated with demand variability, supply disruptions, and lead time variability (Amirjabbari & Bhuiyan, 2011).

Calculating safety stock involves using statistical methods to account for demand and lead time variability. One common approach is to calculate the standard deviation of historical demand and lead time and then apply a suitable factor, such as the Z-score corresponding to the desired service level, to determine the safety stock quantity. The formula may vary depending on the specific requirements and characteristics of the supply chain.

$$safety\ stock : Z * \sigma LT * \overline{D}$$

Z = Safety factor of the inventory

σLT = represents the standard deviation of lead time

$\overline{D}$ = average amount of demand. For safety stock purposes, its common to find the average daily demand

By maintaining an appropriate level of safety stock, companies can effectively manage risks and uncertainties in their supply chain. It provides a buffer to absorb unexpected fluctuations in demand and supply, allowing businesses to respond swiftly to changes in the market. This proactive approach helps in ensuring a reliable supply of products or services, enhancing customer satisfaction, and supporting business growth and profitability in the long run (Shanthikumar & Buzacott, 1994).

II.2.2 Cycle Counting

Cycle counting is a systematic approach to inventory auditing and control in which a subset of inventory items is counted on a regular basis. It is an alternative to traditional annual or periodic full physical inventory counts, which can be time-consuming and disruptive to normal operations. Cycle counting involves dividing the inventory into smaller, manageable groups and conducting frequent, targeted counts throughout the year (Rosseti, Buyurgan, & Bhonsle, 2010).

The main objective of cycle counting is to ensure the accuracy of inventory records by identifying and rectifying any discrepancies between the recorded quantities and the actual quantities of items in stock. It helps in identifying and resolving inventory inaccuracies, improving inventory management, and maintaining a high level of data integrity within the organization's inventory systems.

II.2.3 Inventory Tracking

Inventory tracking is the process of monitoring and managing the flow of goods and materials within a company's supply chain. It involves systematically recording, updating, and analyzing information related to the quantity, location, and status of inventory items throughout their lifecycle, from procurement to sales (Madsen & Alstrom, 1996).

The primary purpose of inventory tracking is to ensure accurate and up-to-date information about the inventory levels and movements within an organization. By effectively tracking inventory,

businesses can optimize their stock levels, avoid stockouts or overstocking, streamline order fulfilment processes, and maintain a reliable supply chain.

II.3 CPFR

Collaborative Planning, Forecasting, and Replenishment (CPFR) is a business practice and framework designed to improve supply chain efficiency through collaborative efforts between trading partners. CPFR aims to enhance communication, coordination, and synchronization of activities related to planning, forecasting, and replenishment (Fliedner, 2003).

The benefits of CPFR include improved forecast accuracy, reduced stockouts and overstock situations, enhanced supply chain visibility, increased customer satisfaction, and reduced costs through better inventory management and streamlined replenishment processes. It enables trading partners to work more efficiently and effectively together, aligning their efforts to meet consumer demand and optimize supply chain performance.

III.3.1 Planning

The planning phase of CPFR involves collaborative efforts between trading partners to develop a shared plan that aligns their goals and objectives. This phase lays the foundation for effective supply chain coordination and synchronization.

By engaging in collaborative planning, trading partners can improve forecast accuracy, optimize inventory levels, minimize stockouts and overstocks, enhance supply chain responsiveness, and ultimately provide better service to customers. It fosters a proactive and synchronized approach to supply chain management, leading to increased operational efficiency and competitiveness.

II.3.2 Replenishment

In the context of CPFR, replenishment refers to the process of restocking inventory to meet customer demand in a timely and efficient manner. Replenishment is a critical aspect of supply chain management and involves collaborative efforts between trading partners to optimize inventory levels and ensure product availability.

Effective replenishment in CPFR ensures that inventory is replenished in a timely manner to meet customer demand while avoiding excess stock or stockouts. By collaborating closely and sharing information, trading partners can optimize order quantities, reduce lead times, streamline order processing, and improve supply chain responsiveness. This collaborative approach minimizes supply chain disruptions, enhances customer satisfaction, and leads to improved overall business performance (Kogan & Hovav, 2009).

