FORECASTING SALES 3KG LPG USING SINGLE EXPONENTIAL SMOOTHING METHOD

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ABSTRACT

Forecasting is a very important in corporate strategy planning. Single Exponential Smoothing Method is one of the time series forecasting methods. The purpose of this study is the number of selling period can be subsequent profits can be sold to customers with appropriate obtained CV. Damayanti every month. This research uses selling data obtained by selling 3kg LPG for 7 years from january 2009 until December 2016. The result of this forecasting is done by Single Exponential Smoothing method with the result of error calculation and selected forecasting result which has minimum MAE. The alpha value is the smallest MAE result = 0.9: 2534.26 from the 3kg lpg sales forecast. The alpha value used affects the results of different forecasts. Then the result of the prediction of each base or region has a smoothing value that is setabil, up, down its value of forecasting results.

Keyword: *Forecasting, selling, Single Exponential Smoothing, Alpha, MAE.*

INTRODUCTION

Sales of a business run by CV Damayanti include 3kg lpg distributor. And there are areas of CV Damayanti covering areas of dukuh kec kec kecuk, lamongan (kec tripe, kec sukodadi, kec kedungpring), tuban rengel. All this time in CV Damayanti to estimate stock of goods using it manually, so it often happens between the stock and the demand is not appropriate. This can be overcome with forecasting system, one using Single exponential smoothing method. Single exponential smoothing is a calculation contained Or commonly referred to as Simple Exponential Smoothing, this method is used for short-term forecasting. The model assumes that the data fluctuates around a fixed mean value, with no consistent trend or growth pattern. Unlike Moving Average, Exponential Smoothing gives greater emphasis to the current time series through the use of a smoothing constant. Smoothing constants may range from 0 to 1. A value close to 1 provides the greatest emphasis on the current value whereas a value close to 0 gives emphasis to the previous data point. And the notion of exponential smoothing is a procedure that continuously improves forecasting by averaging (smoothing = smoothing) the past value of a time series data in an exponential way. Based on the description above can do penelitian with title "forecasting sales LPG 3kg in CV Damayanti using SINGLE EXPONENTIAL SMOOTHING". From the above background, the formulation of research is how to predict the sale of LPG 3kg from CV Damayanti to each base area. From the above background, the problem is limited: 3G of LPG sales data taken from CV Damayanti from 2015 until 2016 and delivery to the base in every area consisting of: Gersik kec. Hamlet, Lamongan kec. Babat, Lamongan kec. Sukodadi, Lamongan kec. Kedungpring, Tuban kec. Rengel. The method used to predict the sale of 3kg lpg with single exponential smoothing. 3kg LPG sales data forecast for 2016. The purpose of this final project is to make an application to predict the sale of 3kg LPG gas cylinders in 2016. The research method using this 3kg LPG sales forecasting are: Analysis, System Design, Implementation, Testing System , Care.

BASIC THEORY

Single Exponential Smoothing Method is a procedure that continuously improves forecasting by smoothing (smoothing) past values from time-expanding data in an exponential way.

$Ft + 1 = \alpha Xt + (1-\alpha)\ F$ 3.1

Information :

$Ft + 1$: forecast for period t + 1

: the real value of the period eke t

: Forecast for period t

Error = $(Xt- Ft)$ is a forecast error or forecast of error period eke t, with can say that forecast in the period to come is the previous prediction plus α (alpha) multiplied by mistakes forecast of previous period. Mean Absolute Error is the absolute average of predictor error, regardless of positive or negative sign.

MAE = Σ | $Xt- Ft$ | 3.2
Mean Squared Error is the mean of the forecast error.
MAE = Σ $(Xt-Ft)$ $2n$ 3.3

SYSTEM DESIGN

Forecasting sales of 3kg lpg, is a system that is able to forecast some number of selling lpg 3kg to each area in the coming months. By can predict the amount of selling then CV. Damayanti can maximize profit every month. This forecasting uses Single Exponential Smoothing method and the data used is 3kg lg amount of selling data in the previous month, which is used as the reference value to predict the production amount next month. Duration of 3kg lpg previous selling data is 7 years or 98 months. With data for 7 years expected results from the forecasting system to be more accurate.

