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Inventory Control Analysis with Continous Review System and Periodic Review System Methods at PT. XYZ

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ABSTRACT

Companies must have various strategies in order to survive and face the competition in the retail industry, where the strategy can be in the form of inventory control. The objective of this research is to categorize products owned by PT. XYZ based on the ABC analysis method, to analyze the best forecasting method for PT. XYZ for Filo Compound, Meses Valentino and Mercolade Dark 1 KG, to analyze the total cost using Q-Method & P-Method, and last to compare among Q-Method, P-Method and PT. XYZ's policy. By doing ABC analysis, company is able to know which products to be prioritized. Forecasting is the first step to find out how much demand is expected in the future by analyzing demand data from the previous period. By having the smallest error which is reflected by MAD and MSE value, Trend Projection is the best method for forecasting as compared to the other five methods. Furthermore, this research is calculating the total cost by using the Q method and P Method to find out the best method with the smallest total cost for PT. XYZ. Q method is the best for Filo Compound and Meses Valentino with the cost saving as much as Rp 38.582.771,08 and Rp 43.215.539,68. While for the Mercolade Dark 1 KG, P Method is the best method with the cost saving as much as Rp 200.290.337,56.

Keywords*: Inventory; ABC Analysis; Forecasting, Continuous Review System (Q); Periodic Review System (P)*

INTRODUCTION

One of the industry that has the most contribution in the economic sector is the retail industry (Cahyadin et al., 2017). In the retail industry, inventory system is very crucial where the company will utilize the financial assets owned by the company. By managing the inventory system, the company is able to increase the company's effectiveness and efficiency in the term of decision making, so that the company will not experiencing the shortage or surplus. Furthermore, sales recording data is also important to ease the company in analyzing the ongoing selling and purchasing transaction (Sembiring, 2019).

In this study, the author will analyze one of the retail industries named PT. XYZ that operating in the cake ingredients located at Pekanbaru, Riau, Indonesia. All the suppliers are located at Jakarta, where the company will have a lead time of the products as long as 7 days after purchasing. This company supplies products to store as well as to end user like bakery store. Thus, the availability of each product stock is very important so that the company is able to fulfill all the demands. After having an interview with an operational management of PT. XYZ, the author found that the company is often experiencing the stock surplus in the warehouse. The main reason is because the owner of the company always places an order of all products every month where the quantity is only based on the personal assumptions, without calculating the previous data in advance.

At the end, the stock surplus is not only affecting the warehouse but also affecting the cost occurred to keep all the stocks in each month. The high inventory in the long-term is the major failure factors for companies (Khan, 2020)AMOS version 24 and SPSS version 23 were used. The findings of the analyzed data revealed that strategies of the business mediate the consequence of inventory materials capability and performance of the firm. The (SEM. Thus, if it occurs continuously will make the company spend additional cost to rent an additional warehouse if the previous warehouse has reached the maximum storage limits (Asana et al., 2020). Therefore, the most effective way is by applying the inventory system that suits well with the company in order to minimize the stock shortage and surplus in the warehouse. Moreover, company is able to minimize the total cost occurred and increase the company's profit (Khan, 2020)**AMOS version 24 and SPSS version 23 were used. The findings of the analyzed data revealed that strategies of the business mediate the consequence of inventory materials capability and performance of the firm. The (SEM**.

ABC analysis is one of the method that can help company to improve the management process in several aspects, such as: inventory control, time management, controlling and some other aspects (Burcu et al., 2017). Therefore, ABC analysis helps company to increase the effectiveness of the company, to meet the customers' demand or market needs, to increase good relationship with suppliers, as well as to help company to find an investment opportunity for the company. ABC analysis has three categories, which consist of (Heizer et al., 2017):

1. Class A – the products that have the highest annual dollar volume, where it represents only 15% of total inventory stocks while having 70-80% of the total dollar usage.
2. Class B – the products that have medium annual dollar volume, where it represents about 30% of total inventory stocks while having 15-25% of the total dollar usage.
3. Class C – the products that have the lowest annual dollar volume, where it represents about 55% of total inventory stocks while having only 5% of the total dollar usage.

