

## CHAPTER 4

### ANALYSIS AND DESIGN

#### 4.1 Analysis

This project uses statistical methods as processing sales data of PT. Asia Synergy Partner. With the following steps:

1. Sales data of PT. Asia Synergy partners are taken from January to December 2017, after which the data is entered into CSV via libre office by exporting it into CSV format.
2. Based on the sales of the export from PT. Asia Synergy Partner, by taking samples as follows:

Table 4.1: Inventory

Tanggal	Nama Barang	Qty
12-Jan-17	Oreo Cookies Blueberry	70
10-Feb-17	Oreo Cookies Blueberry	70
10-Feb-17	Oreo Cookies Blueberry	150
1-Mar-17	Oreo Cookies Blueberry	90
9-Mar-17	Oreo Cookies Blueberry	150
22-Mar-17	Oreo Cookies Blueberry	200
19-May-17	Oreo Cookies Blueberry	440
2-Jun-17	Oreo Cookies Blueberry	249
13-Nov-17	Oreo Cookies Blueberry	100

3. The first step uses the mean formula.

$$\bar{x} = \frac{X_1 + x_2 + x_3 \dots}{n}$$

with the results using the sample data is 168.77.

4. the second step uses the median formula.

$$median = \frac{n \text{ total}}{2}$$

with the results using the median sample data is 150.

5. the third step uses the mode formula.

search mode by calculating values that often appear and from the data above. With data that often comes out of the data sample is 70 with the amount of 2 data.

6. The fourth step looks for maximum value, by finding the largest data. Here the maximum data value is 440.
7. the fifth step is to look for a minimum value, by finding the lowest data. Here the minimum data value is 70.
8. the sixth step with the standard deviation formula.

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

with the results using a sample standard deviation data is 111.6.

9. the tenth step of making a diagram to determine the comparison of goods based on sub-items as follows.

The mini contains mini oreo chocolate, mini oreo vanilla and mini oreo strawberry. In Figure 4.1, the graph shows that the total sales from January to December of the mini Oreo Brown totaled 15,295, the mini Oreo vanilla amounted to 14,883, and the mini Oreo strawberry numbered 25. With these results, we can draw conclusions. If the lowest item can be used as a reference to reduce the amount of inventory for the following month.

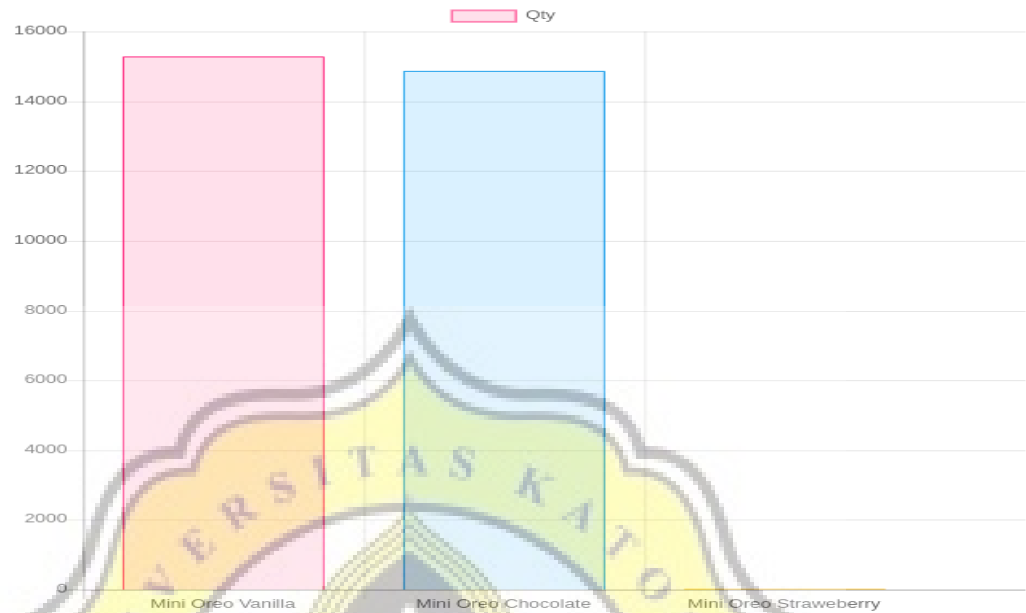


Illustration 4.1: Sales

10. Eleventh step by using a linear regression algorithm looking for regression coefficients.

$$B = \frac{n \cdot \sum XY}{n \cdot \sum X^2} = \frac{\sum \square \in X \cdot \sum \square \in Y}{(\sum X)^2}$$

11. twelfth step by looking for constants.

$$A = \frac{\sum \square \in Y - b \cdot \sum \square \in X}{n}$$

12. thirteenth step by looking for predictive calculations.

$$Y = a + b \cdot X$$

In figure 4.2 describes the data used from January to May to predict June.

