PREDICTION OF SUPPLEMENT SALES ON COVID 19 PANDEMIC USING LEAST SQUARE METHOD

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Keywords:
covid-19
least square,
sales prediction,
PT. Nutrimax.

ABSTRACT

During the current COVID-19 pandemic, everyone has started to care about their health. To avoid the COVID-19 virus, loyal people have used masks, face shields, hand sanitizers, and also take supplements to maintain their health and increase their immunity. PT. Nutrimax is a distributor company engaged in the sale of supplements in Kisaran. Sales of supplements have increased in sales every year. However, PT. Nutrimax has an unpredictable problem in controlling inventory. This is because the head of PT Nurimax's warehouse, at the end of each month, only manually counts the number of supplements left on the supplement shelf and warehouse. To avoid and minimize the loss rate of supplement sales in the future, PT. Nutrimax needs a sales forecasting activity. The Least Square method is a method used to estimate or forecast the future. In predicting the supply of data supplements used from January-June 2020 so that later predictions can be obtained in the form of a lot of stock supplements that must be provided by PT.Nutrimax during this COVID -19 pandemic. The final results of this study are expected to help the calculation process of forecasting future supplements easily, minimize errors, and produce accurate and fast forecasts.

INTRODUCTION

PT. Nutrimax is a private company in Kisaran which is engaged in selling supplements. During the COVID 19 pandemic, in addition to the community using masks, hand syringes, and face shields as personal protective equipment, the public also took several supplements to maintain health in the body. This company has increased sales of supplements for each month which are distributed to each pharmacy in Kisaran. However, this company has a problem in controlling unstable supplement inventory that has an impact on the distribution process. The amount of supplement inventory that is not in accordance with what is desired, the company will suffer a loss because it cannot meet customer demand [1].

With the increase in supplement sales, the marketer must plan and prepare for the supplement sale for the following month. Good planning is based on data and predictions that are expected to be quite precise. This prediction will help marketing in

making decisions in planning the number of sales of supplements to meet needs by using the least square method. Sales predictions are also carried out to be able to continue to meet customer needs as seen from the prediction results so that marketing can take into account the stock inventory during the COVID 19 pandemic [2].

Inventory of goods is one of the most important things in a company. This inventory serves to anticipate the availability of goods out of stock [3]. Sales forecasting is an estimate of the quantitative characteristics including the price of the market development of a product produced by the company at a certain time in the future [4].

The Least Square method is the most widely used method for determining data trend equations because this method produces mathematical results. In this case, it will be more devoted to discussing time series analysis with the least-squares method which is divided into two cases, namely the even data case and the odd data case. By using a supplement sales forecasting application, it will make it easier for marketing to calculate the increase in supplement sales [5].

In this study using 7 names of supplements with the largest use as experimental samples. Actual supplementary data is taken from January – July 2020. The following is the actual supplement data from January – July 2020 :

Table 1. Supplement Actual Data January - July 2020

No.	Supplement Name	Sales Year 2020							Total Sales
		Jan	Feb	March	April	May	June	July	
1	B-Complex	260	234	441	325	318	367	330	2275
2	Coflusin	322	407	412	321	503	524	563	3052
3	C+Plus	392	425	463	461	601	529	503	3374
4	BRP	217	221	216	287	629	315	117	2002
5	Viena	90	125	145	120	167	125	135	907
6	DHA Junior	201	187	310	221	230	200	177	1526
7	Mother Best	216	212	190	250	321	143	285	1617

METHOD

The Least Square method is one of the methods in the form of periodic series data or time series, which requires sales data in the past to forecast future sales so that the results can be determined. Least Square is a forecasting method used to see trends from time-series data [6]. Equation 1 is the equation for the Least Square method.

$$Y = a + bx \tag{1}$$

Information:
Y   : Total Sales
a dan b   : Coefficient
x / t   : Specified time in coded form

In determining the value of x / t, an alternative technique is often used by providing a score or code. In this case, the data was divided into two groups, namely:
a. Even data, then the t value score…,-5, -3, -1,1, 3, 5,…
b. Odd data, then the score is the t value: …,-3,-2, -1, 0, 1, 2, 3,…
Then to find the coefficients a and b, we look for equations 2 and 3.

$$a = \frac{\Sigma y}{n} \tag{2}$$

$$b = \frac{\Sigma xy}{\Sigma_x 2} \tag{3}$$

The prediction process using the Least Square method can be explained as follows:
1. Enter the actual sales data
2. Specifies the number n (sum period/month) and the number of data pairs used in forecasting as the base period.
3. Look for value X, X2, XY, ΣY, ΣXY, ΣX2 for basics looking for TrendsSpecifies the number n (sum period/month), and the number of data pairs used in forecasting as the base period.
4. Finding the value of a (the value of the Trend)
5. Calculates the value of b (change in value Trend) against X (time).
6. Determine the Trend equation will be used (Y = a + bX) [7].

