ANALYSIS OF BLOOD STOCK ON RED CROSS SURABAYA AS DECISION SUPPORT USING SEMI AVERAGE METHOD

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Analysis of Blood Stock on Red Cross Surabaya as Decision Support Using Semi Average Method

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***Abstract*—The purpose of this research is to analyze on the stock of blood at the Red Cross us decision support in Surabaya determining procurement of donor activities program. This research uses data stock of blood from the Red Cross in Surabaya. There are two types of data, data activities and regular blood stock data. The data analyzed in the time series using spring average method. We found that the blood stock trends of activities has significant enough increase compared to taking on a regular basis. For decision makers can use this result to hold donor procurement activities at any given time so that blood stocks safe.**

Keywords—analysis; semi-average method; blood stock;

I. INTRODUCTION

Red Cross Indonesia is a social organization that is trusted to manage donor blood, blood distribution. On his work is divided into several regions. Surabaya is one of the regions designated to represent the Indonesia Red Cross.

Blood donor unit at Red Cross blood trying to serve the demand in Surabaya at any time in a full year. However, the Ministry will be maximized if blood stock in conditions of safety. In fact, there is a lack of stock and surplus stock at any given time. In doing so, the parties making the Red Cross must perform a series of activities to attract volunteer donors or donors outside the so-called regular donors. The main problem arises when, decision makers in the Red Cross has not been able to determine with certainty the time of implementation of the procurement activities of donors.

The making of live blood bank information systems to accelerate any prospective blood donors was performed by [1]. The research created a web connected systems are massive to community charities. So will accelerate reach information about blood donation requests from PMI to charities. However this is still a constraint to be implemented because it has not been optimal regarding the management of the admin and provider as well as the lack of a community of charities listed.

One of the problems on charities is a condition in itself, worthy charities or not do the donor. In the database of charities of the Red Cross there is information that can be maximized to get potential donors data using Fuzzy Logic doves and Tahani by [2]. Data base so that prospective donors may be made.

In addition, the demand for blood donors about to cross merahpun did not escape into the spotlight. By [3] make research to get the pattern of blood on the request of the Red Cross.

On research [4] create a datawarehouse to bridge any purpose in making strategies of Red Cross blood donation processing. It is like being the answer to the problems in the Red Cross. However this system even became a turning point for bridging all the research on the problems in the Red Cross in the days to come.

However, fundamental things and there is still a problem on decision makers in making strategic issues to manage the blood and blood donors. In addition, according to [5] activities such as blood transfusion is also quite important to held..

Therefore in this study examines and analyzes about the stock of blood on a voluntary basis with the stock of blood resulting from the procurement activities of the blood donor. This is a new approach, considering the data stock of blood at the Red Cross only as passive data that have yet to generate meaningful benefits.

Blood stock data presented on the website of the Red Cross blood sotk regular zoned Surabaya, because blood is obtained from the donors who donate their directly. Whereas the other blood stocks data derived from procurement activities outside of the Red Cross.

A few methods to help decision makers one PREACO [6]-based optimization and there based statistics [7]. The stock of the data analyzed using regular analysis with semi-empirical method average. This statistical method is good enough to know the trends of a data. This is very needed by decision makers. By reading this, blood stock trends will make a strategic way in maintaining a stock of blood at the Red Cross in Surabaya remained safe.

This data is obtained from Surabaya and Red Cross data from their site. The data is divided into two parts, namely the data stock of regular blood and blood stock data activities. Both will be analysed using the method of semi-average to compare trends that are formed.

Trend that formed the new findings and this will be a party decision support decision makers in making strategic planning.

As for the contribution of this research is the uniqueness of the problem and how to approach a solution that hasn't been done by other researchers.

On this research will be presented following the research background of the problem and the solution in the chapter Introduction, discussion of settlement method in chapter semi-average, the next chapter describes the experiment as well as the final conclusion.

II. Semi-Average Method

A. Periodic Data

Periodic data is data collected from time to time. The result of this data can be used to describe the progression of an activity. In addition the data intervals can be used to know the patterns and consequences of activities towards other activities, such as the increase in the cost of advertising is there any effect on the amount of income a trade.

