Forecasting the Number of Outpatient Patient Visits Using the ARIMA, SES And Holt-Winters Methods at XYZ Community Health Center

I D Sumitra1*, I Basri2
1,2Departemen Magister Sistem Informasi, Universitas Komputer Indonesia, Indonesia

Email: *irfan_dwiguna@unikom.ac.id

Abstract. The purpose of the research is to find out the visiting patient at the community health center. This research is Forecasting used the ARIMA method, Single Exponential Smoothing, and Holt-Winters, which are very suitable for processing data that is time series as in outpatient visits. The data from outpatients is patient visits for five years from January 2014 to December 2018 where outpatient data were taken from the total number of outpatient visits from visit data categories: General, Clinic, BPJS, Non-BPJS (SKM ), Non-BPJS (Gakinda) List of new patients and the list of patients who were then predicted the level of patient visits during the next two years, namely from January 2019 to December 2020. This study compared the best method among the three-time series methods. The forecast compared with actual data to see accuracy and find out which Forecast is best. The final results show that the MAPE value of the ARIMA method for patient visit data is worth 22.55%, the Single Exponential Smoothing method is worth 9.74%, and the Holt-Winters method is worth 7.90%. It can be said that the smallest error value is Holt-Winters from patient visit data with MAPE 7.90%, which is said to be an excellent Forecasting category by producing a total value of Forecast = 53894.2 with an average monthly = 2245.59 for Forecasting for the next two years. This monthly average result is used as a reference for the number of visitors who come for each month around 2245 people after that the last step taken is to make a strategic design using the SWOT analysis technique combined with prediction results using the Holt-Winters method in getting a conclusion that can make documents which is only around 2245 documents/person, especially outpatient data for problem solutions that occur at public health centers.

1. Introduction

As the number of human population increases as well as the state of the economy is getting more advanced, the people's awareness of health is increasing. This can increase the number of patient visits that if the community will visit for treatment. Therefore, there is a need for special attention from the health center to prepare for the fulfillment of facilities and supporting services, such as services in the outpatient registration area where registration documents must be adjusted with the number of patients available. If the documents are lacking or have not been made, there can be a long queue or a buildup of patients that causes inadequate service. For this reason, the public health center must carry out careful planning activities, one of which is by doing forecasting activities in order to overcome the problem. Public Health Center is a health unit that deals with health problems that exist in the local community environment [1].

Forecasting is the science used to predict something or value that has not yet happened and has the aim to predict something that will happen in the future [2].

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Forecasting is done using three methods with five years data and forecasted the next two years; the methods are Autoregressive Moving Average (ARIMA), Single Exponential Smoothing (SES), and Holt-Winters then forecasting results with selected methods combined with SWOT Analysis. The Analysis SWOT is an analysis of internal and external conditions of an organization, which will be used as a basis for designing strategies and work programs so that they can make decisions well [3]. The purpose of the research is to compare whether those methods are better to determine the number patient visited at community health center.

2. Methods

2.1 Time Series Method

The method of time series is the method that is used to predict the future using the data historically. In other words, the method of time series is trying to see what happened in a period specified and used the data period to predict it [4]. The followings are the time series methods:

2.1.1 Autoregressive Integrated Moving Average Method (ARIMA)

Autoregressive Integrated Moving Average (ARIMA) is often also called the method of cascading time BoxJenkins that use the data series time for forecasting that have validity and accuracy, which is very good [5].

The general model for the AR I MA process is a mixture of the order p (AR (p)), and the pure moving average order q (MA (q)) expressed in mathematical equations.

\[
X_t = \phi_1X_{t-1} + \phi_2X_{t-2} + \ldots + \phi_pX_{t-p} + \epsilon_t - \Theta_1\epsilon_{t-1} - \Theta_2\epsilon_{t-2} - \ldots - \Theta_q\epsilon_{t-q} \tag{1}
\]

Where:
- \(X_t\): data in the t-period
- \(\phi_p\): p-autoregressive parameter
- \(\Theta_q\): the moving average parameter
- \(\epsilon_t\): error value at time t

2.1.2 Single Exponential Smoothing Method

The Single Exponential Smoothing Method is a model of assuming data to fluctuate around a fixed mean value, without a trend or consistent growth pattern [6]. The formula for Simple exponential smoothing is as follows:

\[
F_{t+1} = \alpha \cdot X_t + (1 - \alpha) \cdot F_t \tag{2}
\]