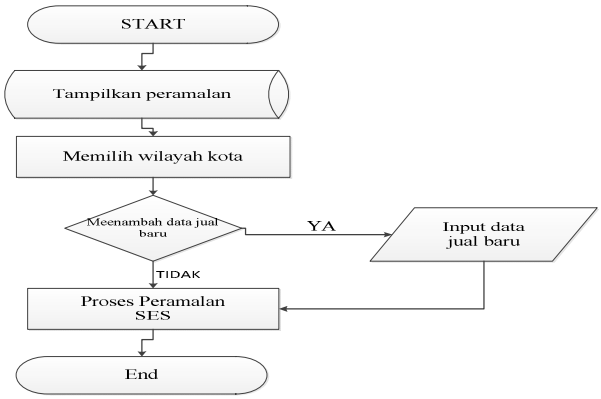

Figure 1 Flowchart Forecasting System

Draft Program Show
Forecast sales of 3kg lpg consists of several shows on all appearances on the final task form. Users should see or check into each select region in CV. Damayanti. Initial view of the image:

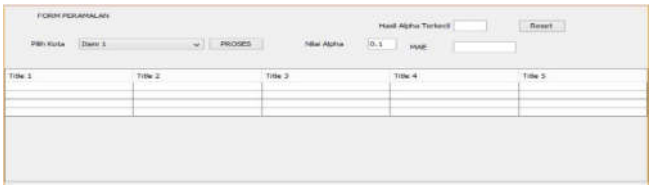

Figure 2 Show Final Form

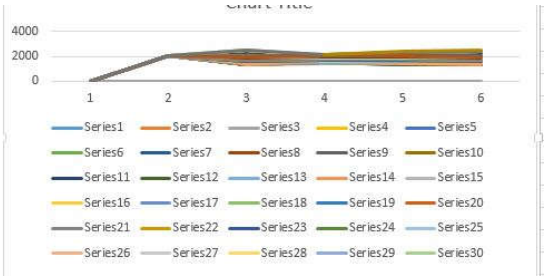

Figure 3 Show Graph Forecasting

SYSTEM IMPLEMENTATION

Calculating Existing Data Smoothing Value is a selling amount that has been done for the previous 7 years, then sought after smoothing value with equation 3.4. The required components are the real value of the previous sale amount and the previous smoothing value. The first calculation process has no previous smoothing value. Then the value of the previous smoothing is equal to the real value of the previous sale amount. In JAVA netbean programming language shown on the following source code fragment.

```
    public void getProses(String zdata){
        //model.fireTableStructureChanged();//.fireTableDataChanged();
      tabelbaru();

        try{
            Statement stat =(Statement)
                    koneksi.GetConnection().createStatement();
            String sql = "Select * from "+zdata;
            ResultSet res = stat.executeQuery(sql);

int hit=0;

            double ALPHA = 0.1;
            ALPHA = Float.parseFloat(txtAlpha.getText());

            double TotPemulusan=0;
            Object[] obj = null;

            while(res.next()){
                obj = new Object[5];

                szBulan = res.getString("bulan");
                obj[0] = szBulan;
                obj[1] = res.getString("tahun");
                jmljual2=res.getInt("jml_jual");
                obj[2] = jmljual2; //INISISIHPANKEVARIABEL A

int datajual = res.getInt("jml_jual");

      RAMALAN = ALPHA *  res.getInt("jml_jual")+(1-ALPHA)*res.getFloat("jml_pemulusan");

nextError = res.getInt("jml_jual")-RAMALAN;
nextRAMALAN = RAMALAN;
TotPemulusan=TotPemulusan+ Math.abs(nextError) ;
hit=hit+1;
obj[3] = nextRAMALAN;
obj[4] = nextError;
model.addRow(obj);
//PANTVARIABELLAIN
//B=A
}

            double TotError = TotPemulusan;

            RAMALAN2= ALPHA * jmljual2+(1-ALPHA)*RAMALAN;
            obj = new Object[5];
            obj[2] = "Ramal";
            obj[3] = RAMALAN2;
        model.addRow(obj);
        //obj = new Object[5];
            obj[0] = "Total Error";
            obj[2] = "";
            obj[3] = "";
            obj[4] = TotError;
        model.addRow(obj);
                    if (minError>TotError){
                minError = TotError;
                txtminErr.setText(String.valueOf(minError));
                mintxtAlpha.setText(String.valueOf(txtAlpha.getText()));
            }


        }catch(SQLException err){
            JOptionPane.showMessageDialog(this, err.getMessage());
        }

    }
```

Figure 4 Smoothing Value

Sourcode Description:

Error = Math.abs (jmljual2-RAMALAN)

jmljual2 = actual data

RAMALAN = ALPHA * res.getInt ("jml_jual") + (1-ALPHA) * res.getFloat ("num_passage")

ALPHA = α = 0.1

ALPHA = α = 0.5

ALPHA = α = 0.9

Jml_jual = truth data.

RESULTS AND DISCUSSION

Forecasting test has been forecasting sales of 3kg LPG made. The purpose of testing is to know whether the system has been created in accordance with what has been planned. From the test of this system can know the level of the system results predicted the number of sales in the next month.