Periodical data analysis generally consists of descriptions of the components that mathematically influenced on the results of the activities reflected in the fluctuations. This makes periodic data (table I) can be used as a basis of creation of trend lines.

TABLE I. Example Of Periodic Data

Years	Month							
	1	2	3	4	5	6	7	8
1995	2	1	3	2	2	3	2	1
1996	3	2	2	2	2	3	1	2

Mathematically, a periodic data are given the symbol of Y_1, Y_2, ... Y_i, ... Yn as the value of variable Y (i.e. production, prices, exports and other).

Y_1 = data on the first time,

Y_2 = data at the time of the second,

Y_i = data at time i, and

Y_n = data at time n, where

Y is a function of time Y = f (X), where X is the time.

Calculation and analysis of periodical data follow the equation of a line as follows:

$$Y = a + bX \quad (1)$$

B. Semi-Average Method

One of the periodic analysis method that is often used is semi-average method. Some still use this method to resolve the problem of periodic data analysis.

Semi-average Method has the following steps:

1. periodic Data are grouped into two, each section should have the same amount of data. For example the data amounted to 10 then the data every part amounted to 5, if there are 8 data then the data are grouped into 2 members each have 4 pieces of data.

If the data is odd then one data must be eliminated, that is in the middle of data. If the data is numbered 9 and each section is divided into 4 equal big.

2. Each piece of data, the results of calculating the average rating is sought as ordinat.

3. The next step gets an absis of point. Absis point should be selected from the variable X which is the location of the data is in the middle on each part (of the year or time in the middle).

6 years of data: $X_1, X_2, X_3, X_4, X_5, X_6, X_7 = \{0, 1, 2, 3, 4, 5, 6\}$

1.5 and 5.5 is an absis (the first an absis is located between the second and third year of data as well as the absis both located between the sixth and seventh year of data).

4. The point coordinates of the calculation and the position of the data inserted into (1), to calculate and obtain the values of *a* and *b*.

III. Experiment

This test is intended to get trend data respectively in the regular donors and donor activities as well as get his mathematical formulation in the form of the equation of a line. The data are divided in two parts of the US the great us either regular or activities. Semi-average determines the value of the's *a* and *b*. data parameters on this blood type is the amount of stock of any regular activity or date. The coefficients used in the fulfillment of the equation of a line (1).

With the formation of the equation of a line, it can serve as a guide in looking at the trend of the stock of the blood. This trend results can serve as an estimate of the future or as a data management decision support in conducting the procurement of donor blood. Semi-average equation is good enough to determine trend data periodically.

A. Data set

The data set used in this study are data blood stock, (Table II).

TABLE II. Dataset Description

Data Set	Number of Data	Number of Kind of Blood	Number of Attribute
Reguler	6	4	1
Activities	5	4	1

The data set consists of two types regular and activities. Both of these data types comes from the Red Cross in the area of Surabaya. Data is sent in .pdf form then translated into a spreadsheet so that makes it easy to count them in. The data obtained is less good for research as seen from the perspective of research. This occurs because of limitations of the right of

access to public data, and we understand it is for the sake of the security of the data.

Regular set of data in the table II has the following criteria. The data have a number of as much as 6 pieces. The data obtained from the online site of the Red Cross in Surabaya in real time every day. Blood type on the data consists of 4 different blood groups namely A, B, AB, and O. features on this data the number of features only one stock of blood.

Blood stock data activities have differences. The data obtained from the results of the blood donation-raising activities recap in cooperation with specific agencies. There is a striking difference is visible from the amount of blood that is obtained. The amount of data as much as 5 pieces with the amount of blood type A, B, AB, and O. features on this data the number of features only one stock of blood.

B. Trend Experiment

This part tell us about result of experiment of Blood Stock trend of Red Cross in Surabaya. Semi-average method applied to each criterion data set and each type of blood. From the results it will look at the trends of each data set and each type of blood.

In these tables describes about number of stock of blood type. This section explains about the number of bags of blood donor results for each blood type.

In table III describes about experiment results analysis of the amount of stock of blood type A for group activities. Below is the description and calculation of the process to get a trend equation is formed.

In table VI, VII, and VIII describes the amount of stock the entire blood type (A, B, AB, O) for regular and group activities.