Where:
- \(F_{t+1}\): forecasting at time \(t+1\)
- \(F_t\): forecasting for period t.
- \(X_t\): actual time series value
- \(\alpha\): leveling constant between 0 and 1

2.1.3 Holt-Winters Method

This method is used to overcome the problem of trends and seasonal indications from one time-series data, which is a combination of the \textit{Holt} method and the \textit{Winters} method [7].
\[ L_t = \alpha (Y_t - St - s) + (1 - \alpha) (L_t - 1 + bt - 1) \] ..............(3)
\[ bt = \beta (L_t - L_t - 1) + (1 - \beta) bt - 1 \] ..............(4)
\[ St = \gamma (Y_t - L_t) + (1 - \gamma) St - s \] ..............(5)
\[ Ft + m = Lt + bt m + St - s + m \] ..............(6)

Where:
\( s \) = seasonal length.
\( Ft + m \) = Forecasting for the next period \( m \).
\( Lt \) = Overall smoothing value.
\( bt \) = Trend component.
\( St \) = Seasonal component

2.2 Evaluation of forecasting results

Evaluation of forecasting results is used to determine the accuracy of forecasting results that have been made against the actual data.

2.2.1 Mean Square Error (MSE)

The method that is quite often used in evaluating forecasting results is to use the Mean Squared Error (MSE) method. By using the MSE, an error that there is showing how significant differences in the results of estimates with actual data [8]. MSE is the average difference squared between the value of the predicted and the observed.

\[ \text{MSE} = \frac{\sum \text{(Error forecasts)}^2}{n} \] ..................(7)

where :
\( n \) = number of data periods

2.2.2 Root Mean Square Error (RMSE)

Root Mean Square Error (RMSE) is used to find the accuracy of forecasting results with historical data using the formula [8]. The smaller the value produced, the better forecast results are done.

\[ \text{MSE} = \sqrt{\frac{\sum (y_t - \hat{y}_t)^n}{n}} \] ...........................(8)

2.2.3 Mean Absolute Deviation (MAD)

Mean Absolute Deviation is a measure of the overall forecasting error for a model. MAD value is calculated by taking the number of absolute values of forecasting error divided by the number of data periods (n) [8].

\[ \text{MAD} = \frac{\sum |\text{Actual Data} - \text{Forecasts}|}{n} \] ...........................(9)

where :
\( n \) = number of data periods

2.2.4 Mean Absolute Percentage Error (MAPE)

This method calculates the difference between the original data and forecasting data. The difference is absolute, then counted as a percentage of the original data. The percentage results are then obtained by the mean value [8].

\[ \text{PE} = \left( \frac{x_t - \hat{x}_t}{x_t} \right) \times 100 \] ...........................(10)

Middle Percentage Error (Mean Percentage Error)

\[ \text{MPE} = \frac{\sum |\text{PE}|}{n} \] ...........................(11)

Where:
3. Results and Discussion

3.1. Research data

This stage is the identification of the data obtained, in the data visit, the patient describes the number of patients visit that occurred in the time of 60 months or five years ranging from January 2014 to December 2018 as shown in Table 1. The data record of January 2014 until December 2018 amounted to as much as 60 data with details totaling 157,405 people. Furthermore, the data analyzed by using three methods, namely Methods ARIMA, exponential smoothing, and Holt-Winters.

| NO | MONTH     | 2014 | 2015 | 2016 | 2017 | 2018 |
|----|-----------|------|------|------|------|------|
| 1  | JANUARY   | 2236 | 2196 | 2457 | 3064 | 2932 |
| 2  | FEBRUARY  | 2285 | 2365 | 2690 | 2710 | 2540 |
| 3  | MARCH     | 2399 | 2502 | 2857 | 3097 | 2677 |
| 4  | APRIL     | 2734 | 2556 | 2849 | 2903 | 2896 |
| 5  | MAY       | 2576 | 2237 | 2789 | 3170 | 2748 |
| 6  | JUNE      | 2609 | 2190 | 2688 | 2233 | 1846 |
| 7  | JULY      | 2091 | 2120 | 2161 | 3257 | 2744 |
| 8  | AUGUST    | 2358 | 2157 | 3025 | 3281 | 2617 |
| 9  | SEPTEMBER | 2513 | 2217 | 2730 | 3056 | 2264 |
| 10 | OCTOBER   | 2441 | 2538 | 2846 | 3474 | 2877 |
| 11 | NOVEMBER  | 2190 | 2424 | 2953 | 3445 | 2550 |
| 12 | DECEMBER  | 2207 | 2565 | 2858 | 2793 | 2622 |