II.3.3 Forecasting

Forecasting the future demand is necessary to minimize the risk of overstock inventory and stock out inventory. Forecasting involves analyzing past data to identify patterns, trends, and relationships that can be used to project future outcomes. It uses quantitative and qualitative data, such as historical sales figures, market trends, demographic information, or expert opinions, to generate forecasts. In supply chain management, this part of CPFR is the substantial factors that should be done with careful calculation and also with the right action. In the context of business and supply chain management, forecasting plays a crucial role in planning, decision-making, and resource allocation. It provides valuable insights into expected demand, market trends, and other factors that impact business operations. There are different methods and techniques for forecasting, including time series analysis, regression analysis, exponential smoothing, moving averages, and economic order quantity. The choice of method depends on the type of data, the nature of the forecasted variable, and the available resources. The most common forecasting formula used by companies for this method is Economic Order Quantity (EOQ).

II.3.3.1 Demand Forecasting

Demand forecasting is a specific type of forecasting that focuses on predicting the future demand for a product, service, or resource. It is a crucial aspect of business planning and operations as it helps companies anticipate customer demand and adjust their production, inventory, and supply chain accordingly. The primary goal of demand forecasting is to estimate the quantity of a product or service that customers will likely purchase during a specific period in the future. This allows businesses to make informed decisions related to

production, procurement, pricing, and resource allocation, which can lead to cost savings, better inventory management, and improved customer service.

In forecasting, the moving average method is used to predict future values based on historical data by calculating the average of a specified number of consecutive data points, called the "window" or "period." The moving average is a simple yet effective technique for smoothing out short-term fluctuations in data and identifying underlying trends or patterns. The formula of moving average can be express as:

$$Moving\ average = \frac{\Sigma Dn}{n}$$

Where n is the total period of the forecast. Moving average formula is commonly used by companies to predict the future based on historical data, but because of the simplicity of the formula moving average is not very accurate. That is why many companies that want to be more accurate and predict for the longer term prefer the utilization of exponential moving averages. The formula can be express as:

$$Exponential\ moving\ average = F_{n-1} + \alpha\,[F_n - F_{n-1}]$$

Where F_{n-1} is the forecast before the forecast that want to calculated and α is the coefficient representing the degree of weighting decrease. Exponential moving average method will give a more accurate result for the actual demand and will give the company a longer period of forecasting.

Forecasting can never give the company an exact number and be right all the time. There are many risks in conducting forecasts, which is why, to reduce the risk of forecasting, there must be a reliability test. The mean absolute percentage error (MAPE) will show the percentage error of the forecast calculation. The formula of MAPE is shown as:

$$MAPE = \left(\frac{1}{N}\sum\frac{|D-F|}{D}\right) * 100$$

The result of MAPE can be the indicator on the percentage of the forecast being wrong. The result can help the company to help a little bit in preparing the worst occasion in case there are some economic shifts in the market.

MAPE - Value	Accuracy of The Foreca
>10%	Highly Accurate Forecast
11% - 20%	Good Forecast
20% - 50%	Reasonable Forecast
<50%	innacurate Forecast

Figure 1. MAPE Indicator

II.3.3.2 Economic Order Quantity (EOQ)

Economic Order Quantity (EOQ) is a formula and concept used in inventory management to determine the optimal order quantity for minimizing total inventory costs. It helps businesses find the balance between holding inventory and ordering inventory by identifying the order quantity that minimizes the combined costs of holding and ordering inventory. The EOQ model assumes that demand for a product is known and constant, that lead time (the time between placing an order and receiving it) is fixed, and that there are no quantity discounts or limitations on order size.

Key components for EOQ are as follows:

- Demand (D): The demand rate or quantity of units sold or used during a certain period.
- Holding cost per unit (H): The cost of holding one unit of inventory for a certain period of time.
- Ordering cost per order (S): The cost of placing an order or setting up production including administrative costs, transportation, etc.

Once all the key components above is fulfilled, the formula for EOQ can be used. The formula of EOQ express as:

$$EOQ = \sqrt{\frac{(2*D*S)}{H}} \text{ or } EOQ = \sqrt{\frac{(2*D*S)}{r*p}}$$

Where p is the unit cost of the product. Unit cost price is determined as a fixed cost along the length of planning. Annual holding cost rate notated as r is also fixed and described for each unit order quantity size. In other words, the holding cost (H) for some period of time can also be express as: $H = r * p$.

