

THE APPLICATION OF THE TRIPLE EXPONENTIAL SMOOTHING METHOD IN THE PREDICTION OF WAREHOUSE INVENTORY

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ABSTRACT

Prediction is an attempt to predict or predict something that will happen in the future by utilizing various relevant information in previous (historical) times through a scientific method. One of the applications of prediction in the business world is to predict future warehouse inventory based on the company's usage in the previous period. Prediction (Forecasting) is very helpful in planning and making decisions in an activity. Analysis is very important in learning, because research becomes more precise and focused. The problem faced by the company at this time is that the company has difficulty predicting warehouse inventory in the next period because there is no system that can be used by the company to predict. This predictive information will be very useful for companies in the process of planning clean water production to customers. In overcoming the problems mentioned above, a system is needed that can process data on goods that go in and out of the warehouse every period to get a prediction of warehouse inventory for the next period. To get optimal forecasting results, one method that can be used is the Triple Exponential Smoothing method. Triple Exponential Smoothing Method This method is a forecast method proposed by Brown, using quadratic equations .

Keywords: Forecasting, Triple Exponential Smoothing, Warehouse Inventory

ABSTRAK

Prediksi adalah usaha menduga atau memperkirakan sesuatu yang akan terjadi di waktu mendatang dengan memanfaatkan berbagai informasi yang relevan pada waktu-waktu sebelumnya (historis) melalui suatu metode ilmiah. Penerapan prediksi dalam dunia bisnis salah satunya adalah untuk memprediksi persediaan gudang dimasa mendatang berdasarkan pemakaian perusahaan di periode sebelumnya. Prediksi (Forecasting) sangat membantu dalam perencanaan dan pengambilan keputusan dalam suatu aktivitas. Analisis sangat penting dalam pembelajaran, karna penelitian menjadi lebih tepat dan terarah. Permasalahan yang dihadapi oleh perusahaan saat ini adalah perusahaan kesulitan untuk memprediksi persediaan gudang di periode berikutnya karena belum adanya sistem yang dapat digunakan perusahaan untuk memprediksi. Informasi prediksi ini akan sangat bermanfaat bagi perusahaan dalam proses perencanaan produksi air bersih ke pelanggan. Dalam mengatasi permasalahan tersebut diatas dibutuhkan suatu sistem yang dapat mengolah data barang yang keluar masuk gudang setiap periodenya untuk mendapatkan prediksi persediaan gudang pada periode berikutnya. Untuk mendapatkan hasil peramalan yang optimal, maka salah satu metode yang dapat digunakan adalah metode Triple Exponential Smoothing. Metode Triple Exponential Smoothing Metode ini merupakan metode forecast yang dikemukakan oleh Brown, dengan menggunakan persamaan kuadrat).

Kata Kunci : Peramalan, Persediaan Gudang, Triple Exponential Smoothing

1. INTRODUCTION

Prediction is an attempt to predict or predict something that will happen in the future by utilizing various relevant information at previous times (historically) through a scientific method. [1]. Prediction application in the business world one of which is to predict future warehouse inventory based on the company's use in the previous period. Prediction (Forecasting) is very helpful in planning and decision making in an activity. Analysis is very important in learning, because research becomes more precise and focused [2].

PDAM Tirtanadi, North Sumatra Province is a local government agency that under and responsible to the Governor of North Sumatra. PDAM Tirtanadi North Sumatra Province has a duty to serve the people of Medan City and surrounding areas in the field of drinking water supply and waste water management. The problem faced by the company today is that it is difficult for the company to predict warehouse inventory in the next period because there is no system that can be used by the company to predict. This predictive information will be very useful for the company in the process of planning the production of clean water to customers.

In overcoming the problems mentioned above, a system is needed that can process data on goods that go in and out of the warehouse each period to get a prediction of warehouse inventory in the next period. To get optimal forecasting results, one of the methods that can be used is the Triple Exponential Smoothing method . Triple Exponential Smoothing Method This method is a forecast method proposed by Brown, with using quadratic equation [3]. Triple Exponential Smoothing is an extension of the technique Holt . two-parameter linear double exponential top seasonal by including third smoothing to adjust [4]

Recruitment is one of the most important steps in selecting HR (Human Resources). The objectives to be pursued based on the selection and recruitment process of Human

Resources are human resources who are professional and have the characteristics of noble behavior, are skilled and have a contribution [2]. This recruitment and selection process is the main step in determining whether an accepted HR is qualified and professional. Professional human resources certainly have a very influential impact and output, namely in the form of quality results or services. Quality products and services certainly have an impact on the welfare of organizations, individuals and even the wider community [5].