3.2. Research Stages

This study was conducted to determine the grooves or processes that occur in the processing of the data. For more details, it can be seen on the chart flowchart below (Figure 1):
As shown in Figure 1 above, the process that occurs is as follows:
1. Historical data collection for visitors from January 2014 to December 2018.
2. Identify data patterns shown by visitor data.
3. The forecasting the number of visits using the ARIMA, Single Exponential Smoothing, and Holt-Winters methods.
4. Calculate forecast results with actual data in 2018.
5. Comparing the smallest average value of visit data to the ARIMA, Single Exponential Smoothing, and Holt-Winters methods.
6. The results of the selected method used.

3.3. Forecasting Using the ARIMA Method

Table 2 shown the forecasting visit patients in January 2014 up to December 2018 in the can value Forecast ARIMA 0,1,1 during the year (2018) and then do test the data with the actual data.

### Table 2. ARIMA Forecast Results (0,1,1) Patient Visits

| Period | Actual | Forecast | Error | Absolute Value of Error | Square of Error | Absolute Values of Errors Divided by Actual Values |
|--------|--------|----------|-------|--------------------------|-----------------|-----------------------------------------------|
| T      | At     | Ft       | At -Ft | |                          |                 |                                               |
| 49     | 2932   | 3126.22  | -194.22| 194.22                   | 37721.4084      | 0.066241473                                   |
| 50     | 2540   | 3130.49  | -590.49| 590.49                   | 348678.4401     | 0.232476378                                   |
| 51     | 2677   | 3134.75  | -457.75| 457.75                   | 209535.0625     | 0.17099365                                   |
| 52     | 2896   | 3139.02  | -243.02| 243.02                   | 59058.7204      | 0.083915746                                  |
| 53     | 2748   | 3143.28  | -395.28| 395.28                   | 156246.2784     | 0.143842795                                  |
| 54     | 1846   | 3147.54  | -1301.54| 1301.54                  | 1694006.372     | 0.705059588                                  |
| 55     | 2744   | 3151.81  | -407.81| 407.81                   | 166308.9961     | 0.148618805                                  |
| 56     | 2617   | 3156.07  | -539.07| 539.07                   | 290596.4649     | 0.205987772                                  |
| 57     | 2264   | 3160.34  | -896.34| 896.34                   | 803425.3956     | 0.395909894                                  |
| 58     | 2877   | 3164.6   | -287.6 | 287.6                    | 82713.76        | 0.099965242                                  |
| 59     | 2550   | 3168.86  | -618.86| 618.86                   | 382987.6996     | 0.242690196                                  |
| 60     | 2622   | 3173.13  | -551.13| 551.13                   | 303744.2769     | 0.210194508                                  |
| Totals | 31313  | 37796.11 | -6483.11| 6483.11                  | 4535022.875     | 2.705896046                                  |
| Forecast ARIMA 0,1,1 | RMSE | MAD | MSE | MAPE |
|       | 614.751 | 540.259 | 377918.573 | 22.55% |

3.4. Forecasting Using the Single Exponential Smoothing Method

The forecasting visit patients in January 2014 up to December 2018 in the can value Forecast Single Exponential Smoothing Alpha (α: 0.2) during the year (2018) and then the early test of data with the actual data as shown in Table 3.