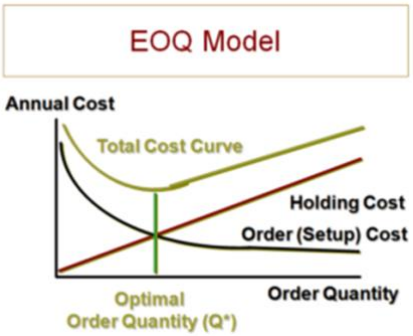

Figure 2 EOQ Model

EOQ have another important aspect in order to more effective, that aspect is reorder point. The reorder point represents the inventory level at which a new order should be placed to replenish stock before it runs out. It is the threshold or trigger point that determines when to initiate the ordering process. The reorder point is calculated based on the lead time, which is the time it takes for a new order to be delivered after it is placed. The reorder point is determined based on factors such as the demand rate, lead time, and desired level of service or safety stock. It takes into account the average demand during the lead time and provides a buffer to account for variability in demand or lead time.

To calculate the reorder point in the EOQ model, you need the following information:

- Demand rate (D): The average rate at which the product is consumed or sold, typically expressed as units per time period (e.g., units per day, units per week).
- Lead time (L): The time it takes for a new order to be delivered after it is placed, expressed in the same time units as the demand rate.
- Safety stock: An additional quantity of inventory held to mitigate the risk of stockouts due to demand variability or lead time variability.

The formula to calculate the reorder point is:

$$R = (D * L) + Safety\ Stock$$

Economic order quantity (EOQ) is very important concept for the inventory management and it has a lot of business benefits. Applying EOQ will help the company to optimizing the inventory cost. By ordering the right quantity at the right time, the company can reduce the holding cost inside the warehouse where they stored the inventory. EOQ can also prevents stockouts and excess inventory because it ensures that inventory is replenished at the right time and preventing stockouts. Stockouts can lead to loss of sales and dissatisfied customers. Overall, EOQ is very important because it helps the company's optimization in almost every aspect in inventory management.

3. METHODOLOGY

III.1 RESEARCH METHOD

The purpose of this research is categorized as a predictive research. This research will show how a small or medium business operates its supply chain management, mainly in the warehouse department. Helping the company improve the supply chain from a forecasting standpoint. This research will also try to prove that improving supply chain management will reduce inventory costs for the company.

This type of research is casual and tries to solve the problem of increasing dead stock in the warehouse inside PT. Rosyada Herba Natura. This will also determine the exact number of safety stocks that are needed in order for the company to try and minimize the holding cost of the product.

III.2 DATA COLLECTION

The data used for this research was collected from the company PT. Rosyada Herba Natura. The data collected is the data from the company's warehouse, which is the product that is being stored and waiting to be shipped. The total product inside the warehouse is five items. The data includes sales for 1 year of selling each product, the stock inside the company warehouse, and the lead time for each order. There is some data from the company that unfortunately will not be used in this research because some of it is not really relevant to the subject discussed in this project.

III.3 SAMPLING METHOD

The data gathered for this research is based on five products from the company. To maximize the impact of this research for the company, the data needs to be sorted out from the most significant to the least significant to the company's profit. In order to gather the most significant data from the company, a sampling method is used. The sampling method used for this research is the Pareto Chart.

III.3.1 Pareto Chart

A Pareto Chart is a visual tool that combines both a bar graph and a line graph to display data in descending order of importance or frequency. It is named after Vilfredo Pareto, an Italian economist who observed the Pareto Principle, also known as the "80/20 rule." This method divides each product from the most significant to the least significant. After dividing the product, the method will dictate the percentage based on how significant each product is to the company. In this research, the percentage of each product is determined by the stock value of each product for the company. The value of the product will be calculated from the data given by the company as of January 2022. The stock values will be calculated by the following formula:

$$Stock\ Value = P * \bar{D}$$

P = Price per item
$\bar{D}$ = Average demand from the last 18 month

Table 1 Most Significant Product

Product	Total Value	Percentage of Total	Cumulative Percentage
E	IDR 157.801.333	26,09%	26,09%
B	IDR 144.892.222	23,95%	50,04%
C	IDR 127.901.889	21,14%	71,18%
A	IDR 88.717.777	14,67%	85,85%
D	IDR 85.608.000	14,15%	100,00%
Total	**IDR 604.921.221**	**100,00%**	

In Table 2, it is shown which product is the most significant for the company according to the stock value. When the data is already calculated and sorted, as Figure 3.2 shows, then the pareto chart can be created.