2. RESEARCH METHODS

In completing this research the author uses 2 (two) study methods, namely:

1. Field Study

This method is carried out by conducting a direct survey to the study site. The data collection techniques carried out are:

a. Observation

Namely by observing the management of warehouse inventory data at PT. PDAM Tirtanadi Belawan Branch.

b. Interview

In this section, a direct interview process with the Warehouse Section at PT. PDAM Tirtanadi Belawan Branch to obtain information such as: the current system running, and the weaknesses of the existing system so that it needs to be made a system the new one .

2. Library Research

The author conducts a literature study to obtain data related to writing from various reading sources such as manufacturing guide books or journals that discuss the concept of warehouse inventory prediction .

3. System Development Method

The system development in this study is described in the form of a fishbone diagram as shown in Figure 2.1 below:

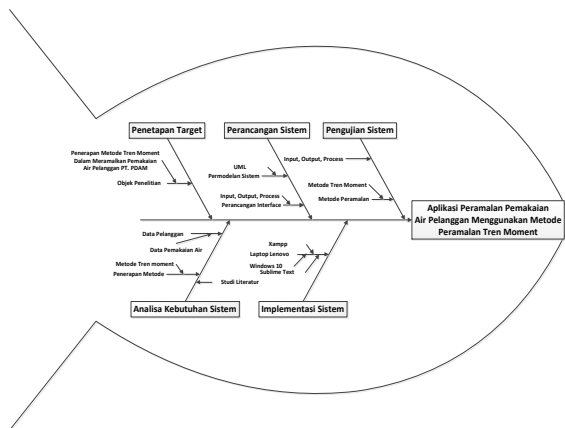


Figure 2.1 Fishbone Diagram System Development

System development using fishbone diagrams can be explained as follows:

- 1) **Target Setting**
This stage is the stage of setting research targets. The object of research is the application of the Triple Exponential Smoothing method in predicting warehouse inventory at PT. PDAM Tirtanadi Belawan City Branch .
- 2) **Needs Analysis**
Contains the things that must exist in the design results in order to be able to solve existing problems according to the objectives. The data needed in designing the system is inventory data while the method used is the method Triple Exponential Smoothing
- 3) **System planning**
This stage is the system modeling stage using UML modeling including use case diagrams, class diagrams, activity diagrams and sequence diagrams . After the system modeling is carried out, it is continued with the design of the display (layout) such as the input, process and output views.
- 4) **System Implementation**
This stage requires hardware and software according to system requirements with the following specifications:
 - a. **Hardware Specifications**
The hardware needed is a laptop with a specification of Intel(R) i5-5200U

@ 2.20 GHz Processor, 8 GB Ram, 500 GB Hard Drive .

- b. **Software Specification**
The required software includes: Windows 10, Xampp Apache Server

5) **System Test**

In this stage, the process of testing the decision support system that has been built is carried out whether the information produced is in accordance with the assessment data, criteria and application of the Triple Exponential Smoothing method . Tests are carried out on input data, output data and process .

6) **Finalization**

At this stage the application of the Triple Exponential Smoothing method in Predicting Warehouse Inventories at PT. PDAM Tirtanadi Belawan City Branch . It has passed the testing and validation stages so that it can be used at PT. PDAM Tirtanadi Belawan City Branch.

3. RESULTS AND DISCUSSION

3.1. Triple Exponential Smoothing Method

The obstacle that is often faced by the company is the absence of a system that can be used by the company to forecast warehouse inventory in the next period . This forecasting information will be very useful for the company in the prediction process of warehouse inventory that must be provided so that there is no shortage of warehouse inventory . In overcoming these problems, we need a system that can process warehouse inventory data every period to get warehouse inventory forecasting in the next period. To get optimal forecasting results, one method that can be used is the Triple Exponential Smoothing method . Method Triple Exponential Smoothing can produce forecasts for several periods in the future by considering the effects of random, trend and seasonality on the past data to be processed. This method is applied to a web - based application built using the PHP programming language and the MYSQL database . The final

result of this research is the company knows the prediction of warehouse inventory .