RESULT AND DISCUSSION

To develop an analysis system that can predict the level of supplement sales at PT. Nutrimax uses the Least Square method. Forecasting using quantitative forecasting methods. The components used in this forecast are to supplement sales data from January 2020 to July 2020. The following is the calculation of each supplement to get the predictive results of supplement sales in August 2020.

1. Calculation of the predicted number sales of "B-Complex " Supplements

Table 2. Data on the number of B-Complex sales during January - July 2020

Period	Y (Sales Amount)	Packaging	X	X.Y	X2
January	260	Bottle	-3	-780	9
February	234	Bottle	-2	-468	4
March	441	Bottle	-1	-441	1
April	325	Bottle	0	0	0
May	318	Bottle	1	318	1
June	367	Bottle	2	734	4
July	330	Bottle	3	990	9
Σ	2275	-	0	353	28

$a = \sum y / n = 2275 / 7 = 325$
$b = \sum XY / \sum X^2 = 353 / 28 = 12,60$
$y = a + bX = 325 + 12,60 (4) = 375,4$
The prediction for August's sales of the B-Compelx is 375.4 bottles (376 bottles) or the same as 4 boxes.

2. Calculation of the predicted number sales of "Coflusin" Supplements

Table 3. Data on the number Coflusin sales during January - July 2020

Period	Y (Sales Amount)	Packaging	X	X.Y	X2
January	322	Bottle	-3	-966	9
February	407	Bottle	-2	-814	4
March	412	Bottle	-1	-412	1
April	321	Bottle	0	0	0
May	503	Bottle	1	503	1
June	524	Bottle	2	1048	4
July	563	Bottle	3	1689	9
$\sum$	3052	-	0	1048	28

$a = \sum y / n = 3052 / 7 = 436$
$b = \sum XY / \sum X^2 = 1048 / 28 = 37,42$
$y = a + bX = 436 + 37,42 (4) = 585,68$

The prediction for August sales of Coflusin is 585.68 bottles (586 bottles) or the same as 6 boxes.

3. Calculation of the predicted number sales of "C+Plus" Supplements

Table 4. Data on the number C+Plus sales during January - July 2020

Period	Y (Sales Amount)	Packaging	X	X.Y	X2
January	392	Bottle	-3	-1176	9
February	425	Bottle	-2	-850	4
March	463	Bottle	-1	-463	1
April	461	Bottle	0	0	0
May	601	Bottle	1	601	1
June	529	Bottle	2	1058	4
July	503	Bottle	3	1509	9
$\sum$	3374	-	0	679	28

$a = \sum y / n = 3374 / 7 = 482$
$b = \sum XY / \sum X^2 = 679 / 28 = 24,25$
$y = a + bX = 482 + 24,25 (4) = 579$
The sales prediction for C+Plus in August is 579 bottles or the same as 6 boxes.

Table 5. Prediction Results of Total Supplement Sales for August 2020

No.	Supplement Name	Actual Data	Forecasting
1.	B – Complex	330	376 Bottle
2.	Coflusin	563	586 Bottle
3.	C+Plus	503	579 Bottle
4.	BRP	117	329 Bottle
5.	Viena	135	152 Bottle
6.	DHA Junior	177	200 Bottle
7.	Mother Best	285	259 Bottle

The comparison graph between the actual data on supplement sales and the prediction data on supplement sales using the Least Square method is shown in Image 1.
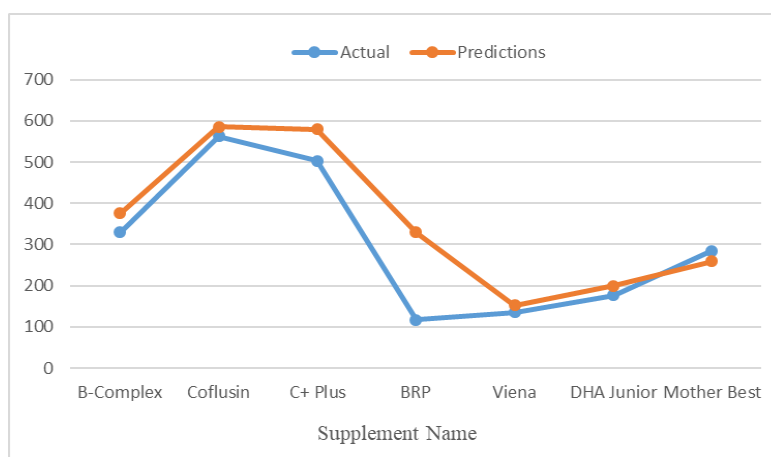

Image 1. Test Results of Supplement Sales Predictions

In Image 1, it can be seen that the name Coflusin supplement has a high level of need, namely 563 bottles, this is in following the results of the predictions made. The prediction results show that the need for Coflusin supplements in the future is high, namely 586 bottles.

CONCLUSION

Supplement sales prediction system in the future at PT. Nutrimax using the Least Square method, it can be concluded that with the supplement sales prediction system application at PT. Nutrimax is able to predict the future sales of supplements with predetermined criteria and is able to produce data reports on sales of supplements needed.

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