In table IX describes the results of the analysis of trends with making equations in each blood type and of each group.

TABLE III. DATASET OF STOCK OF BLOOD TYPE A

Date Of Aftap	Number of Stock Of Blood Type A	Date Of Aftap	Number of Stock Of Blood Type A
Activities		Regular	
07/11/15	211	28/8/17	24
09/11/15	81	29/8/17	18
29/11/15	8	30/8/17	35
06/12/15	19	31/8/17	25
20/12/15	24	06/09/17	23
-	-	08/09/17	27

The following is a description of the table III, date of aftap is a date taken blood from donors of blood ejected from the calculated from body donors toward the SAC of blood. Details of the activities of table IV.

TABLE IV. CALCULATION OF THE CATEGORY OF ACTIVITIES OF A BLOOD TYPE

Start Value	Number of Stock Of Blood Type A	Average (Y)	Absis position (X)
0	211		
1	81	(211 + 81) / 2 = 146	(0 + 1) / 2 = 0.5
2	**8**	-	-
3	19		
4	24	(19 + 24) / 2 = 21.5	(3 + 4) / 2 = 3.5

Table IV is used to obtain an average value with the data is divided into two parts with the same data in the middle is not used.

The equation that must be met are the linear equations (1), that is $Y = a + bX$. Then, the next step is to get the value of a and b using the elimination and substitution.

$Y = a + bX$; where the value of $Y_1 = 146$ and $X_1 = 0.5$; $Y_2 = 21.5$ and $X_2 = 3.5$, then:

$146 = a + 0.5b$

$a = 146\text{-}0.5b$ (2)

$21.5 = a + 3.5b$ (3)

The next step is doing the substitution (2) into (3)

$21.5 = 146b + 3.5\text{-}0.5b$

$21.5 - 146 = 3b$

$b = (-124.5)/3 = (-41.5)$

Get the value of a by inserting the value of b to a (2)

$a = 146 + 0.5b$

$a = 146 + 0.5 * (-41.5)$

$a = 166.75$

Finally, arrange the equation that has developed into a trend (1) :

$Y = 166.75 - 41.5X$ (4)

TABLE V. CALCULATION OF THE REGULAR CATEGORIES OF BLOOD TYPE A

Start Value	Number of Stock Of Blood Type A	Average (Y)	Absis position (X)
0	24		
1	18	(24 + 18 + 35) / 3 = 25.67	1
2	35		
3	25		
4	23	(25 + 23 + 27) / 3 = 25	4
5	27		

Table V is used to obtain an average value with the data is divided into two parts as great.

The first step is get two equations

$Y = a + bX$; where the value of $Y_1 = 25.67$ and $X_1 = 1$; $Y_2 = 21.5$ and $X_2 = 4$, then:

$25.67 = a + b$

$a = 25.67 - b$ (5)

$25 = a + 4b$ (6)

The next step is doing the substitution (5) (6)

$21.5 - 146 = 3b$

$b = (-0223)$

Get the value of a by inserting the value of b to a (5)

$a = 25.67 + 0223$

$a = 25.89$

Finally, arrange the equation that has developed into a trend (1)

$Y = 25.89 - 0.223X$ (7)

Equal treatment to other blood type table VI, VII, and VIII as on the second step has been done to get the equation (4) and (7). The result of the treatment is summarized in table IX. Table IX contains the results of the equations of the trend of each blood type.

TABLE VI. DATASET OF STOCK OF BLOOD TYPE B

Date Of Aftap	Number of Stock Of Blood Type B	Date Of Aftap	Number of Stock Of Blood Type B
Activities		Regular	
07/11/15	307	28/8/17	51
09/11/15	116	29/8/17	18
29/11/15	8	30/8/17	22
06/12/15	16	31/8/17	13
20/12/15	27	06/09/17	28
-	-	08/09/17	9

TABLE VII. DATASET OF STOCK OF BLOOD TYPE AB

Date Of Aftap	Number of Stock Of Blood Type AB	Date Of Aftap	Number of Stock Of Blood Type AB
Activities		Regular	
07/11/15	62	28/8/17	28
09/11/15	25	29/8/17	16
29/11/15	1	30/8/17	24
06/12/15	3	31/8/17	24
20/12/15	7	06/09/17	18
-	-	08/09/17	10