Tabel Perhitungan :

X	Y	X <sup>2</sup>	X*Y
01	320	1	320
02	1208	4	2416
03	1687	9	5061
04	470	16	1880
05	393	25	1965
$\Sigma x : 15$	$\Sigma y : 4078$	$\Sigma x^2 : 55$	$\Sigma x*y : 11642$

Constanta (a) : 993.2  
 Persamaan Regresi (b) : -59.2

Hasil Perkiraan (Y) : 638

Hasil Peramalan Regresi Linear :

Bulan Ke	Hasil perkiraan
6	638

Illustration 4.2: Forecasting with Linear Regression

13. The fourteenth step is looking for RMSE.

$$RMSE = \sqrt{\frac{\sum (X - f)^2}{n}}$$

From the results of the trials above, it will perform an error level search using the Mean Squared Error method to measure the accuracy of a prediction. RMSE search results in figure 4.3

**Maen Square Error :**

Bulan Ke	Actual	Forecast	Error
01	320	934	376996
02	1208	874	111556
03	1687	815	760384
04	470	756	81796
05	393	697	92416
<b>6</b>	<b>393</b>	<b>638</b>	<b>60025</b>

**RMSE : 497.188**

Illustration 4.3: Looking for RMSE

## 4.2 Desain

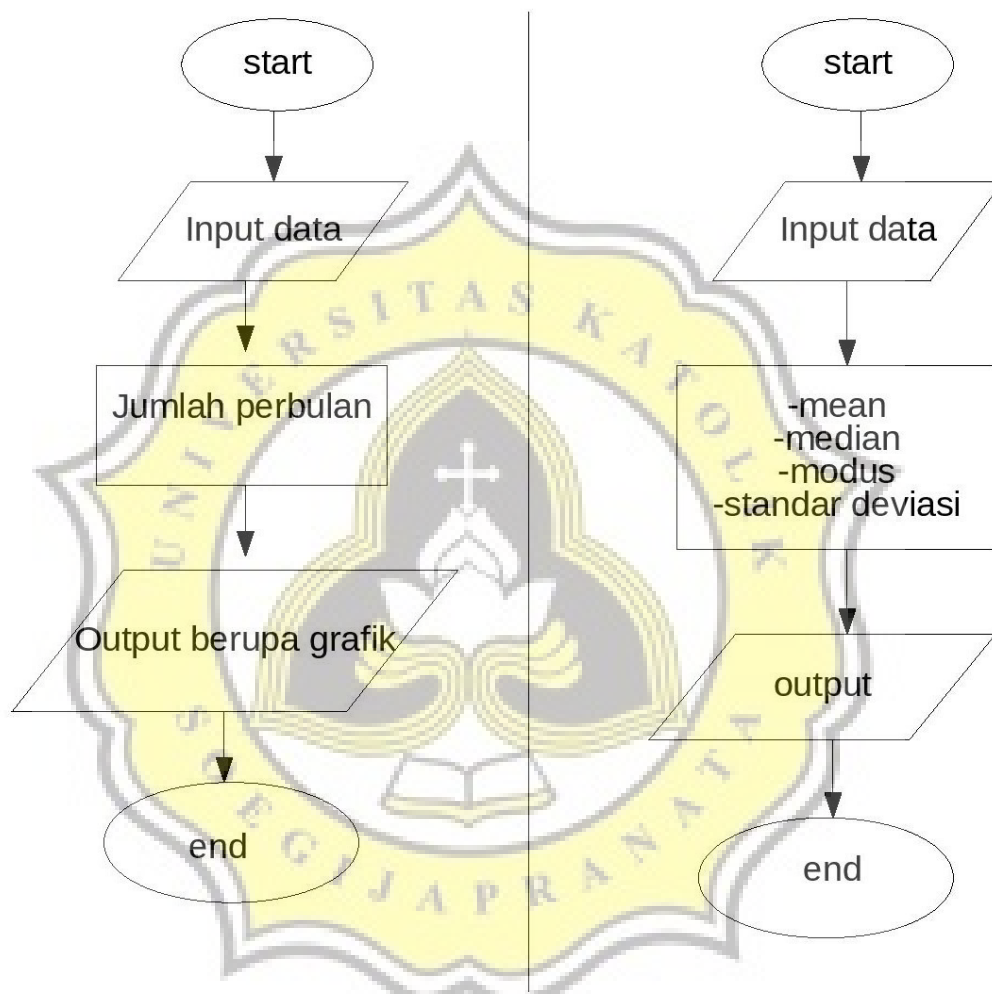


Illustration 4.4: Statistics

From the 4.4 flowchart above, we explain two statistical flows. In the left-hand flow of statistics, it explains how to add the whole item out. The first step is choosing the name of the item that will amount. The next step displays the number of items coming out from January to December. The last step displays a graph of sales from January to December. Charts make it easy to see sales per month, can find the most sales and at least. It is also easy to see the inventory of each month and become a reference for the availability of goods in the following month. In the right-hand statistical flow explain basic statistical formulas. With the first step