The next theory that will be discussed is forecasting method, this method is the foundation to get an accurate information that will help company to make an effective and efficient planning in the future (Hyndman & Athanasopoulos, 2018). According to Winarno et al. (2017), forecasting is an estimation of the future by using an approach model based on actual data in the past and present with a subjective mathematical model. The main purpose of forecasting is to determine the number of requests for one or more products in the company. This purpose is one of the initial steps for the process of planning and production control in the future (Winarno et al., 2017).

Within the company, the company will often face the uncertainty demand fluctuation among all products in the company. The inability of a company to meet this demand will have a major impact on the stability of the company, which can lead to increase losses and reduced the customer satisfaction (Fatma & Pulungan, 2018). Therefore, in general, the company will provide a safety stock to overcome the demand instability.

In this study, the inventory control model that will be discussed is a probabilistic inventory model which refers to the arrangement of inventory based on the consumer demand's characteristics and the assumption that the time of arrival of each order is uncertain. However, this variable has a predictable distribution pattern and expected value that based on a probability distribution. Within the probabilistic inventory model itself, there are two main models, namely: Q-Method (Continuous Review) and Method P (Periodic Review) (Jonek-kowalska, 2019). Probabilistic Q-Method has a fixed order quantity for each order with varying order times. On the other hand, P-Method has a fixed order time range with a different order quantity in each order (Pratiwi et al., 2020)

As previously discussed, various costs that are generally considered in the total cost are purchasing costs, holding costs, and inventory shortage costs (Fatma & Pulungan, 2018). Purchasing Cost (Ob) is the purchase price or the production price per unit, where Ob can be calculated by the multiplication of the quantity of the products purchase (D) with the price of products per unit (p). Next, the Ordering Cost (Op) which refers to the costs required each time the company place an order. The ordering cost is obtained from the multiplication between the frequency of orders (n) and the ordering cost of each order placed (A). The last cost is the Shortage Cost (Os) which arises due to the shortage of the product within a certain period. Shortage costs can be calculated by multiplying the average amount of inventory in the warehouse (a) with the cost of storage per unit per period (h). The last type of cost is the cost of inventory shortage (Ok). These costs arise as a consequence of non-fulfillment of orders, such as: back-orders or lost sales.

Based on the background stated above, the main problems that will be raised in this research are: (1) How to group and categorize all the products with ABC analysis at PT. XYZ?, (2) Between the selected five methods:

Moving Average, Weighted Moving Average, Exponential Smoothing, Exponential Smoothing with Trend and Trend Projection or Trend Linear, which one is the best forecasting method that can be used by PT. XYZ to forecast Filo Compound, Meses Valentino and Mercolade Dark 1 KG?, (3) How to calculate the total cost of Filo Compound, Meses Valentino and Mercolade Dark 1 KG by using Q-Method and P-Method at PT. XYZ?, and (4) What is the result after analyzing the comparison between Q-Method, P-Method and company's policy at PT. XYZ?

Based on the problems faced by PT. XYZ, this research has several purposes that can assist the company in the future. Firstly, the purpose is to categorize all products owned by PT. XYZ based on the ABC analysis method. The next purpose is to know the best method among Moving Average, Weighted Moving Average, Exponential Smoothing, Exponential Smoothing with Trend, dan Trend Projection atau Trend Linear to forecast the sales of Filo Compound, Meses Valentino and Mercolade Dark 1 KG in the future. Thirdly, this research is aiming to know the total cost of these three products by using Q-Method (Continuous Review System) and P-Method (Periodic Review System). The last purpose is to make a comparison among Q-Method, P-Method and PT. XYZ's policy.

After analyzing all the problems faced by the company, the author intends to raise this issue as a form of research to assist the company in solving the problems regarding the stock surplus and finding some ways to minimize the cost in the warehouse. Firstly, the author is going to use analyze ABC to find out which products to be prioritized. Secondly, this research will do some forecasting method for the three products based on the highest sales in the chocolate topping category. After that, the author will calculate the cost occurred by using both Q-method and P-method to find out the best method to minimize the total cost.