### Table 3. Results of Single Exponential Smoothing Forecast (0.2) Patient Visits

| Period | Actual | Forecast | Error | Absolute Value of Error | Square of Error | Absolute Values of Errors Divided by Actual Values |
|--------|--------|----------|-------|--------------------------|-----------------|-----------------------------------------------|
| T      | At     | Ft       | At -Ft | |                          |                 |                                               |
| 49     | 2932   | 3126.22  | -194.22| 194.22                   | 37721.4084      | 0.066241473                                   |
| 50     | 2540   | 3130.49  | -590.49| 590.49                   | 348678.4401     | 0.232476378                                   |
| 51     | 2677   | 3134.75  | -457.75| 457.75                   | 209535.0625     | 0.17099365                                   |
| 52     | 2896   | 3139.02  | -243.02| 243.02                   | 59058.7204      | 0.083915746                                  |
| 53     | 2748   | 3143.28  | -395.28| 395.28                   | 156246.2784     | 0.143842795                                  |
| 54     | 1846   | 3147.54  | -1301.54| 1301.54                  | 1694006.372     | 0.705059588                                  |
| 55     | 2744   | 3151.81  | -407.81| 407.81                   | 166308.9961     | 0.148618805                                  |
| 56     | 2617   | 3156.07  | -539.07| 539.07                   | 290596.4649     | 0.205987772                                  |
| 57     | 2264   | 3160.34  | -896.34| 896.34                   | 803425.3956     | 0.395909894                                  |
| 58     | 2877   | 3164.6   | -287.6 | 287.6                    | 82713.76        | 0.099965242                                  |
| 59     | 2550   | 3168.86  | -618.86| 618.86                   | 382987.6996     | 0.242690196                                  |
| 60     | 2622   | 3173.13  | -551.13| 551.13                   | 303744.2769     | 0.210194508                                  |
| Totals | 31313  | 37796.11 | -6483.11| 6483.11                  | 4535022.875     | 2.705896046                                  |
| Forecast ARIMA 0,1,1 | RMSE | MAD | MSE | MAPE |
|       | 614.751 | 540.259 | 377918.573 | 22.55% |
| Period | Actual | Forecast | Error | Absolute Value of Error | Square of Error | Absolute Values of Errors Divided by Actual Values. |
|--------|--------|----------|-------|-------------------------|----------------|-----------------------------------------------|
| T      | At     | Ft       | At-Ft | [At-Ft]                 | (At-Ft)^2       | (At-Ft)/At                                     |
| 49     | 2932   | 2932     | 0     | 0                       | 0              | 0                                             |
| 50     | 2540   | 2932     | -392  | 392                     | 153664         | 0.154330709                                   |
| 51     | 2677   | 2853.6   | -176.6| 176.6                   | 31187.56       | 0.065969369                                   |
| 52     | 2896   | 2818.28  | 77.72 | 77.72                   | 6040.3984      | 0.026837017                                   |
| 53     | 2748   | 2833.824 | -85.824| 85.824                  | 7365.758976    | 0.031231441                                   |
| 54     | 1846   | 2816.659 | -970.659| 970.659                 | 942179.2825    | 0.525817551                                   |
| 55     | 2744   | 2622.527 | 121.472| 121.472                 | 14755.60227    | 0.044268455                                   |
| 56     | 2617   | 2646.821 | -29.821| 29.821                  | 889.345039     | 0.011395448                                   |
| 57     | 2264   | 2640.857 | -376.857| 376.857                 | 142021.5841    | 0.166456498                                   |
| 58     | 2877   | 2565.486 | 311.513| 311.513                 | 97040.96701    | 0.108277369                                   |
| 59     | 2550   | 2672.778 | -77.7888| 77.7888                 | 6051.098441    | 0.030505414                                   |
| 60     | 2622   | 2612.231 | 9.76895| 9.76895                 | 95.43247545    | 0.003725765                                   |
| Totals | 31313  | 32902.07 | -1589.07| 1589.07                 | 1401291.028    | 1.168815035                                   |

Forecasting Using the Holt-Winters Method

The process of working on methods of Holt-Winters is almost equal to the ARIMA and SES, forecasting visit patients in January 2014 to December 2018. In the value Forecast Holt-Winters Alpha ($\alpha = 0.3$, $\beta = 0.1$, $\gamma = 0.1$) during the year (2018) and then do test the data with the actual data as shown in the Table 4.

Table 4. Holt-Winters Results $\alpha = 0.3$ $\beta = 0.1$ $\gamma = 0.1$ Patient Visits

| Period | Actual | Forecast | Error | Absolute Value of Error | Square of Error | Absolute Values of Errors Divided by Actual Values. |
|--------|--------|----------|-------|-------------------------|----------------|-----------------------------------------------|
| T      | At     | Ft       | At-Ft | [At-Ft]                 | (At-Ft)^2       | (At-Ft)/At                                     |
| 49     | 2932   | 3067.49  | -135.49| 135.49                  | 18357.5401     | 0.046210778                                   |
| 50     | 2540   | 3108.33  | -568.33| 568.33                  | 322998.9889    | 0.223751969                                   |
| 51     | 2677   | 3364.49  | -687.49| 687.49                  | 472642.5001    | 0.256813597                                   |
| 52     | 2896   | 3437.08  | -541.08| 541.08                  | 292767.5664    | 0.186837017                                   |
| 53     | 2748   | 3361.72  | -613.72| 613.72                  | 376652.2384    | 0.223333333                                   |
| 54     | 1846   | 3049.85  | -1203.85| 1203.85                 | 1449254.823    | 0.652139762                                   |
| 55     | 2744   | 3027.73  | -283.73| 283.73                  | 80502.7129     | 0.103400146                                   |
| 56     | 2617   | 3413.89  | -796.89| 796.89                  | 635033.6721    | 0.304505159                                   |
| 57     | 2264   | 3373.31  | -1073.31| 1073.31                 | 1151994.356    | 0.474076855                                   |
| 58     | 2877   | 3601.58  | -724.58| 724.58                  | 525016.1764    | 0.251852624                                   |
| 59     | 2550   | 3521.26  | -971.26| 971.26                  | 943345.9876    | 0.380886275                                   |
| 60     | 2622   | 3356.88  | -734.88| 734.88                  | 540048.6144    | 0.2802746                                    |
3.6. Model Analysis