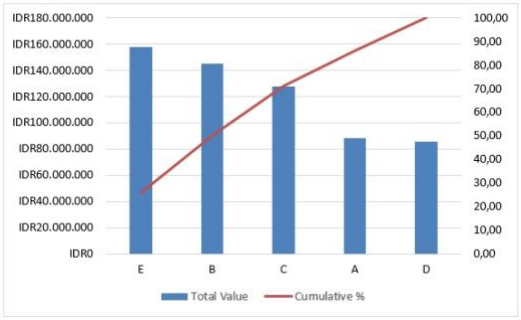

Figure 3 Pareto Chart

To further conduct this research, this chart helped determine the most significant product that will be investigated. A Pareto Chart can help shift attention to the most significant product so that this research can really have an impact on the company. From the chart above, it is easy to determine the most significant product by applying the 80/20 rule from the pareto chart. The products that will be chosen are products E and B.

III.4 DATA ANALYSIS

III.4.1 Current Inventory Stock

Inventory stock is defined as the amount of inventory that the company is currently holding in the warehouse. Inventory stock in the company is not very stable because of the variety of demand each month. Hence, sometimes the inventory stock of the company is less than every other month. The significant effect of having a lot of inventory is that the company must spend more on holding costs. In addition, having more inventory increases the chance of having deadstock. The situation of the current inventory stock in the company is not very good because the company never hesitates to order new stock from the supplier in order to prevent running out of product to sell.

Table 3 Current Inventory Stock

Current Inventory Stock	
Product	Current Inventory Stock
Product A	408
Product B	408
Product C	478
Product D	358
Product E	246

Error! Reference source not found.2 depicts how much the company's current inventory stock is. This much inventory stock will become a burden for the

company at some point because of how much the holding cost will be. **Error! Reference source not found.** shows the current stock based on the data given by the company on July 1, 2023

III.4.2 Lead Time

Lead time is the time required by the supplier to transport the product to the company warehouse. Lead time is counted from the time the company orders the supply to the time the order arrives at the warehouse. Lead time can vary in many ways; not all the time is constant, depending on the situation of the transportation. In this case, the transportation is by cargo vehicle from the supplier, which is located in Sragen, Central Java, to the warehouse in Malang, East Java. Land transportation is usually the safest way to transport products compared to air and water, but the flip side is that it is usually in small quantities.

Table 4 Lead Time

Lead Time	
Product	Lead Time
Product A	5
Product B	5
Product C	5
Product D	5
Product E	5

Lead time usually varies for each product because each product is delivered differently, but in this research, the company is producing medicine, which is a small product, and every product is small. The data from the company is not consistent; it is between 3 and 5 days of delivery. This research will be prepared for the worst occasion, so this research will use the latest lead time, which is 5.

III.4.3 Product Price Sales

PT. Rosyada Herba Natura is a company that sells herbal medicine. In this research, there are five products that are being used to improve the supply chain management of the company. The name of the product will not be displayed because it is not relevant to the research.

Table 5 Price

Price	
Product	Price
Product A	IDR 290.000
Product B	IDR 490.000
Product C	IDR 490.000
Product D	IDR 290.000
Product E	IDR 490.000

Error! Reference source not found.5 d isplayed the price of each product sold by PT. Rosyada Herba Natura for the past 2 years.

Table 6 Sales

Sales	
Product	Sales (Monthly)
Product A	341
Product B	318
Product C	281
Product D	328
Product E	346

Error! Reference source not found. s hows the average sales each month for the last 1 year and 6 months. The data given by the company is only within that time span. PT. Rosyada Herba Natura has been consistent in terms of selling their product because of how they market it and how they keep in touch with their customers.

III.4.4 Warehouse

PT. Rosyada Herba Natura owns a warehouse located in Malang, East Java. This warehouse is mainly where this research is being held. The data gathered from the company is from the warehouse. This warehouse is a two-story house with an estimated capacity of about 2000 to 3000 products.

III.4.5 Salary

Having a warehouse has many advantages for your business, especially when the company has a high demand for products like PT. Rosayada Herba Natura. With all the benefits of having a warehouse, it can never be left unattended. The warehouse holds almost all of the assets of the company. In this case, the warehouse also acts as the beginning of the shipping process for the company.

Table 7 Salary

Salary	
Workers	Salaries
Employee A	IDR 4.500.000
Employee B	IDR 3.500.000
Employee C	IDR 3.000.000

The company has been investing a lot to the warehouse every year. Adding a few employees from time to time in order to keep the warehouse operating successfully.

III.4.6 Rent

Operating a warehouse is not cheap, and every company that owns a warehouse must keep the business going for a long time because the money invested in the warehouse is not a small amount. The cost of renting this warehouse is Rp. 42.000.000 per year.