METHODS

Data collection techniques were carried out by having an interview with the company, namely PT. XYZ regarding the problems that has been experienced by the company. The next technique in this study was finished by having a direct observation to the company. The data collected are the demand data, price of the products, and the sales of this company. And the last technique was by doing a literature review to obtain the information and theoretical matters so that this study can have a strong foundation, where the source were from books and journals that related to the topic being researched.

In this study, ABC analysis will be carried out to classify all the products at PT. XYZ to determine which products to be prioritized. Furthermore, the forecasting method will be conducted for the selected three products with the highest sales in the same "chocolate topping category". The purpose of this forecasting method is to find out the expected product demand based on the demand from the previous period. The forecasting methods will use the Moving Average, Weighted Moving Average, Exponential Smoothing, Exponential Smoothing with Trend, and Trend Projection methods with the help of QM application for Windows version 5. Among these five methods, the method that will be chosen is the best method which has the smallest MAD (Mean Absolute Deviation) and MSE (Mean Squared Error) values. Furthermore, this research will calculate the total cost of the inventory by using the Q-Method (Continuous Review System) and the P-Method (Periodic Review System) to find out the best method for this company. The following are the methods that will be carried out in this research:

Moving Averages

The purpose of this method is to calculate the average price of an asset over a certain period and combine them in the form of a line. This method is based on the past events that will provide all information about historical market data, where each calculation will remove the oldest value and add new value (Raudys & Pabarškaitė, 2018). This method used as a tool to identify a stable demand, but unfortunately this method cannot describe a clear demand behavior, such as trend or seasonal demand. The Moving Average method can be calculated using the formula:

$$\text{Moving Average} = \frac{\sum \textbf{demand in previous } n \textbf{ periods}}{n}$$

Where, n is the number of periods in the moving average. For example: 4 months, 5 months or 6 months.

Weighted Moving Average

This method is able to calculate future data by using past data that have been given their respective weights. In this method, determining the right weight for each period generally requires several experimental trial-error to get the right results (Heizer et al., 2017). If the calculated weight is too much, the forecast will overreact to the demand. On the other hand, if the calculated weights are too small, the forecast may be less responsive to the changes in actual demand behavior. The Weighted Moving Average method can be calculated using the formula:

$$\text{Weighted Moving Average} = \frac{\sum(\text{(Weight for period } n)\text{Demand in period } n)}{\sum Weights}$$

Exponential Smoothing

Exponential Smoothing is a forecasting method that follows the pattern of fluctuations in a period to forecast future data by smoothing and reducing the fluctuations in a forecast (H. Ihsan et al., 2018). Exponential Smoothing method can be calculated using this formula:

$$F_t = F_{t-1} + \alpha(A_{t-1} - F_{t-1})$$

Where,

F_t : New forecast

F_{t-1} : Previous period's forecast

α : Smoothing (or weighting) constant ($0 <= \alpha <= 1$)

A_{t-1} : Previous period's actual demand

Exponential Smoothing with Trend (Holt's Method)

The exponential smoothing with trend method is used when the demand for an item is affected by the trend but not by season. This method smoothen the trend value by using parameters that are not the same as the parameters used in the original series (N. H. A. S. Al Ihsan et al., 2020). However, to forecast demand in the next period, this method requires a new smoothing value (level) and an estimate of its trend. The level can be calculated using the formula below, where the t-th smoothing value requires the t-th demand data, smoothing value and the previous trend value. After knowing the t-th refinement value, the following Tt value can be obtained with formula as follow:

$$F_t = \alpha(A_{t-1}) + (1 - \alpha)(F_{t-1} + T_{t-1})$$

$$or$$

$$T_t = \beta(F_t - F_{t-1}) + (1 - \beta)T_{t-1}$$

After the level forecast and trend forecast are obtained, the Exponential Smoothing with Trend formula can be calculated using the formula:

$$\hat{Y}_{t+p} = F_t + pT_t$$

Where,

F_t : The average of exponentially smoothed forecast from the data series in period *t*