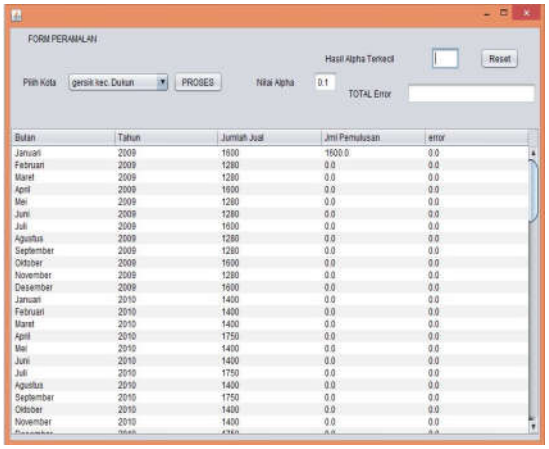

Figure 5 Forecasting Lpg 3KG

In testing the system that has been made, the system can run as expected. Once the system is running it is necessary to test the results of forecasting. Forecasting the number of sales made to predict the 5 areas of shaman dust smack, lamongan kec. Sukodadi, tuban kec. Rengel, lamongan kec. Kedungpring. To prove successful applying single exponential smoothing method then do manual counting at one of the dukun grit areas result of manual count compared with forecasting result in system of forecasting made.

From the data is done forecasting using Single Exponential Smoothing method to get the results of forecasting on the next method. Forecasting is done α = 0.1, α = 0.5, α = 0.9. the process of calculating the first smoothing value is equal to the second smoothing value. For the first smoothing value is equal to the value of the first sale data.

The calculation of the exponential smoothing value for the 2009 selling period data in the second dukun shaman smack with α = 0.1

$Ft + 1 = \alpha Xt + (1- \alpha)\ Ft$

$Ft + 1 = 0.1 * 1280 + (1 - 0.1) * 1600$

$Ft + 1 = 128.0 + 0.9 * 1600$

$Ft + 1 = 128.0 + 1440$

$Ft + 1 = 1568$

Calculation of exponential smoothing value for second selling period data with α = 0.5

$Ft + 1 = \alpha Xt + (1- \alpha)\ Ft$

$Ft + 1 = 0.5 * 1280 + (1 - 0.5) * 1600$

$Ft + 1 = 640.0 + 0.5 * 1600$

$Ft + 1 = 640.0 + 800.0$

$Ft + 1 = 1440$

Calculation of exponential smoothing value for second selling period data with α = 0.9

$Ft + 1 = \alpha Xt + (1- \alpha)\ Ft$

$Ft + 1 = 0.9 * 1280 + (1 - 0.9) * 1600$

$Ft + 1 = 1152.0 + 0.1 * 1600$

$Ft + 1 = 1152.0 + 160$

$Ft + 1 = 1312.0$

Calculation of error value for data of selling period with α = 0.1

Error = X_t - F_t

Error = 1280 - 128.0

Error = 1152

Calculation of error value for the data of the selling period with α = 0.5

Error = X_t - F_t

Error = 1280 - 640.0

Error = 640.0

Calculation of error value for data of selling period with α = 0.9

Error = X_t - F_t

Error = 1280 - 1152

Error = 128

From the results of January 2017 sales forecasting using Single Exponential Smoothing at table 6.5

SES Forecasting Results Table

no	per daerah	nilai pemulusan			Hasil peramalan
		0.1	0.5	0.9	
1	gersik kec. Dukun	2164.23	2390.24	2490	2490
2	lamongan kec. Sukodadi	2161.3	2283.68	2299.95	2299.95
3	lamongan kec. Babat	2583.74	2727.34	2794.95	2794.95
4	Tuban kec. Rengel	1639.15	1575.86	1523.42	1523.42
5	lamongan kec.kedungpring	1440.13	1782.51	1932.58	1932.58

From the results of the forecasting of the above instructions in the table on the analysis of these results. Analysis of forecasting results can know the selling data in January 2017 or the month that diperdiksi. Then it can know the value of smoothing which is almost closer than the actual value of the smallest Total Error.

no	nama setiap daerah	prediksi 2016
1	gersik kec. Dukun	hasil nilai naik
2	lamongan kec. Sukodadi	hasil nilai stabil
3	lamongan kec. Babat	hasil nilai naik
4	tuban kec. Rengel	hasil nilai turun
5	lamongan kec. Kedungpring	hasil nilai stabil

Table of Forecasting Analysis Results

CONCLUSION

From testing the forecast that has made some conclusions:

a. The result of forecasting is done using Single Exponential Smoothing method by calculating the result of total error and selected minimum result of MAE.
b. The alpha value used results from different forecasts. The results of smoothing on the number of selling in 2016 in the dukun shaman crunch has a prediction result that is rising, lamongan kec. Sukodadi predicted results are stable, lamongan kec. Predicted result boost is up, tuban kec.rengel prediction result that is down, and lamongan kec. Kedungpring predictions are stable then MAE results are down.

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