

CHAPTER IV

DATA COLLECTING AND PROCESSING

4.1. Collecting Data

In this chapter, researcher will identify material requirement planing in Couvee Coffee. The historical data are used to collect data about sales that consist of sales demand. Historical data is needed for supporting data processing. Historical data of demand on coffee beans that will be used are accumulated in 10 month from August 2018 until May 2019. The data structure will be shown in the Table 4.1.

4.1.1. Forecasting

The researcher collected data in Couvee from August 2018 until May 2019, later the data are processed to forecast the demand in future. By forecasting the data, it will improve the amounts of coffee beans availability in Couvee. The author gets the data of coffee demand per cup that are shown in Table 4.1.

Table 4.1 Demand of coffee per cup

	Coffee Demand									
	Augu st '18	Septemb er '18	Octob er '18	Novemb er '18	Decemb er '19	Januar y '19	Februar y '19	Marc h '19	Apri l '19	Ma y '19
1st Wee k	521	259	456	719	1265	791	921	981	977	157 7
2nd Wee	530	268	510	748	831	825	917	973	125 7	135 1

k										
3rd										
Wee	529	242	540	762	857	852	949	947	135	147
k									1	9
4th										
Wee	476	227	558	788	889	883	957	1027	157	153
k									9	3

In Table 4.2, it is shown the 40 data of coffee demand per pack which is explained in detail from each week for 10 months.

Table 4.2 Demand of coffee per pack

Coffee Demand										
	Augu	Septemb	Octob	Novemb	Decemb	Januar	Februar	Marc	Apri	Ma
	st '18	er '18	er '18	er '18	er '19	y '19	y '19	h '19	l	y
									'19	'19
1st										
Wee	11	6	10	15	16	16	19	20	20	32
k										
2nd										
Wee	11	6	11	15	16	17	19	20	25	27
k										
3rd										
Wee	11	5	11	16	16	18	19	19	27	30
k										
4th										
Wee	10	5	12	16	16	18	20	21	32	31
k										

4.1.2 Data of Coffee Beans Demand

Data of coffee beans demand in Couvee is significantly raised month by month as shown by Table 4.1 and 4.2. The author determines to get the data because there are some problems with the coffee beans availability. The data above could become a source for the forecasting calculation.

Forecasting method that is chosen by the author is Simple Moving Average (SMA) and Linear Regression. The author wants to identify the forecasting of coffee beans demand for the next few months. After that from the Simple Moving Average (SMA) and Linear Regression calculation, it can be found the error from each calculation. Then the author could compare them and identify which has the lowest error that will be selected for the best method in this research.

4.2 Data Processing

The data processing already conducted by performing several calculations. Simple Moving Average (SMA) calculation will be shown in Table 4.3.

Table 4.3 Simple Moving Average Calculation

MA 2						
Month	Demand	Forecast	FE	CFE	FE ²	
1	41120					
2	19920					
3	41280	30520	10760	10760	115777600	
4	60340	30600	29740	40500	884467600	
5	76840	50810	26030	66530	677560900	SEE
6	67020	68590	-1570	64960	2464900	
7	74880	71930	2950	67910	8702500	
8	78560	70950	7610	75520	57912100	
9	103280	76720	26560	102080	705433600	
10	118800	90920	27880	129960	777294400	
Total			129960	558220	3229613600	23200.62

As shown in table 4.3 , the author can get the result of Forecast Error (FE) amount are 129960, total amount of Cumulative Forecast Error (CFE) is 558220, total amount of Square Forecast Error (FE²) is 3229613600 and total Standard Error Estimated (SEE) is 23200.62.