T_t : Exponentially smoothed trend in period *t*

A_t : Actual demand in period *t*

$\hat{Y}_{t+p}\hat{Y}_{t+p}$: Forecast for period *p* in the future

p : Number of periods for future forecasts

α : Smoothing constant for the average ($0 <= \alpha <= 1$)

β : Smoothing constant for the trend ($0 <= \beta <= 1$)

Trend Projection

The last method is by adjusting the trend line with existing data in the past and then project it into the forecasts for the future; both in the medium and long term (Pataropura & Sabatino, 2020). The Trend Projection method can use the following formula:

$$\hat{y} = a + bt$$

Where,

$\hat{y}$	: Computed value of the variable that will be predicted
t	: The independent variable
a dan b	: Constants and coefficients

The following measures are used to determine forecasting errors in this study, which will be described as follows:

- **Mean Absolute Deviation (MAD)**

This indicator measures the accuracy of forecasting by flattening the magnitude of the forecast error where each forecast has an absolute value for each error.

$$\mathbf{MAD} = \frac{\sum|\mathbf{Actual} - \mathbf{Forecast}|}{\mathbf{n}}$$

- **Mean Square Error (MSE)**

This indicator reduces the value of the actual data with the forecast data, where the result will be squared and calculate the total data. Then, the data results will be divided by the number of existing data.

$$\mathbf{MSE} = \frac{\sum(\mathbf{Foreast\ Errors})^2}{n}$$

The following formula will be used by researchers in calculating the total cost of inventory using the Q and P methods. To perform the calculations using the Q (Continuous Review System) method, the following calculations will be used:

- **The calculation of Quantity Order (Q)**

$$Q = \sqrt{\frac{2 \times A \times E(D)}{h}}$$

Where,

A	: Ordering cost
E(D)	: Total demand in 12 months
h	: Holding cost

- **The calculation of Reorder Point (r) and Safety Stock (ss)**

  a. The calculation of demand during the lead time

$$E(X) = L \times E(D)$$

  Where,
  L : Lead time
  E(D) : Total demand in 12 months

  b. The calculation of standard deviation for 12 months

$$\sigma_x = \sigma_D \times \sqrt{L}$$

  Where,

  $\sigma_D \sigma_D$: Standard deviation
  L : Lead time

  c. The calculation of order frequency for 12 months

$$F = \frac{E(D)}{Q}$$

  Average Ordering Time $(t_0)(t_0)$

$$t_0 = \frac{Q}{E(D)} \times total\ days\ in\ 12\ months$$

  Where,
  E(D) : Total demand in 12 months
  Q : Quantity order

  d. The calculation of Reorder Point (r)

$$r = E(X) + \sigma_x \times Z_\alpha$$

  Where,
  E(X) : Demand during the lead time

  $\sigma_x \sigma_x$: Standard deviation for 12 months

  $Z_\alpha Z_\alpha$: Normal standard deviation

  e. The calculation of Safety Stock (ss)

$$ss = r - E(X)$$

  Where,
  r : Reorder point
  E(X) : Demand during the lead time

- **The calculation of Total Cost (TC)**

  a. Purchasing Cost = $P \times E(D)$

  b. Ordering Cost = $A \times \frac{E(D)}{Q}$

  c. Holding Cost = $h \times \left(\frac{Q}{2} + r - E(X)\right)$

d. Total Cost (TC) = Purchasing Cost + Ordering Cost + Holding Cost

$$= \left[\left(P \times E(D) \right) + \left(A \times \frac{E(D)}{Q} \right) + \left(h \times \left(\frac{Q}{2} + r - E(X) \right) \right) \right]$$

Where,
E(D) : Total demand in 12 months
P : Price of the product
A : Ordering cost
h : Holding cost
Q : Quantity order
E(X) : Demand during lead time
R : Reorder point