Using the Triple Exponential Smoothing method are:

Terms of value α and β use is :

Table 3.1. Value α and β

No	α	β
1	0.1	0.1
2	0.2	0.2
3	0.3	0.3
4	0.4	0.4
5	0.5	0.5
6	0.6	0.6
7	0.7	0.7
8	0.8	0.8
9	0.9	0.9

PT . PDAM Tirtanadi Belawan City Branch Exit item for 1 (one) year period January 2020 – December 2020 with data in Table 3.2.

1. Exponential Smoothing in January
 $S_1 = 140$
2. Exponential Smoothing in February
 $S_2 = (0.3) 159 + (1 - 0.3) 140$
 $S_2 = 47.7 + 98$
 $= 145.7$
3. Exponential Smoothing in March
 $S_3 = (0.3) 136 + (1 - 0.3) 145.7$
 $S_3 = 40.8 + 101.99$
 $= 142.79$
4. Exponential Smoothing in April
 $S_4 = (0.3) 157 + (1 - 0.3) 142.79$
 $S_4 = 47.1 + 99.95$
 $S_4 = 147.05$
5. Exponential Smoothing in May
 $S_5 = (0.3) 173 + (1 - 0.3) 147.05$
 $S_5 = 51.9 + 102.9$
 $S_5 = 154.8$
6. Exponential Smoothing in June
 $S_6 = (0.3) 131 + (1 - 0.3) 154.8$
 $S_6 = 39.3 + 108.36$
 $S_6 = 147.66$
7. Exponential Smoothing in July
 $S_7 = (0.3) 177 + (1 - 0.3) 147.66$
 $S_7 = 53.1 + 103.36$

Table 3.2. Item Data Out

Month	Exit item
January	140
February	159
March	136
April	157
May	173
June	131
July	177
August	188
September	154
October	179
November	180
December	160

Then it will forecast the 13th Period (January 2021) with the value $\alpha = 0.3$.

- ✓ The first stage of Single Exponential Smoothing: $S'_t = \alpha X_t + (1 - \alpha) S'_{t-1}$

8. Exponential Smoothing in August
 $S_7 = 156.46$
 $S_8 = (0.3) 188 + (1 - 0.3) 156.46$
 $S_8 = 56.4 + 109.52$
 $S_8 = 165.92$
9. Exponential Smoothing in September
 $S_9 = (0.3) 154 + (1 - 0.3) 165.92$
 $S_9 = 46.2 + 116.14$
 $S_9 = 162.34$
10. Exponential Smoothing in October
 $S_{10} = (0.3) 179 + (1 - 0.3) 162.34$
 $S_{10} = 53.7 + 113.63$
 $S_{10} = 167.33$
11. Exponential Smoothing in November
 $S_{11} = (0.3) 180 + (1 - 0.3) 167.33$
 $S_{11} = 54 + 117.13$
 $S_{11} = 171.13$
12. Exponential Smoothing in December
 $S_{12} = (0.3) 160 + (1 - 0.3) 171.13$
 $S_{12} = 48 + 119.79$
 $S_{12} = 167.79$

- ✓ The first stage of Double Exponential Smoothing: $S''_t = \alpha S'_t + (1 - \alpha) S''_{t-1}$