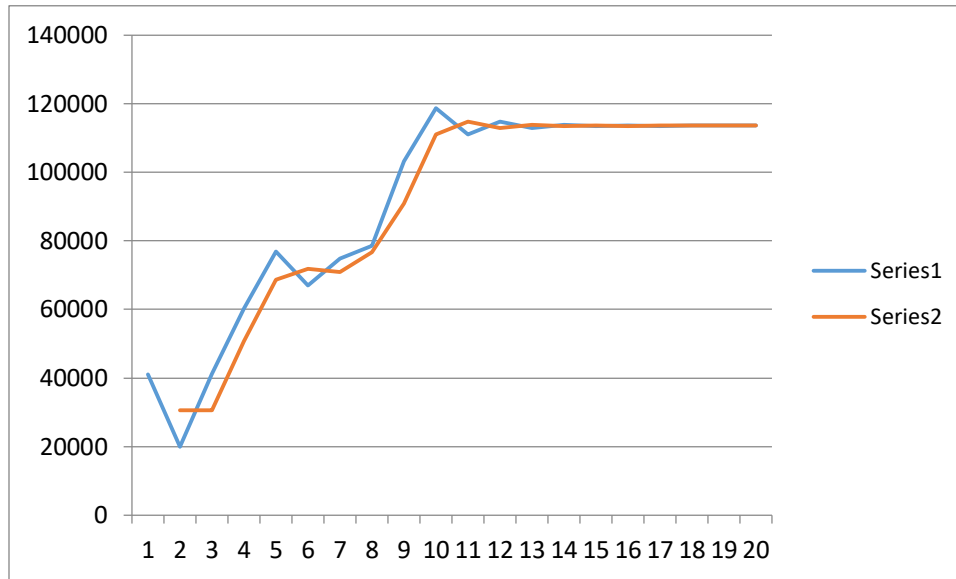


Figure 4.1 Graphic of Simple Moving Average Calculation

In Figure 4.1, it is shown the 10 data already calculated by Simple Moving Average (SMA) method and transforms the data into graphic. According to the Figure 4.1, the forecast and actual demand has equal result in period 4 and 6.

The processing data already calculated by the author. Linear Regression calculation will be shown in table 4.4.

Table 4.4 Linear Regression Calculation

Month	Demand	Forecast	Y(t)*t	t ²	FE	CFE	[y(t) - y'(t)] ²	SEE
1	41120	118298.6	41120	1	-77178.6	695.12	5956539385.10	SEE
2	19920	127406.7	39840	4	107487	-106792	11553399275.83	

3	41280	136514.9	123840	9	-	-202026	9069678559.22
4	60340	145623	241360	16	95234.9	-287309	7273186677.68
5	76840	154731.1	384200	25	-	-365201	6067023459.21
6	67020	163839.2	402120	36	77891.1	-462020	9373961361.41
7	74880	172947.3	524160	49	-	-560087	9617203174.68
8	78560	182055.5	628480	64	98067.3	-663583	10711310240.61
9	103280	191163.6	929520	81	-	-751466	7723523633.62
10	118800	200271.7	1188000	100	87883.6	-832938	6637637900.89
Total	55	682040	4502640	385	-	-	83983463668.24
					910812	4230727	102459.4

As shown in table 4.4, the period that author used is 10 periods and has total 55 periods. The result of Forecasting times period ($Y(t)*t$) is 4502640, the total amount of square of period is 385, then for Forecast Error (FE) amount are -910812, total amount of Cumulative Forecast Error (CFE) is -4230727, total amount Sum of Square Error ($[y(t) - y'(t)]^2$) is 83983463668.24 and total Standard Error Estimated (SEE) is 102459.4.

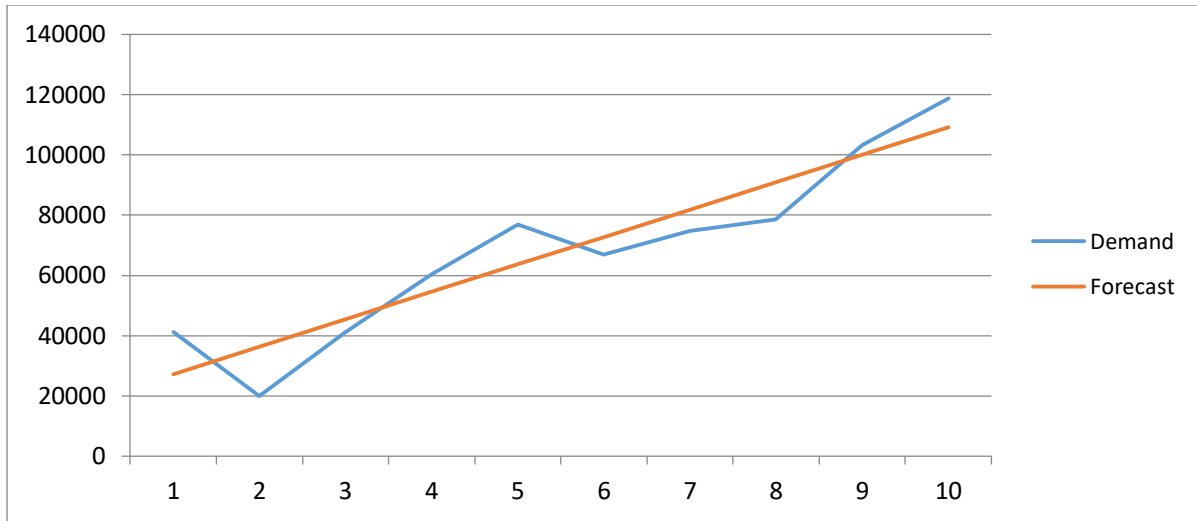


Figure 4.2 Graphic of Linear Regression Calculation

The author calculates it by using Linear Regression for 10 periods into graphic that shown in Figure 4.2. According to the Figure 4.2, the forecast and actual demand has equal result in period 3, 5, and 9.

Based on the analysis above, the author concludes that Simple Moving Average is the best method for this research, because the Simple Moving Average (SMA) method has the lowest amount of error compared to the Linear Regression. The error shows in Standard Error Estimated (SEE) column. Simple Moving Average (SMA) calculation has 23200.62, meanwhile Linear Regression has 102459.4.