TABLE VIII. DATASET OF STOCK OF BLOOD TYPE O

Date Of Aftap	Number of Stock Of Blood Type O	Date Of Aftap	Number of Stock Of Blood Type O
Activities		Regular	
07/11/15	416	28/8/17	34
09/11/15	148	29/8/17	25
29/11/15	13	30/8/17	31
06/12/15	33	31/8/17	23
20/12/15	51	06/09/17	33
-	-	08/09/17	18

TABLE IX. TREND EQUATIONS RESULTS

Blood Type	Trend	Blood Type	Trend
Activities		Regular	
A	Y = **166.75** - 41.5X	A	Y = 25.89 - **0.223**X
B	Y = **243.16** - 63.3X	B	Y = 34.83 - **4.54**X
AB	Y = **49.92** - 12.83X	AB	Y = 24.45 - **1.78**X
O	Y = **322** - 80X	O	Y = 31.78 – **1.78**X

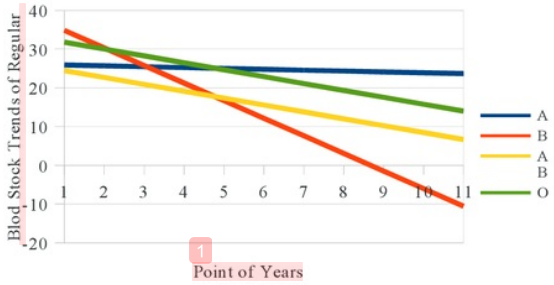

Fig. 1. *Graphical results of regular blood stock trends based on table IX*

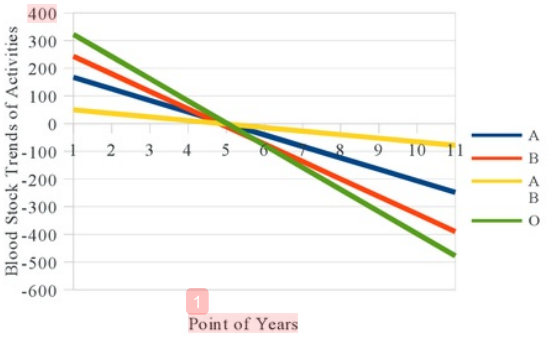

Fig. 2. *Graphical results of activities blood stock trends based on table IX*

C. Analysis

To get an overview of the level of significance of procurement of blood through regular activities with the need to make comparisons between the two trends.

In the table of stock either from table III, VI, VII, and VIII describe developments in the procurement of blood from time to time. Although with a little data, however this can illustrate the differences between the two (regular and activities). On the table to see that the column activities accounted for the granting of significant amounts of blood compared to regular though on some other activity to decrease.

To get an overview of blood procurement trend from time to time to make it more predictable, then applied the method of semi-average number of stock. This is necessary, because the

data it contains the stock data periodically. The result of the calculation method are inserted into the table (see table IX and fig.1 and also fig.2).

In table IX is a collection of results trends in each blood type. From the results of this group we can see the equation an absis (eg. 41.5 X) is showing growth per year. The table has a large decline in activities characterized by the coefficient of an absis (-) with large numbers. However, the coefficient fixed tends to be a big thing this proves that activities contributed a large amount of blood. Whereas, in the regular column contributed to a slight amount of blood with a little amount of reduction.

IV. Conclusion

Semi-average statistical methods used to analyze the blood stock at Red Cross blood procurement in Surabaya have been tested. The results in the form of the equation of the trend. Through the results of the trend can be used to make predictions in the future.

In addition, these trends illustrate that procurement of blood that comes from the significant rise compared to regular activities. Both of Activities and Regular have same decrease but activities has more. This can happen cause in this activities has uncertainty participant of blood donor.

However, the more stable the regular trend from the perspective of his descent. The results of this analysis can be used as a reference for decision makers get an idea that comes from the blood donor procurement activities need to be held more frequently to maintain the stability of blood stock in the future. In this study, there is a shortage of that is the amount of data is still limited, so that the results obtained can still be changed and does not yet have the stability of the formulation. This research has been to analyze the trend of stock of blood as an alternative way of using a decision support method of semi-average.

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