To perform the calculations by using the P Method (Periodic Review System), the following formula will be used:

- **The calculation of order period (T)**

$$T = \sqrt{\frac{2A}{h \times E(D)}}$$

Where,
A : Ordering cost
h : Holding cost
E(D) : Total demand in 12 months

- **The calculation of maximum amount of inventory (R)**

a. The calculation of demand during lead time and ordering period ($X_{L+T}X_{L+T}$)

$$X_{L+T} = E(D) \times (L + T)$$

Where,
E(D) : Total demand in 12 months
L : Lead time
T : Order period

b. The calculation of standard deviation during lead time and ordering period ($\sigma_{L+T}\sigma_{L+T}$)

$$\sigma_{L+T} = \sigma_D \times \sqrt{L + T}$$

c. The calculation of maximum inventory quantity (R)

$$R = X_{L+T} + (\sigma_{L+T} \times Z_\alpha)$$

Where,

$X_{L+T}X_{L+T}$: Demand during lead time and ordering period

$\sigma_{L+T}\sigma_{L+T}$: Standard deviation during lead time and ordering period

$Z_\alpha Z_\alpha$: Normal standard deviation

d. The calculation of safety stock (ss)

$$ss = R - (X_{L+T})$$

Where,
R : Maximum quantity stock

$X_{L+T}X_{L+T}$: Demand during lead time and ordering period

The calculation of Total Cost (TC)

a. Purchasing Cost = $\boldsymbol{P} \times \boldsymbol{E(D)} \boldsymbol{P} \times \boldsymbol{E(D)}$

b. Ordering Cost = $\frac{\boldsymbol{AA}}{\boldsymbol{TT}}$

c. Holding Cost = $\boldsymbol{h} \times \left(\boldsymbol{R} - \boldsymbol{X_L} - \frac{\boldsymbol{X_T}}{\boldsymbol{2}}\right)\boldsymbol{h} \times \left(\boldsymbol{R} - \boldsymbol{X_L} - \frac{\boldsymbol{X_T}}{\boldsymbol{2}}\right)$

Where,

$X_L X_L$ = Order quantity during lead time

= $\boldsymbol{E(D)} \times \boldsymbol{LE(D)} \times \boldsymbol{L}$

$X_T X_T$ = Demand during ordering period

= $\boldsymbol{E(D)} \times \boldsymbol{TE(D)} \times \boldsymbol{T}$

d. Total Cost (TC) = Purchasing Cost + Ordering Cost + Holding Cost

$$= \left[\left(\boldsymbol{P} \times \boldsymbol{E(D)}\right) + \left(\frac{\boldsymbol{A}}{\boldsymbol{T}}\right) + \left(\boldsymbol{h} \times \left(\boldsymbol{R} - \boldsymbol{X_L} - \frac{\boldsymbol{X_T}}{\boldsymbol{2}}\right)\right)\right]$$

Where,

E(D) : Total demand in 12 months
P : Price of the product
A : Ordering cost
L : Lead time
T : Ordering period
h : Holding cost
R : Maximum stock

$X_L X_L$: Order quantity during lead time

$X_T X_T$: Demand during order period

To calculate the total cost of inventory based on company's policy, the following formula will be used:

a. Purchasing Cost = $\boldsymbol{P} \times \boldsymbol{D} \times \boldsymbol{nP} \times \boldsymbol{D} \times \boldsymbol{n}$

b. Ordering Cost = $\boldsymbol{A} \times \boldsymbol{nA} \times \boldsymbol{n}$

c. Holding Cost = $\boldsymbol{h} \times \boldsymbol{ah} \times \boldsymbol{a}$

d. Total Cost (TC) = Purchasing Cost + Ordering Cost + Holding Cost

Where,

P : Price of the product
D : Quantity order
n : Number of periods
A : Ordering cost
h : Holding cost
a : Inventory stock

RESULT AND DISCUSSION

ABC Analysis

Based on the ABC analysis result to categorize all the products at PT. XYZ by using QM for Windows V.5, the results are as in Table 1 above where there are 15 products with 80.24% of the total dollar usage in Class A, for class B there are 9 products with 15.57% of the total dollar and the last class is class C where there are 6 products with the total 4.19% of the total dollar usage.