4. RESULT

IV.1 DATA ANALYSIS

PT. Rosyada Herba Natura is a new business that just started around two years ago. The company has been lacking in terms of applying supply chain management. That's why this research will help provide that for the company, with the hopes of reducing the total cost annually. In order for this research to operate the formula to calculate the total cost, the first thing to do is create the forecast for one year ahead. Before doing a forecast for one year, there are methods of forecasting, and this research will first find the best one for the company according to the situation. Forecasting will use the sales of product E and B from the company. The best method will be the one with the least amount of MAPE. The forecast result will be in a one-year timeline.

IV.1.1 Moving Average

Moving average is a forecasting method that's often used by businesses. Moving average formula can vary depending on how much is the value "n". Moving average can be reliable sometimes but the main disadvantages of moving average method is, it is a very short-term forecasting method.

Table 8 Moving Average of Product E

Moving Average per 3 Month			
Time	Sales	Forecast	MAPE
Jan-22	148		
Feb-22	239		
Mar-22	241		
Apr-22	306		
May-22	340		
Jun-22	389	295,67	24%
Jul-22	361	345,00	4%
Aug-22	352	363,33	3%
Sep-22	391	367,33	6%
Oct-22	388	368,00	5%
Nov-22	401	377,00	6%
Dec-22	423	393,33	7%
Jan-23	374	404,00	8%
Feb-23	331	399,33	21%
Mar-23	390	376,00	4%
Apr-23	411	365,00	11%
May-23	348	377,33	8%
Jun-23	396	383,00	3%
			9%

Table 9 Moving Average of Product B

Moving Average per 3 Month			
Time	Sales	Forecast	MAPE
Jan-22	104		
Feb-22	197		
Mar-22	158		
Apr-22	321		
May-22	309		
Jun-22	359	262,67	27%
Jul-22	298	329,67	11%
Aug-22	370	322,00	13%
Sep-22	349	342,33	2%
Oct-22	402	339,00	16%
Nov-22	411	373,67	9%
Dec-22	379	387,33	2%
Jan-23	364	397,33	9%
Feb-23	327	384,67	18%
Mar-23	312	356,67	14%
Apr-23	339	334,33	1%
May-23	341	326,00	4%
Jun-23	392	330,67	16%
			11%

IV.1.2 Exponential Smoothing

Table 10 Exponential Smoothing of Product E

EXPONENTIAL SMOOTHING			
Time	Sales	Forecast	MAPE
Jan-22	148		
Feb-22	239		
Mar-22	241		
Apr-22	306		
May-22	340		
Jun-22	389	238	39%
Jul-22	361	344	5%
Aug-22	352	356	1%
Sep-22	391	353	10%
Oct-22	388	380	2%
Nov-22	401	385	4%
Dec-22	423	396	6%
Jan-23	374	415	11%
Feb-23	331	386	17%
Mar-23	390	348	11%
Apr-23	411	377	8%
May-23	348	401	15%
Jun-23	396	364	8%

EXPONENTIAL SMOOTHING			
Time	Sales	Forecast	MAPE
			11%

Table 11 Exponential Smoothing of Product B

EXPONENTIAL SMOOTHING			
Time	Sales	Forecast	MAPE
Jan-22	104		
Feb-22	197		
Mar-22	158		
Apr-22	321		
May-22	309		
Jun-22	359	216	40%
Jul-22	298	316	6%
Aug-22	370	303	18%
Sep-22	349	350	0%
Oct-22	402	349	13%
Nov-22	411	386	6%
Dec-22	379	404	6%
Jan-23	364	386	6%
Feb-23	327	371	13%
Mar-23	312	340	9%
Apr-23	339	320	5%
May-23	341	333	2%
Jun-23	392	339	14%
			8%

IV.1.3 Triple Exponential Smoothing

Table 12 Triple Exponential Smoothing of Product E

TRIPLE EXPONENTIAL SMOOTHING			
Time	Sales	Forecast	MAPE
Jan-22	148		
Feb-22	239		
Mar-22	241		
Apr-22	306		
May-22	340		
Jun-22	389	281	28%
Jul-22	361	291	19%
Aug-22	352	301	15%
Sep-22	391	310	21%
Oct-22	388	320	18%
Nov-22	401	329	18%
Dec-22	423	339	20%
Jan-23	374	348	7%
Feb-23	331	358	8%
Mar-23	390	367	6%
Apr-23	411	377	8%
May-23	348	386	11%
Jun-23	396	396	0%
			14%