1. January 's Double Exponential Smoothing
 $S''1 = 140$
 2. February Double Exponential Smoothing
 $S''2 = (0.3) 145.7 + (1 - 0.3) 140$
 $S''2 = 43.71 + 98$
 $S''2 = 141.71$
 3. March Double Exponential Smoothing
 $S''3 = (0.3) 142.79 + (1 - 0.3) 141.71$
 $S''3 = 42.83 + 99.19$
 $S''3 = 142.02$
 4. April Double Exponential Smoothing
 $S''4 = (0.3) 147.05 + (1 - 0.3) 142.02$
 $S''4 = 44.11 + 99.41$
 $S''4 = 143.52$
 5. May Double Exponential Smoothing
 $S''5 = (0.3) 154.8 + (1 - 0.3) 143.52$
 $S''5 = 46.11 + 100.46$
 $S''5 = 146.9$
 6. June 's Double Exponential Smoothing
 $S''6 = (0.3) 147.66 + (1 - 0.3) 146.9$
 $S''6 = 44.9 + 102.83$
 $S''6 = 147.12$
 7. July Double Exponential Smoothing
 $S''7 = (0.3) 156.46 + (1 - 0.3) 147.12$
 $S''7 = 46.93 + 102.98$
 $S''7 = 149.91$
 8. August Double Exponential Smoothing
 $S''8 = (0.3) 165.92 + (1 - 0.3) 149.91$
 $S''8 = 49.77 + 104.93$
 $S''8 = 154.7$
 9. September Double Exponential Smoothing
 $S''9 = (0.3) 162.34 + (1 - 0.3) 154.7$
 $S''9 = 48.70 + 108.29$
 $S''9 = 156.99$
 10. October Double Exponential Smoothing
 $S''10 = (0.3) 167.33 + (1 - 0.3) 156.99$
 $S''10 = 50.19 + 109.89$
 $S''10 = 160.08$
 11. November Double Exponential Smoothing
 $S''11 = (0.3) 171.13 + (1 - 0.3) 160.08$
 $S''11 = 51.33 + 112.05$
 $S''11 = 163.38$
 12. December Double Exponential Smoothing
 $S''12 = (0.3) 167.79 + (1 - 0.3) 163.38$
 $S''12 = 50.33 + 114.36$
 $S''12 = 213.71$
- ✓ Triple Exponential Calculation Steps :
- $S_t = a S_t + (1 - a) S_{t-1}$
 1. Smoothing of trend values in January
 $S_t = 140$
 2. Smoothing of trend values in February
 $S_t = 0.3 (141.71) + 0.7(140)$
 $S_t = 42.51 + 98$
 $S_t = 140.51$
 3. Smoothing of trend values in March
 $S_t = 0.3 (142.02) + 0.7(140.51)$
 $S_t = 42.60 + 98.35$
 $S_t = 140.95$
 4. Smoothing of trend values in April
 $S_t = 0.3 (143.52) + 0.7(140.95)$
 $S_t = 43.05 + 98.66$
 $S_t = 141.71$
 5. Smoothing of trend values in May
 $S_t = 0.3 (146.9) + 0.7(141.71)$
 $S_t = 44.07 + 99.19$
 $S_t = 143.26$
 6. Smoothing of trend values in June
 $S_t = 0.3 (147.12) + 0.7(143.26)$
 $S_t = 44.13 + 100.28$
 $S_t = 144.41$
 7. Smoothing of trend values in July
 $S_t = 0.3 (149.91) + 0.7(144.41)$
 $S_t = 44.97 + 101.08$
 $S_t = 146.05$
 8. Smoothing of trend values in August
 $S_t = 0.3 (154.7) + 0.7(146.05)$
 $S_t = 46.41 + 102.23$
 $S_t = 148.64$
 9. Smoothing of trend values in September
 $S_t = 0.3 (156.99) + 0.7(148.64)$
 $S_t = 47.09 + 104.04$
 $S_t = 151.13$
 10. Smoothing of trend values in October
 $S_t = 0.3 (160.08) + 0.7(151.13)$
 $S_t = 48.02 + 105.79$
 $S_t = 153.81$
 11. Smoothing of trend values in November

- $$S_t = 0.3 (163.38) + 0.7(153.81)$$
- $$S_t = 49.01 + 107.66$$
- $$S_t = 156.67 _$$
12. Smoothing of trend values in December
- $$S_t = 0.3 (213.71) + 0.7(156.67)$$
- $$S_t = 64.11 + 109.66$$
- $$S_t = 173.77 _$$
- ✓ Steps for calculating the value of a : a t
= 3S t - 3S t + S t
1. Calculation of the value of a in January