selecting items that will be processed using a statistical formula for a year. The second step shows mean, mode, median, and standard deviation values. The mean calculates the average sale of selected items. Mode displays the number of sales with the same value. Median to find out sales in the middle of the period. While the standard deviation to find out sales that are outside the standard.

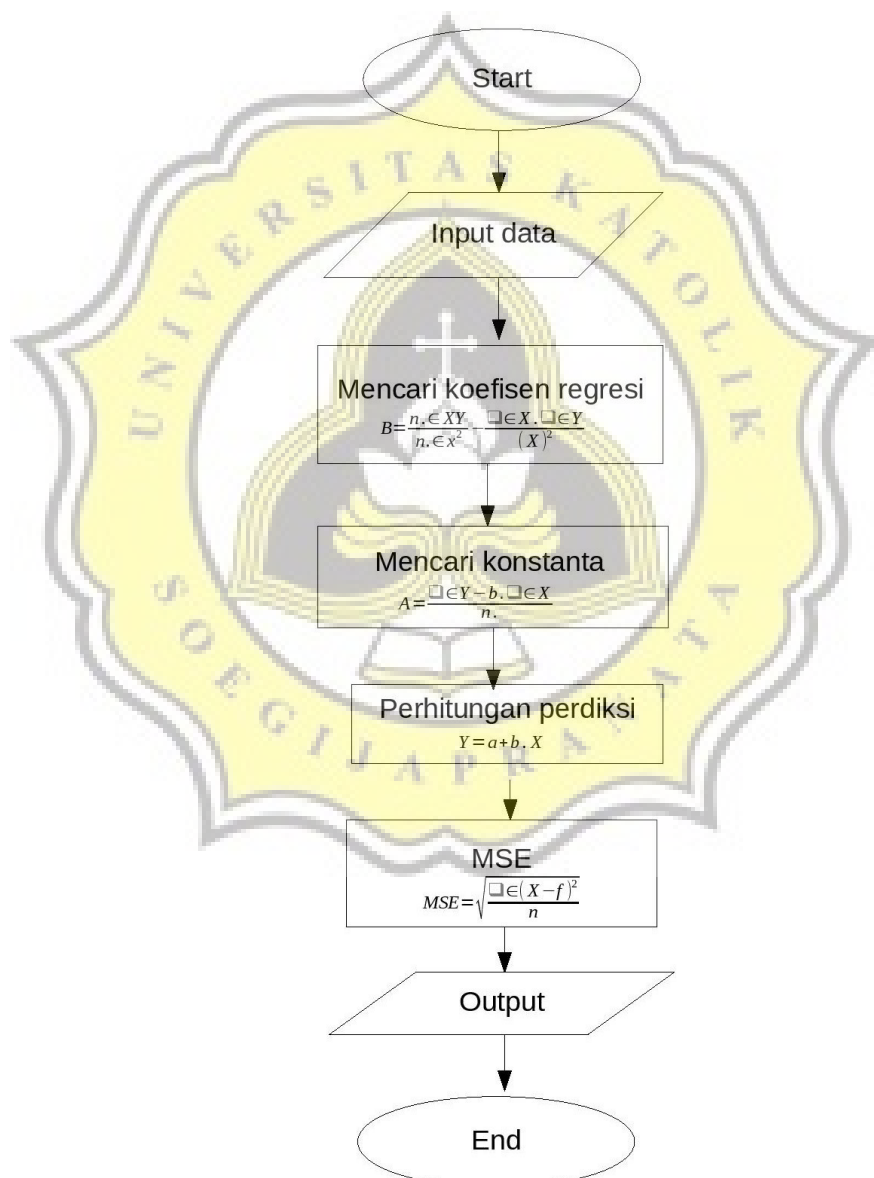


Illustration 4.5: Linear Regression

In figure 4.5 describes the first step to input data from the month and the name of the item to be predicted. The inputted month is a minimum of 5 months. The first step in processing data is by finding coefficients and constants. Coefficients and constants, are used to predict export sales. From the Prediction results, it contains sales in the following month. Example of looking for sales predictions in June. Then input from January to May. And enter sales items every month. Finally, calculate the accuracy of prediction results with the RMSE formula which serves to ensure the results of predictions with real data.