Based on the three models, namely ARIMA, Single Exponential Smoothing, and Holt-Winters from Patient Visit data, by comparing the average error values of each model is shown in Table 5.

Table 5. Results of Calculation of Patient Visit Error values

| Method                      | MAPE Value | Information          |
|-----------------------------|------------|----------------------|
| ARIMA                       | 22.55%     | Fair/decent          |
| Single Exponential Smoothing| 9.74%      | Very Good            |
| Holt-Winters                 | 7.90%      | Very Good            |

In Table 5 above, it can be said to value error smallest is Holt-Winters of the MAPE 7.90%, which is said to be a category of forecasting were very good.

3.7. Forecast Analysis

On this stage, while (Forecast, Lower, Upper) during the 24 periods from January 2019 to December 2020 of all three methods respectively: ARIMA, Single Exponential Smoothing, and Holt-Winters, as well as calculated the amount of the total overall and the value of the average monthly of forecasting in the Table 6.

Table 6. Results Forecasting Patient Visits in the next 24 periods

| Period (p) | Forecast | Lower | Upper |
|------------|----------|-------|-------|
| A          | S        | H     | A     | S     | H     | A     | S     | H     |
| 61         | 2616.74  | 2624.46 | 2495.53 | 2036.87 | 2062.17 | 1967.51 | 3196.61 | 3186.74 | 3186.74 | 2951.55 |
| 62         | 2620.00  | 2624.46 | 2382.94 | 2015.86 | 2062.17 | 1873.28 | 3226.15 | 3186.74 | 3186.74 | 2892.60 |
| 63         | 2625.27  | 2624.46 | 2536.77 | 1995.86 | 2062.17 | 2006.72 | 3254.68 | 3186.74 | 3186.74 | 3066.82 |
| 64         | 2629.53  | 2624.46 | 2589.96 | 1976.76 | 2062.17 | 2037.07 | 3282.30 | 3186.74 | 3186.74 | 3142.85 |
| 65         | 2633.80  | 2624.46 | 2486.91 | 1958.47 | 2062.17 | 1909.03 | 3309.12 | 3186.74 | 3186.74 | 3064.80 |
| 66         | 2638.06  | 2624.46 | 2101.57 | 1940.91 | 2062.17 | 1496.79 | 3335.21 | 3186.74 | 3186.74 | 2706.34 |
| 67         | 2642.32  | 2624.46 | 2237.39 | 1924.01 | 2062.17 | 1604.08 | 3360.64 | 3186.74 | 3186.74 | 2870.70 |
| 68         | 2646.59  | 2624.46 | 2397.34 | 1907.72 | 2062.17 | 1734.05 | 3385.46 | 3186.74 | 3186.74 | 3060.62 |
| 69         | 2650.85  | 2624.46 | 2256.37 | 1891.98 | 2062.17 | 1561.86 | 3409.72 | 3186.74 | 3186.74 | 2950.88 |
| 70         | 2655.12  | 2624.46 | 2484.18 | 1876.76 | 2062.17 | 1757.56 | 3433.47 | 3186.74 | 3186.74 | 3211.01 |
| 71         | 2659.38  | 2624.46 | 2346.43 | 1862.01 | 2062.17 | 1586.34 | 3456.75 | 3186.74 | 3186.74 | 3106.52 |
| 72         | 2663.64  | 2624.46 | 2239.02 | 1847.71 | 2062.17 | 1444.83 | 3479.58 | 3186.74 | 3186.74 | 3033.21 |
| 73         | 2667.91  | 2624.46 | 2201.59 | 1833.82 | 2062.17 | 1372.57 | 3502.00 | 3186.74 | 3186.74 | 3030.60 |
| 74         | 2672.17  | 2624.46 | 2130.83 | 1820.32 | 2062.17 | 1266.35 | 3524.03 | 3186.74 | 3186.74 | 2995.31 |
| 75         | 2676.44  | 2624.46 | 2266.00 | 1807.18 | 2062.17 | 1365.48 | 3545.69 | 3186.74 | 3186.74 | 3166.51 |
| 76         | 2680.70  | 2624.46 | 2311.03 | 1794.38 | 2062.17 | 1373.98 | 3567.02 | 3186.74 | 3186.74 | 3248.07 |
| 77         | 2684.96  | 2624.46 | 2216.65 | 1781.90 | 2062.17 | 1242.63 | 3588.03 | 3186.74 | 3186.74 | 3190.68 |
| 78         | 2689.23  | 2624.46 | 1871.10 | 1769.73 | 2062.17 | 859.70  | 3608.72 | 3186.74 | 3186.74 | 2882.49 |
| 79         | 2693.49  | 2624.46 | 1989.76 | 1757.85 | 2062.17 | 940.64  | 3629.14 | 3186.74 | 3186.74 | 3038.88 |
| 80         | 2697.76  | 2624.46 | 2129.54 | 1746.24 | 2062.17 | 1042.38 | 3649.27 | 3186.74 | 3186.74 | 3216.69 |
| 81         | 2702.02  | 2624.46 | 2001.95 | 1734.89 | 2062.17 | 876.47  | 3669.15 | 3186.74 | 3186.74 | 3127.43 |
The results of forecasting get the value of Forecast, Lower, Upper from the three methods: ARIMA, Single Exponential Smoothing, and Holt-Winters. Nevertheless. The data to be used is Holt-Winters data because the data has been selected. Table 4.11, from the results of the patient visits, the Holt-Winters method has a total number (t) Forecast = 53894.2, Lower = 33967.7, Upper = 73820.8, and for the average monthly value with the formula (t / p), namely Forecast = 2245.59 , Lower = 1415.32 , Upper = 3075.86.