$$a_1 = 3.140 - 3.140 + 140$$

$$a_1 = 140$$
 2. Calculation of the value of a in February

$$a_2 = 3(145.7) - 3(141.71) + 140.51$$

$$a_2 = 437.1 - 425.13 + 140.51$$

$$a_2 = 152.48$$
 3. Calculation of the value of a in March

$$a_3 = 3(142.79) - 3(142.02) + 140.95$$

$$a_3 = 428.37 - 426.06 + 140.95$$

$$a_3 = 143.26$$
 4. Calculation of the value of a in April

$$a_4 = 3(147.05) - 3(143.52) + 141.71$$

$$a_4 = 441.15 - 430.56 + 141.71$$

$$a_4 = 152.3$$
 5. Calculation of the value of a in May

$$a_5 = 3(154.8) - 3(146.9) + 143.26$$

$$a_5 = 464.4 - 440.7 + 143.26$$

$$a_5 = 166.96$$
 6. Calculation of the value of a in June

$$a_6 = 3(147.66) - 3(147.12) + 144.41$$

$$a_6 = 442.98 - 441.36 + 144.41$$

$$a_6 = 146.03$$
 7. Calculation of the value of a in July

$$a_7 = 3(156.46) - 3(149.91) + 146.05$$

$$a_7 = 469.38 - 449.73 + 146.05$$

$$a_7 = 165.7$$
 8. Calculation of the value of a in August

$$a_8 = 3(165.92) - 3(154.7) + 148.64$$

$$a_8 = 497.76 - 464.1 + 146.05$$

$$a_8 = 179.71$$
 9. Calculation of the value of a in September

$$a_9 = 3(162.34) - 3(156.99) + 151.13$$

$$a_9 = 487.02 - 470.97 + 151.13$$

$$a_9 = 167.18$$
10. Calculation of the value of a in October

$$a_{10} = 3(167.33) - 3(160.08) + 153.81$$

$$a_{10} = 501.99 - 480.24 + 153.81$$

$$a_{10} = 175.56$$
11. Calculation of the value of a in November

$$a_{11} = 3(171.13) - 3(163.38) + 156.67$$

$$a_{11} = 513.39 - 490.14 + 156.67$$

$$a_{11} = 179.92$$
12. Calculation of the value of a in December

$$a_{12} = 3(167.79) - 3(213.71) + 173.77$$

$$a_{12} = 503.37 - 641.13 + 173.77$$

$$a_{12} = 36.01$$
- ✓ Step calculation of the value of b : b t -
a / 2(1 - a)(6 - 5. a) S ' - (10 - 8. a) S ' -
(4 - 3. a) S t
1. Calculation of b1 value in January

$$b_1 = (0.3 / (2 \times 0.7)) \times ((6 - (5 \times 0.3)140) - (10 - (8 \times 0.3)140) + (4 - (3 \times 0.3)140))$$

$$b_1 = 0.214 \times ((-204) - (-326) + (-122))$$

$$b_1 = 0$$
 2. Calculation of b2 value in February

$$b_2 = (0.3 / (2 \times 0.7)) \times ((6 - (5 \times 0.3)145.7) - (10 - (8 \times 0.3)141.71) + (4 - (3 \times 0.3)140.51))$$

$$b_2 = 0.214 \times ((-212.55) - (-330.104) + (-122.459))$$

$$b_2 = -1.0496$$
 3. Calculation of b3 value in March

$$b_3 = (0.3 / (2 \times 0.7)) \times ((6 - (5 \times 0.3)142.79) - (10 - (8 \times 0.3)142.02) + (4 - (3 \times 0.3)140.95))$$

$$b_3 = 0.214 \times ((-208.185) - (-330.848) + (-122.855))$$

$$b_3 = -0.041$$
 4. Calculation of b4 value in April

$$b_4 = (0.3 / (2 \times 0.7)) \times ((6 - (5 \times 0.3)147.05) - (10 - (8 \times 0.3)143.52) + (4 - (3 \times 0.3)141.71))$$

$$b_4 = 0.214x((-214.575)-(-334.448))+(-123.539)$$

$$b_4 = -0.784$$

5. Calculation of b5 value in May

$$b_5 = (0.3/(2x0.7)x((6-(5*0.3)154.8)-(10-(8x0,3)146.9)+(4-(3x0.3)143.26))$$

$$b_5 = 0.214x((-226.2)-(-342.56))+(-124.934)$$

$$b_5 = -1.834$$

6. Calculation of b6 value in June

$$b_6 = (0.3/(2x0.7)x((6-(5*0.3)147.66)-(10-(8x0,3)147.12)+(4-(3x0.3)144.41))$$

$$b_6 = 0.214x((-215.49)-(-343.088))+(-125.969))$$

$$b_6 = 0.348$$

7. Calculation of b7 value in July

$$b_7 = (0.3/(2x0.7)x((6-(5*0.3)156.46)-(10-(8x0,3)149.91)+(43x0.3)146.05))$$

$$b_7 = 0.214x((-228.69)-(-349.784))+(-127.445))$$

$$b_7 = -1.359$$

8. Calculation of b8 value in August

$$b_8 = (0.3/(2x0.7)x((6-(5*0.3)165.92)-(10-(8x0,3)154.7)+(4-(3x0.3)148.64))$$

$$b_8 = 0.214x((-242.88)-(-361.28))+(-129.776))$$

$$b_8 = -2.434$$

9. Calculation of b9 value in September

$$b_9 = (0.3/(2x0.7)x((6-(5*0.3)162.34)-(10-(8x0,3)156.99)+(4-(3x0.3)151.13))$$

$$b_9 = 0.214x((-237.51)-(-366,776))+(-132,017))$$

$$b_9 = -0.588$$

10. Calculation of b10 value in October

$$b_{10} = (0.3/(2x0.7)x((6-(5*0.3)167.33)-(10-(8x0,3)160.08)+(4-(3x0.3)153.81))$$