Table 13 Triple Exponential Smoothing of Product B

TRIPLE EXPONENTIAL SMOOTHING			
Time	Sales	Forecast	MAPE
Jan-22	104		
Feb-22	197		
Mar-22	158		
Apr-22	321		
May-22	309		
Jun-22	359	267	26%
Jul-22	298	277	7%
Aug-22	370	288	22%
Sep-22	349	298	15%
Oct-22	402	309	23%
Nov-22	411	319	22%
Dec-22	379	330	13%
Jan-23	364	340	7%
Feb-23	327	350	7%
Mar-23	312	361	16%
Apr-23	339	371	9%
May-23	341	382	12%
Jun-23	392	392	0%
			14%

The figures shown above are the annual forecasts of products E and B using three different methods. All of the methods are tested by MAPE to calculate the percentage or errors that may have been caused by the forecasting. The lower the percentage, the more accurate the forecasting will be. Calculating error can help companies prevent stockouts, but it will not guarantee anything because there are a lot of factors contributing to generating forecast data.

Moving average has the advantage of having the lowest MAPE percentage, but it is only for short-term forecasting, and the variable to operate the moving average method is the simplest of the three methods. Hence, it will not guarantee accuracy for long-term forecasts.

The exponential smoothing method is also one of the more accurate methods, according to the MAPE calculation. It is more accurate than a moving average because there are a lot more variables to be used in the equation. The disadvantage of exponential smoothing is that it is also only for short-term forecasting. It is more likely to increase errors as time goes by compared to the third and last method.

The Triple Exponential Smoothing method is quite similar to exponential smoothing. The

difference is that triple exponential smoothing is more calculated because this forecast method also includes the seasonality and trend of the actual data given. It is a more complex formula that is more likely to be consistent and be used for a long time by the company. The MAPE percentage is also still considered a good and dependable forecasting tool. So, to continue this research, the writer will choose to use the result of annual forecast from the triple exponential smoothing method.

IV.2 EOQ AND SAFETY STOCK ANALYSIS

EOQ is one of the most crucial factors in reducing the total cost of the company. Ordering supplies can be a tricky situation when starting a business because nothing can accurately predict demands from customers. No company can avoid ordering supplies, and most new companies will have problems deciding how much quantity to order in order to keep enough stock in the warehouse. EOQ helps the company choose the right quantity to order from the supplier while avoiding overstocking and understocking. Meanwhile, safety stock is an extra stock added in order make sure the company never run out of stock. Currently, PT. Rosyada Herba Natura doesn't have an exact number for the safety stock because they tend to order supplies weekly whenever the company starts to sell a lot of product.

IV.2.1 EOQ Analysis

To calculate EOQ, this research will need three important pieces of data from the company. First is the annual demand, which was already calculated through the forecast analysis from the forecasting analysis. The second one is the order cost, which is gathered from the company. It is the cost of ordering the supply from the supplier. This cost is purely from transportation or inspection, if needed, and does not include the cost of the product. The last important piece of data is the holding cost of the product inside the warehouse. This data is gathered from the company through every cost needed by the warehouse annually. Including the rent of the warehouse, the salary of the employee in the warehouse, and the utility costs like electricity and water for the warehouse.

The following is the calculation for Product E and B:

$$EOQ_E = \sqrt{\frac{(2 * 4403 * 125000)}{0{,}3 * 35000}} = 324\ units$$

$$EOQ_B = \sqrt{\frac{(2 * 4284 * 125000)}{0{,}3 * 35000}} = 319\ units$$

According to the equation above, the monthly optimal ordering quantity for product E and B is 324 and 319 respectively. When this theory is applied to the company, this research believe that it will reduce the total cost of the company significantly. When the EOQ has been established, the company must know what is the reorder point (ROP) is for the company.

$$ROP_E = \frac{4403}{250} * 5 = 25$$

$$ROP_B = \frac{4284}{250} * 5 = 24$$

This means that when the company's inventory hits that number, it must place another order to restock the product. ROP helps companies avoid stockouts and reduce holding costs. Nevertheless, companies must find a priority to protect because uncertainty in demand, stockouts, and overstocking are bound to happen. Companies must choose which problems must be avoided at all costs. Safety stock is provided to avoid stockouts, but it increases the holding cost by a small amount.