Figure 2. Results Forecasting For 2 Years Next

Figure 2 shows the graph forecast for 24 periods or 24 months for two years starting from January 2019 until December 2020 data pattern of methods ARIMA and Single Exponential Smoothing have a pattern of the same data that the pattern of the trend, while for the method of Holt-Winters has a pattern seasonal.

3.8. Interpretation of SWOT Analysis for development

In determining the policy of the development strategy of marketing that can be made of a matrix SWOT, here to the aggregate of four types of strategies are strategy SO (Strength Opportunities), the strategy WO (Weaknesses Opportunities ), the strategy ST (Strength Threat), and the strategy WT (Weakness Threat) as shown in Table 7.

| Table 7. SWOT Matrix |
|---------------------|
| **INTERNAL FACTORS** | Strength | Weakness |
| 1. Government support | 1. Lack of supporting services |
| 2. Health facilities | 2. Lack of promotion |
| 3. Health office branch | 3. Lack of disciplined service |
| **EXTERNAL FACTORS** | Opportunities | SO Strategy | WO Strategy |
1. Cooperation with BPJS
2. Interwoven collaboration
3. Number of health facilities
4. Forecast (Holt-Winters) Research Results Data

Treats
1. Exploiting opportunities
2. Competition between hospitals

ST Strategy
1. Dare to compete with the strength of your health facility (S2, T2)
2. Establish cooperation with other hospitals (S3, T2)

WT Strategy
1. Increase promotion of health facilities owned (W2, T1)
2. More prepared needs for supporting services in order to compete (W1, T2)

After having performed the analysis using the method of analysis of SWOT, the health center has been excellent in giving service. However, such strategies need to notices for patient’s data in the future. In order to create a new document, especially the patient’s data hospitalized.

4. Conclusion
The ARIMA, Single Exponential Smoothing, and Holt-Winters method can be said to be the smallest error value are Holt-Winters with a MAPE of 7.90%, which results in a total value of Forecast = 53894.2 with an average monthly = 2245.59 for forecasting for the next two years. This monthly average result is used as a reference for the number of visitors who come for each month around 2245 people. Subsequently, the results of the application using the Holt-Winters method are combined again with strategic design using business techniques SWOT analysis so that a conclusion can be obtained that can create a new document in the range of 2245 documents/person mainly outpatient data for problem solutions that occur at public health centers.

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