Table 1. Results of Grouping Categories A, B, and C

Item Name	Demand	Price/ Unit (Rp)	Dollar Volume (Rp)	Percent of $-Vol	Cumultv $-vol %	Category
Calf Merah	4.837	740.000	3.579.380.000	21,48	21,48	A
Filoku	4.851	445.000	2.158.695.000	12,96	34,44	A
Filo Compound	3.797	335.000	1.271.995.000	7,63	42,07	A
Mercolade Dark 1 KG	1.913	560.000	1.071.280.000	6,43	48,5	A
Calf Mentari	1.069	700.000	748.300.000	4,49	53	A
Meses Valentino	3.170	212.000	672.040.000	4,03	57,02	A
Tropicana Strawberry	3.385	155.000	524.675.000	3,15	60,17	A
Mercolade Dark 5 KG	547	850.000	464.950.000	2,79	62,96	A
Meses K 8 Cokelat	2.397	193.000	462.621.000	2,78	65,74	A
Filtop	2.570	163.000	418.910.000	2,51	68,25	A
Tropicana Blueberry	2.650	155.000	410.750.000	2,47	70,72	A
Koboi Nanas	2.627	153.000	401.931.000	2,41	73,13	A
Filo 123	2.426	165.000	400.290.000	2,4	75,53	A
So Bagus	606	650.000	393.900.000	2,36	77,9	A
Susu Full Altoz	673	580.000	390.340.000	2,34	80,24	A
Mercolade White 1 KG	676	575.000	388.700.000	2,33	82,57	B
Susu Full Navco	850	425.000	361.250.000	2,17	84,74	B
Meses Ruiter	796	375.000	298.500.000	1,79	86,53	B
Accord SP	556	520.000	289.120.000	1,74	88,27	B
LBF Pandan 10 KG	801	350.000	280.350.000	1,68	89,95	B
Tropicana Pineapple	1.656	155.000	256.680.000	1,54	91,49	B
Koboi Strawberry	1.675	153.000	256.275.000	1,54	93,03	B
Spontan 88	318	780.000	248.040.000	1,49	94,52	B
Baking Xena Double	314	685.000	215.090.000	1,29	95,81	B
Mercolade Flexy 5 KG	295	725.000	213.875.000	1,28	97,09	C
LBF Sarikaya 10 KG	389	350.000	136.150.000	,82	97,91	C
Meses K 8 WTC	618	205.000	126.690.000	,76	98,67	C
LBF Sarikaya 500 GR	432	190.000	82.080.000	,49	99,16	C
LBF Kelapa 500 GR	328	235.000	77.080.000	,46	99,62	C
LBF Pandan 500 GR	331	190.000	62.890.000	,38	100	C
TOTAL	47.553		16.662.827.000			

(Source: QM for Windows V.5 Data Processing Results)

Forecasting

Table 2. Product Calculation Results with Forecasting Method

Filo Compound			
Methods	**MAD**	**MSE**	**Forecasting**
Moving Average	40,593	2.446,37	354
Weighted Moving Average	39,074	2.189,722	357
Exponential Smoothing	30,068	1.668,749	358
Exponential Smoothing with Trend	30,863	1.708,219	359
Trend Projection* atau *Trend Linear	**28,209**	**1.134,085**	**356**
Meses Valentino			
Methods	**MAD**	**MSE**	**Forecasting**
Moving Average	29,148	1.544,284	276
Weighted Moving Average	27,111	1.207,068	274
Exponential Smoothing	31,331	2.048,268	275
Exponential Smoothing with Trend	31,799	2.113,197	274
Trend Projection* atau *Trend Linear	**26,509**	**1.190,13**	**289**
Mercolade Dark 1 KG			
Methods	**MAD**	**MSE**	**Forecasting**
Moving Average	19,296	537,617	161
Weighted Moving Average	18,204	489,028	161
Exponential Smoothing	16,731	443,875	160
Exponential Smoothing with Trend	16,869	447,265	161
Trend Projection* atau *Trend Linear	**13,002**	**312,406**	**164**