IV.2.2 Safety Stock Analysis

Safety stock is an extra stock to increase the amount of ROP. Safety stock adds more unit when the company hits the ROP number. The formula of safety stock is quite similar with ROP but the difference is that safety stock adds more probability and may change every order period depending of the lead time and the supplier. In this case, the research will use safety factor of the company at 90%.

$$Safety\ stock_E = 1{,}28 * 5 * 18 - ROP = 25\ units$$

$$Safety\ stock_B = 1{,}28 * 5 * 17 - ROP = 24\ units$$

The variable that could change in the safety stock equation is the standard deviation in lead time. It could vary depending on the lead time that month. PT. Rosyada Herba Natura is always expecting the lead time to be three days, but it always varies between three and five days. Hence, nothing can guarantee the lead time, and nothing can also guarantee the safety stock for each order.

IV.3 TOTAL COST ANALYSIS

The total cost refers to the overall cost associated with ordering and carrying inventory over a one cycle of order. The formula of total cost (TC) contains a several important components, such as ordering cost (S), holding cost (H), and EOQ. in order to become a balance comparison between total cost of this research and the company, the unit of period must be equal. The company has given the data of their total cost and the unit is per one cycle order. Thus, this research will also do the total cost analysis in a one cycle order, which is one month.

$$TC = \frac{D}{EOQ} * S + \frac{EOQ}{2} * H$$

$$TC_E = \frac{339}{90} * 125000 + \frac{90}{2} * 6.800 = 777.126$$

$$TC_B = \frac{330}{89} * 125000 + \frac{89}{2} * 7.000 = 775.605$$

The results of TC formula will be the money spent on this specific product in the company in a one cycle order. The unit of total cost will be monetized to Indonesian Rupiah. To make the result more realistic, it will be rounded to the nearest amount which is Rp. 777.000 for Product E and Rp. 776.000 for Product B.

The goal of determining the total cost for this research is to compare it with the cost of a one cycle order from the company. PT. Rosyada Herba Natura used the estimated approach to provide the total cost for each product. Depending on the department manager, a lot of new businesses still rely heavily on estimating. The company's estimate for a single cycle order is around Rp. 500.000. The corporation places an order from the supplier once a week, based on the sales data. The company places an order four times per month, according to the information provided by the company. This means that a fair comparison is based on the entire monthly cost of each product.

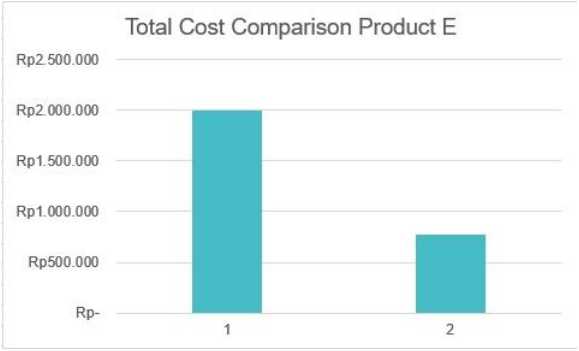

Figure 4 Total Cost Comparison Product E

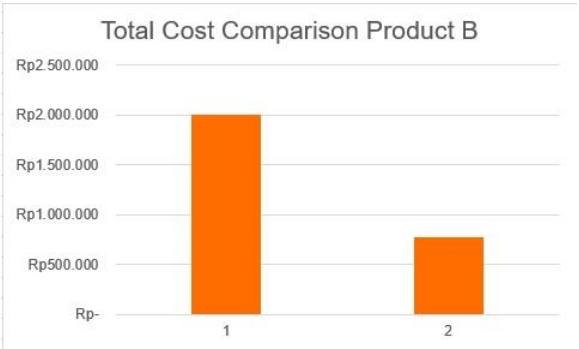

Figure 5 Total Cost Comparison Product B

From the graphs above, it is clear that using the EOQ method will ultimately reduce the total cost of the product. The company estimated Rp. 500.000 of total cost per order, which must be multiplied by four because the company makes an order four times per month. Meanwhile, with the EOQ method, the company only needs to order once per month, so that also reduces the company's ordering costs. The total cost of the company will become Rp. 4.000.000 per month for both products, while the total cost when using EOQ is only Rp. 1.552.000 per month for both products. It might not seem much, but when this difference in cost is accumulated for one or two years, it will surely have an impact on the company's finances.

IV.4.4 COMPANY COMPARISON ANALYSIS

PT. Rosyada Herba Natura has been contributing a substantial amount of data to this study in the hopes that it will help the company marginally lower its yearly expenditures. The comparison of a few elements that affect the cost of the company will be covered in this chapter. This study succeeds in determining the demand projection for the 12-month period from July 2022 to July 2023 using the forecasting outcomes from the triple exponential smoothing approach. employing that precise data, this research will attempt to demonstrate how inventory management will function while employing the company's

present supply chain management system along with EOQ and safety stock.