$$b_{10} = 0.214x((-244.995)-(-374.192))+(-134.429))$$

$$b_{10} = -1.119$$

11. Calculation of b11 value in November

$$b_{11} = (0.3/(2x0.7)x((6-(5*0.3)171.13)-(10-(8x0,3)163.38)+(4-(3x0.3)156.67))$$

$$b_{11} = 0.214x((-250695)-(-382.112))+(-137.003))$$

$$b_{11} = -1.195$$

12. Calculation of b12 value in December

$$b_{12} = (0.3/(2x0.7)x((6-(5*0.3)167.79)-(10-(8x0,3)213.71)+(4-(3x0.3)173.77))$$

$$b_{12} = 0.214x((-245,685)-(-502,904))+(-152,393))$$

$$b_{12} = 22.432$$

✓ Steps for calculating the value of C : c t
 $a^2 / (1 - a)^2 (S' t S'' t S t)$

1. Calculation of C1 value in January

$$C_1 = 0.3^2 / (1 - 0.3)^2 * ((140 - (2 * 140) + 140))$$

$$C_1 = 0$$

2. Calculation of C2 value in February

$$C_2 = 0.3^2 / (1 - 0.3)^2 * ((142.79 - (2 * 141.71) + 140.51))$$

$$C_2 = -0.022$$

3. Calculation of the value of C3 in March

$$C_3 = 0.3^2 / (1 - 0.3)^2 * ((142.79 - (2 * 142.02) + 140.95))$$

$$C_3 = -0.055$$

4. Calculation of C4 value in April

$$C_4 = 0.3^2 / (1 - 0.3)^2 * ((147.05 - (2 * 143.52) + 141.71))$$

$$C_4 = 0.315$$

5. Calculation of the value of C5 in May

$$C_5 = 0.3^2 / (1 - 0.3)^2 * ((154.8 - (2 * 146.9) + 143.26))$$

$$C_5 = 0.782$$

6. Calculation of the value of C6 in June

$$C_6 = 0.3^2 / (1 - 0.3)^2 * ((147.66 - (2 * 147.12) + 144.41))$$

$$C_6 = -0.398$$

7. Calculation of the value of C7 in July

$$C_7 = 0.3^2 / (1 - 0.3)^2 * ((156.46 - (2 * 149.91) + 146.05))$$

$$C_7 = 0.494$$

8. Calculation of the value of C8 in August

$$C_8 = 0.3^2 / (1 - 0.3)^2 * ((165.92 - (2 * 154.7) + 148.64))$$

$$C_8 = 0.947$$

9. Calculation of the value of C9 in September

$$C_9 = 0.3^2 / (1 - 0.3)^2 * ((162.34 - (2 * 156.99) + 151.13))$$

$$C_9 = 0.093$$

10. Calculation of the value of C10 in October

$$C_{10} = 0.3^2 / (1 - 0.3)^2 * ((167.33 - (2 * 160.08) + 153.81))$$

$$C_{10} = 0.18$$

11. Calculation of the value of C11 in November

$$C_{11} = 0.3^2 / (1 - 0.3)^2 * ((171.13 - (2 * 163.38) + 156.67))$$

$$C_{11} = 0.191$$

12. Calculation of the value of C12 in December

$$C_{12} = 0.3^2 / (1 - 0.3)^2 * ((167.79 - (2 * 213.71) + 173.77))$$

Forecasting results goods out at PT. PDAM Tirtanadi Belawan City Branch for the 13th period is 50,557 or equal to 51 Warehouse Inventories.

1. Use Case Diagrams

In the preparation of a program required a data model in the form of a diagram that can explain a process flow of the system to be built. In writing this research the author uses the UML method in which the author applies a Use Case diagram . Then a Use Case diagram is drawn which can be seen in Figure 3.1