(Source: QM for Windows V.5 Data Processing Results)

Based on the calculation method above, the results obtained with the smallest MAD and MSE values is by using the Trend Projection method. It means that Trend Projection method is the best method for predicting the calculation of these selected three products. For Filo Compound, the expected demand in the next period is as much as 356 boxes for January 2021, while for Meses Valentino as much as 289 boxes in January 2021 and lastly the forecasting results for Mercolade Dark 1 KG is as much as 164 boxes for January 2021. Besides, the result of expected demand for the next period are as follow:

Table 3. Forecasting Results for Filo Compound, Meses Valentino, and Mercolade Dark 1 KG with the Trend Projection Method for the Period of 2021

Year	**Months**	**Filo Compound**	**Meses Valentino**	**Mercolade Dark 1 KG**
2021	January	356	289	164
	February	362	293	164
	March	368	297	165
	April	374	301	166
	May	380	305	166
	June	386	309	167
	July	392	313	168
	August	398	317	168
	September	405	321	169
	October	411	325	170
	November	417	329	171
	December	423	333	171
	Total	4.672	3.732	2.009

(Source: QM for Windows V.5 Data Processing Results)

After analyzing the forecasting method for January to December 2021 using the Trend Projection method, the expected total demand for Filo Compound, Meses Valentino, and Mercolade Dark 1 KG products are 4,672 boxes, 3,732 boxes, and 2,009 boxes.

Q-Method (Continous Review System)

Table 4. Summary Results of Total Cost with Q Method for 12 Months

Products	Q	r	ss	F	t_0	Total Cost (Rp)
Filo Compound	340	110	6	13 kali	22 hari	1.409.821.973,56
Meses Valentino	279	87	4	13 kali	23 hari	706.834.925,44
Mercolade Dark 1 KG	157	45	-	12 kali	24 hari	1.027.572.800,21

Source: Author (2021)

Based on the results from the calculation above, the reorder point for Filo Compound is when the inventory stock in the warehouse has reached the stock of 110 boxes with the number of orders (Q) of 340 boxes for each time the company place an order, the total cost for 1 year is as much as Rp. 1,409,821,973.56. For Meses Valentino, the company places a reorder point if the inventory level in the warehouse has reached 87 boxes with a total order (Q) of 279 boxes each time the company place an order, with the total cost incurred by the company for 1 year is Rp. 706.834,925.44. Lastly, for Mercolade Dark 1 KG, the company places a reorder point if the inventory level in the warehouse has reached 45 boxes with an order quantity (Q) of 157 boxes each time the company place an order, and the total cost incurred by the company for 1 year is Rp. 1,027,572,800,21.

P-Method (Periodic Review System)

Table 5. Summary Results of Total Cost with P Method for 12 Months

Products	T	R	ss	Total Cost (Rp)
Filo Compound	22 hari	447	13	1.409.826.253,7
Meses Valentino	23 hari	367	9	706.838.098,59
Mercolade Dark 1 KG	24 hari	199	0	1.027.572.536,58

Source: Author (2021)

Based on the results from the calculation above, the company will monitor the inventory level of Filo Compound every 22 days and the company will place an order if the amount of inventory in the warehouse is below the maximum inventory level of 447 boxes, and the total cost incurred by the company for 1 year is as much as Rp. 1,409,826,253.7. For Meses Valentino, the company will monitor the inventory level every 23 days and the company will place an order if the amount of inventory in the warehouse is below the maximum inventory level of 367 boxes, and the total cost incurred by the company for 1 year is Rp. 706.838.098.59. For Mercolade Dark 1 KG, the company will monitor the inventory level every 24 days and the company will place an order if the amount of inventory in the warehouse is below the maximum inventory level of 199 boxes, and the total cost incurred by the company for 1 year is Rp. 1,027,572,536.58.