The writer will include data from a one-month comparison between the company's inventory value and the inventory value obtained after using the EOQ and Safety Stock Method in this study. The month will be chosen from the highest difference of inventory value between the two data. After that, the full year comparison will be shown to display the full picture of the comparison.

Table 14 Inventory Value Product E (EOQ Method)

Period	Apr-23
Demand	377
Stock	714
Supply (EOQ)	324
Leftover	337
Inventory Cost (Rp)	11.795.000
Safety Stock	25

Table 15 Inventory Value Product E (Company Method)

Period	Apr-23
Demand	377
Stock	1268
Supply	400
Leftover	891
Inventory Cost (Rp)	31.185.000

Table 16 Inventory Value Product B (EOQ Method)

Period	Apr-23
Demand	371
Stock	759
Supply (EOQ)	319
Leftover	388
Inventory Cost (Rp)	13.580.000
Safety Stock	24

Table 17 Inventory Value Product E (Company Method)

Period	Apr-23
Demand	371
Stock	1023
Supply	400
Leftover	652
Inventory Cost (Rp)	22.820.000

After conducting the comparison between using the supply chain management method and not using the supply chain management method, the difference is very clear. When applying EOQ in ordering the supply, the order will become more consistent, especially when safety stock is also applied. It is more coordinated with the supplier as well. PT. Rosyada Herba Natura places an order from the supplier every week, whereas when using EOQ, the order can be done per month without having to be scared of running out of stock. This can also increase trust and transparency between the company and the supplier.

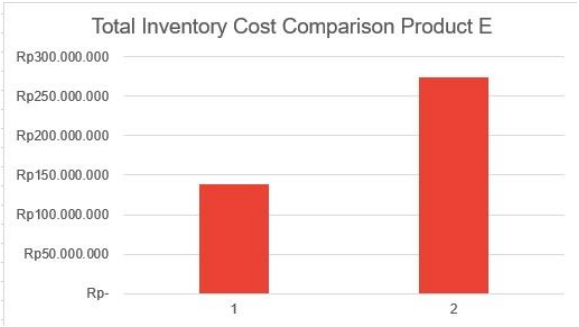

Figure 6 Total Inventory Cost Product E

Figure 7 Total Inventory Cost Product B

The difference in the total inventory cost is very clear, especially for product E, which is the most influential product for the company according to the pareto chart from the previous chapter. This can make a difference every year for the company.

5. CONCLUSION AND RECOMMENDATION

V.1 CONCLUSION

This research is intended to try to find the flaws in the supply chain management method in the company and try to improve that department. From the first time the data was given by the company, it was clear that there was some problem

ordering products from the supplier. The amount of order is very random and inconsistent. By applying EOQ, reorder point, and safety stock, this research manages to reduce the cost of the warehouse and give a better solution to improve the relationship between the company and the supplier. Adding EOQ will provide consistency in the order quantity, which will improve trust and transparency between the company and supplier.

Referring to the results of the diagram of the total inventory cost, the difference is very significant for long-term business. This research only applies the supply chain management method to two products. Imagine the difference it will make when other products also apply the supply chain management method. In another one or two years, this research believes that the company will feel the difference when operating their warehouse. It will be more coordinated and calculated between every order and shipping.

V.2 RECOMMENDATION

From conducting this research, the company will surely see that applying supply chain management methods will improve the company in many ways. This research only focuses on the company's inventory management. For the future, this research believes that PT. Rosyada Herba Natura will improve significantly after applying more methods to their supply chain management. improving forecasting, planning, logistics, and many more supply chain management methods.

This research also recommends that the company apply more advanced technology to operate its supply chain. There are so many ways to apply technology to the supply chain. For example, adding ERP to operate supply chain management. ERP is the current trend and probably the future of supply chain management for every business around the world. This research only contributes in a small way to improving the company; there are still a lot of departments to improve in this company in order to become a long-lasting and successful company.

Finally, this analysis will assist the corporation in managing the year-end Stock Opname. Companies conduct Stock Opname at the end of each year to gather data from the warehouse. The corporation will quickly become aware of how much inventory it has been holding throughout the year once it does a Stock Opname. By implementing EOQ, deadstock will be reduced, and adding inventory tracking will help ensure that no goods is wasted at the end of the year.

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