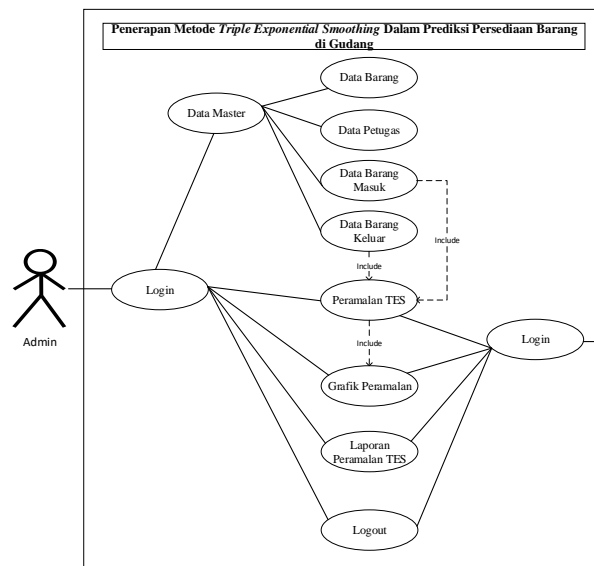


Figure 3.1 Use Case Diagram

2. Class Diagram

Class Diagram is a specification that when instantiated will produce an object and is the core of object-oriented development and

$$C_{12} = -15,770$$

Forecasting results for January are:

$$F_{t+m} = a_t + b_t(1) + c_t(1)$$

$$= 36.01 + 22,432(1) + (1/2 * -15,770(1))$$

$$= 36.01 + 22.432 + (-7.885)$$

$$= 50,557$$

design. Class describes the state (attribute/property) of a system, as well as offering services to manipulate the state can be seen in Figure 3.2

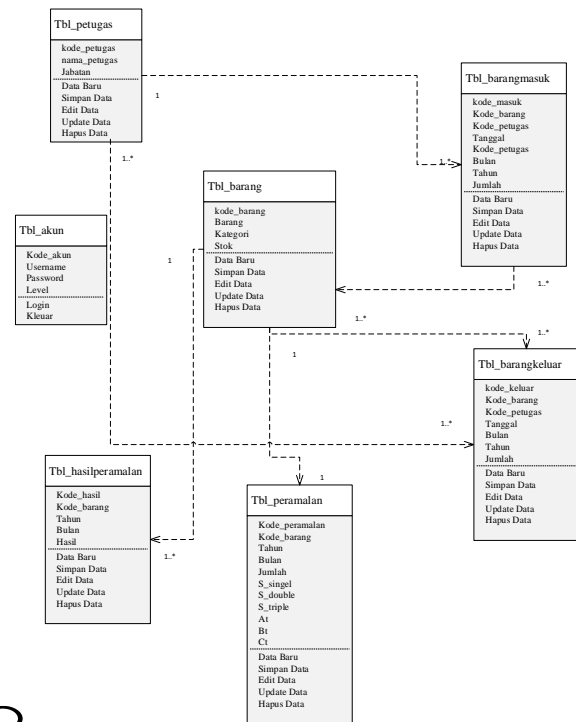


Figure 3.2 Class Diagram

3.2. Result Display

1. Display Item Data Form

This view is a display of goods that serves to find out the goods. The image display of the goods form is shown in Figure 3.3 :

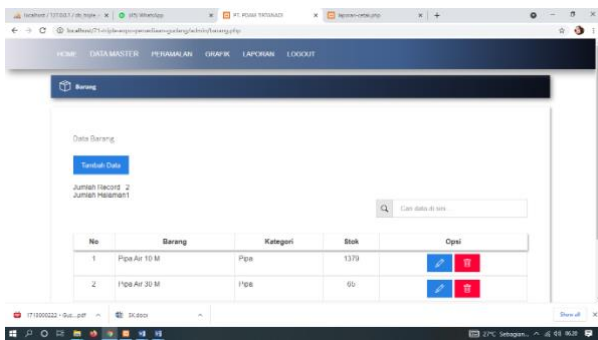


Figure 3.3 Display of Goods Data Form

2. Display of Goods Input Data Form

This display is a display of input goods that serves to determine the calculation of input goods. Image display form Item input is shown in Figure 3.4:

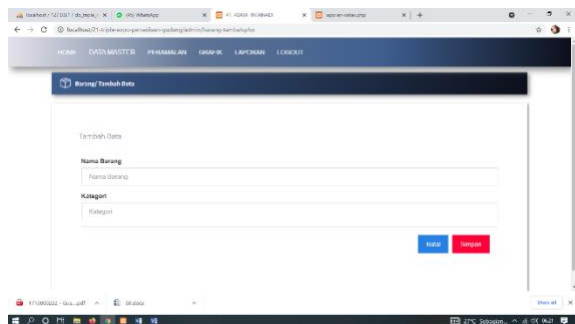


Figure 3.4 Display of Goods Input Data Form

3. Display of Incoming Goods Data Form

This view is a display of the incoming goods data form which serves to display the data of incoming goods. The following is an image of the incoming goods data form shown in 3.5:

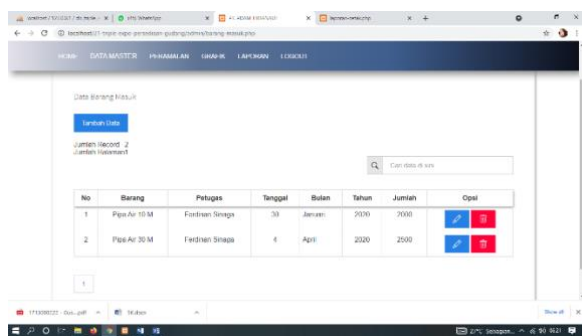


Figure 3.5 Display of Incoming Goods Data Form

4. Display of Data Input Form for Incoming Goods

This view is a display of the incoming goods data input form which serves to fill in the incoming goods data. The following is a picture of the incoming goods data input form shown in 3.6:

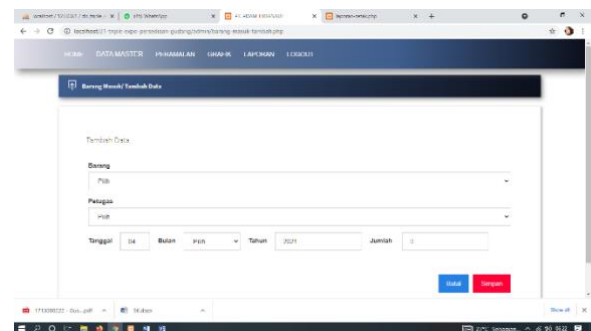


Figure 3.6 Display of Data Input Form for Incoming Goods

5. Display of Outgoing Goods Data Form

This view is a display of the outgoing goods data form which serves to display the data of outgoing goods. The following is a picture of the outgoing goods data form shown at 3.7 :

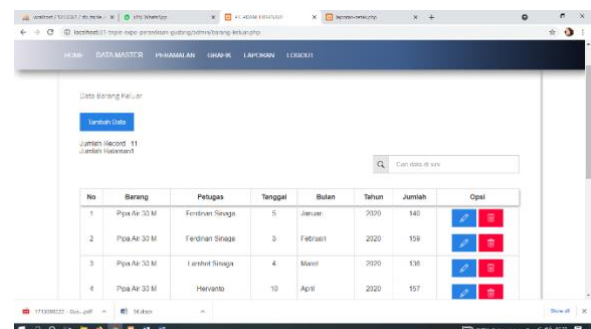


Figure 3.7 Display of Outgoing Goods Data Form

6. Display of Outgoing Goods Data Input Form

This display is a display of the data input form for goods out which serves to fill in the data of outgoing goods. The following is a picture of the outgoing goods data input form shown at 3.8 :

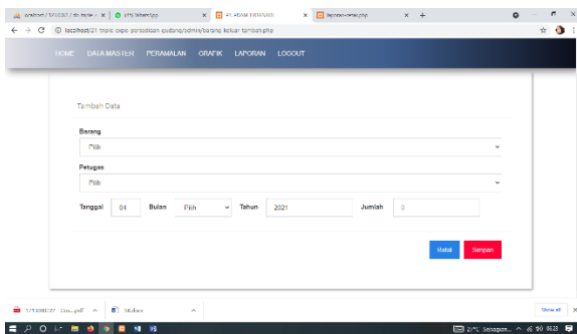


Figure 3.8 Display of Item Data Input Form Out

4. CONCLUSION

From the results of the author's research, several conclusions can be drawn, including:

1. PDAM Tirtanadi can reduce the error rate in determining the prediction of the inventory of goods in the warehouse and making reports on the inventory of goods in the warehouse can make it easier and faster for users to collect inventory data in the warehouse .
2. With this system designed using the Triple Exponential Smoothing method using PHP applications and MySQL databases.
3. The system designed can assist companies in overcoming the constraints of forecasting the inventory of goods in the warehouse in the future period.

5. SUGGESTIONS

Based on the results of the research and the conclusions described above, there are several suggestions that can be given. The suggestions that can be put forward are as follows:

1. The system that is built is expected in the future to be developed again for online customers .
2. It is hoped that if there is damage to the server the data will not be deleted.
3. It is hoped that in the future the company will be ready to stock up on goods in the warehouse online so that consumers are more interested.

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