Company Policy

Table 6. Summary Results of Total Cost with Company Policy for 12 Months

Products	Total Cost (Rp)
Filo Compound	1.448.404.744,64
Meses Valentino	750.051.465,12
Mercolade Dark 1 KG	1.227.862.874,14
Total	3.426.319.083,9

Source: Author (2021)

Based on the calculation of total cost above, it is found that the cost needed to control Filo Compound based on the company policy is Rp. 1,448,404,744.64. While to control Meses Valentino, company need as much as Rp. 750,051,465,12 to control the products. Lastly, it has been found that the cost needed to control the Mercolade Dark 1 KG based on company policy is as much as Rp. 1,227,862,874.14.

Comparison of Q-Method and P-Method with Company Policy

Table 7. Comparison of Total Cost Q and P Methods with Company Policy

Products	Q-Method (Rp)	P-Method (Rp)	Company (Rp)	Cost Savings (Rp)
Filo Compound	**1.409.821.973,56**	1.409.826.253,7	1.448.404.744,64	**38.582.771,08**
Meses Valentino	**706.834.925,44**	706.838.098.59	750.051.465,12	**43.216.539,68**
Mercolade Dark 1 KG	1.027.572.800,21	**1.027.572.536,58**	1.227.862.874,14	**200.290.337,56**

Source: Author (2021)

Table 7 above describes the results after analyzing the comparison between the total cost of company policies, continuous review system (Q), and periodic review system (P) methods. From the results of these comparison, it is found that the minimum total cost for Filo Compound is by using the Q-Method, with the saving cost as much as Rp. 38,582,771.08. Furthermore, the minimum total cost for Meses Valentino can be obtained by using the Q-Method, where the company can save the total cost as much as Rp. 43,216,539.68. Lastly, it is recommended for Mercolade Dark 1 KG product to use the P-Method, with the saving cost as much as Rp. 200,290,337.56.

CONCLUSION

By doing an ABC analysis using the QM for Windows version 5 application, the company can identify and categorize which products that need to be prioritized at PT. XYZ. It can be concluded that there are 15 products that fall into "A" class with the total dollar volume of 80.24%, while for "B" class there are only 9 products that fall into this category with the total dollar volume of 15.57 %, and there are 6 products that fall into the "C" class with the percentage of 4.19% from the total dollar volume.

The most suitable forecasting method to forecast Filo Compound, Meses Valentino, and Mercolade Dark 1 KG at PT. XYZ is by using the Trend Projection or Trend Linear method as this method has the smallest Mean Absolute Deviation (MAD) as well as the smallest Mean Squared Error (MSE) as compared to the other four methods.

The total cost of inventory control for Filo Compound by using the Q-Method (Continous Review System) is Rp. 1,409,821,973.56, while the total cost by using the P-Method is Rp. 1.409.826.253,7. PT. XYZ itself also has the own company policy where the expected total cost for the next period is Rp. 1.448.404.744,64. Therefore, it is recommended for PT. XYZ to use the P-Method as the company can save the total cost of Rp 38.582.771,08 as compared to the own company policy.

The total cost of inventory control for Meses Valentino by using the Q-Method (Continous Review System) is Rp. 706.834.925,44, while the total cost by using the P-Method is Rp. 706.838.098.59. Thus, it is recommended for PT. XYZ to use the Q-Method as the company can save the total cost of Rp. 43.216.539,68 as compared to the P-Method and the own company's policy that need the total cost of Rp. 750.051.465,12 for Meses Valentino.

The total cost of inventory control for Mercolade Dark 1 KG by using the Q-Method (Continous Review System) for is Rp. 1.027.572.800,21, while the total cost by using the P-Method is Rp. 1.027.572.536,58. PT. XYZ itself also has the own company policy where the expected total cost for the next period is Rp. 1.227.862.874,14. Therefore, it is recommended for PT. XYZ to use the P-Method as the company can save the total cost of Rp 200.290.337,5 as compared to the own company policy.

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