1.2.1. Inventory Record

Inventory record is inventory data in the form of quantity and kind of inventory on hand inventory. Table 4.5 below is the list of inventory record:

Table 4.5 Inventory Record

Month	Item	Total
1	Coffee Bean	43000
2	Coffee Bean	22000
3	Coffee Bean	44000

Month	Item	Total
4	Coffee Bean	62000
5	Coffee Bean	64000
6	Coffee Bean	69000
7	Coffee Bean	77000
8	Coffee Bean	80000
9	Coffee Bean	104000
10	Coffee Bean	120000

From table 4.5 above, it can be seen that there are 10 items existed in the inventory record. The item of raw material above will be used as data for the next calculation of material requirement planning.

1.2.2 Lot for Lot

This section will calculate for material requirement planning of bean coffee. Calculation of material requirement planning in Couvee coffee will be shown in the figure below. This figure is describing about the gross requirement, on hand inventory, and net requirement of bean coffee. There is raw material that will be calculated to get gross material value.

Table 4.6 Material Requirement Planning of Lot For Lot of Coffee Beans

Item	Coffee Beans	Level	1											
Lot Size	Lot For Lot	Lead Time	1											
Safety Stock				0	1	2	3	4	5	6	7	8	9	10
Gross Requirement				114920	112980	113950	113465	113708	113586	113647	113617	113632	113624	
Schedule Receipts														
On Hand Inventory			118800	3880	3880	0	0	0	0	0	0	0	0	0
Net Requirement					109100	113950	113465	113708	113586	113647	113617	113632	113624	
Planned Order Receipts					109100	113950	113465	113708	113586	113647	113617	113632	113624	
Planned Order Release				109100	113950	113465	113708	113586	113647	113617	113632	113624		

Table 4.6 above shows the results of the calculation of MRP, where the optimal order lot sizing is by releasing orders rate around 113148. So that supplier should fulfill the demand of coffee beans of Couvee Coffee around 113148 gr or in pack around 114 pack per month.

4.2.3. Opportunity Cost Lost

Lost opportunity in cost because there are no stocks of coffee beans then cannot fulfill the demand. Strategy that applied in Couvee Coffee when they doesn't has stock is buy coffee beans accidental not to supplier but another roaster and will impact of cost monthly.

The opportunity loss of cost happened in Couvee Coffee, even only 1 day, could impact to the sales of coffee basis. The sales of coffee basis are around 40 – 60 cup per day. So, it could be estimated the cost that Couvee Coffee lost in 1 day, if the rate of sales coffee basis are 50 cup and the rate of price is around Rp. 20.000,- then the total about Rp. 1.000.000,- per day.

4.2.4. Key Performance Index

Key performance index of Couvee Coffee according to ratio productivity will be shown in figure 4.4 below.

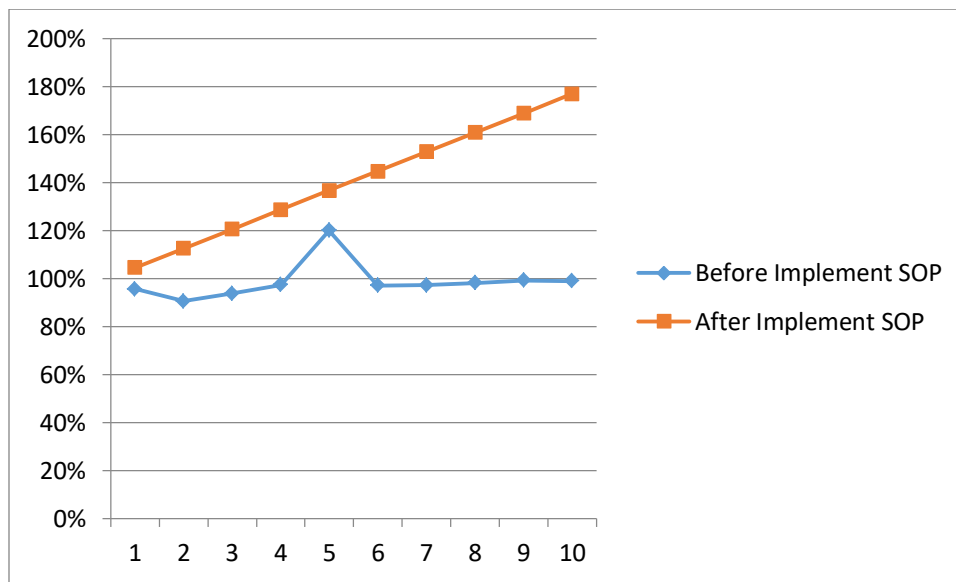


Figure 4.3 Compare Key Performance Index of Coffee Beans

From figure 4.3, it is shown the differences of performance of coffee beans in Couvee Coffee. The ratio of productivity coffee beans as the performance index in Couvee Coffee, figure

4.3 indicates the performance that always increasing each month after new SOP is implemented in Couvee Coffee.