Fundamental indicators analysis toward foreign exchange (forex) prediction using neural network method-radial basis function (NN-RBF)

Ifadhila[1], I. Haanurat[2],*, A. Jaya[2]

[1]Postgraduate Student of Management Department
[2]Lecturer Faculty of Economics and Business
Muhammadiyah University
Faculty of Post Graduate, Jl. Sultan Alauddin, Makassar, Sulawesi Selatan, Indonesia

*Corresponding Email : Ifadhila33@gmail.com, ifayani.haanurat@unismuh.ac.id, asrijaya@unismuh.ac.id

Abstract. Phenomenon in forex shows that trading in the forex market was generally just assumed in making decisions buy or sell, so it takes the principle of caution for trading, therefore this study aimed to provide information to traders about the methods used in making predictions buy or sell value of forex (EUR/USD), by using fundamental data that provide information in the form of news. The results of this study indicated that by using the method NN–RBF wasable to give recommendation to trader, if MSE close to zero then performance of NN–RBF program run well, for that this program can be used in predict price trend formed so that it can be used as tool and base for decision maker to do buy or sell. It was proved by the NN-RBF program performance of predictable news that shows the results of MSE news Average Hourly Earning ($1{,}72x10^{-7}$), Consumer Confidence (35,7), CPI ($6{,}04x10^{-7}$), GDP($9{,}80x10^{-5}$), Manufacturing Index (3,660), Non–Farm Employment Change (1,21), and Retail Sales ($1{,}55x10^{-7}$). The results of this research provided a solution for traders to use the NN-RBF method in predicting the forex in orderto know the price at the forex market and prediction accurately.

Keywords – ***Forex, Neural Network – Radial Basis Function, Trader***

1. Introduction

Now a day is technological era, shows that trade transactions no longer will not be done conventionally. The development of era. A long with development a rapidly growing technology making trade transactions can be done without having face to face between the seller and the buyer.

The advancement of the time requires people transact or invest their money to prepare for the future one of them through trading forex. Forex (Foreign Exchange) otherwise known as foreign exchange (Valas) is the trade value of foreign currencies of various countries, where the currency plays a very important role in the continuity of foreign trade and business. There are many currencies traded in the forex market, but researchers only use the EUR/USD currency, because the EUR currency is the single currency used by European Union countries and the USD currency is the currency of the United States and the global currency, where this currency is a currency that can be used as a means of payment around the world.

Previously Forex is merely a mechanism for the payment of inter-state trade transactions, but now it becomes a trade commodity for speculative purposes [1]. Fundamental data used in the form of news

supported by the efficient market theory proposed by Fama states that news can provide information about the formation of prices in the market.
Previous research conducted by Masahiro et al, did fundamental data analysis on the forex market in the form of news after the reform in London in 2015 turned out to have an impact on trading behaviour in the forex market [2], but this research does not use the NN-RBF method. In relation to forex, other researchers done by Trilok et al, explain that making predictions in the forex market can use several methods, one of them is NN-RBF, this research is more focused in the informatics field. And provided to analysis fundamental data from economic side [3]. In line with efficient market theory, this research focuses on the method use Neural Network – Radial Basis Function (NN – RBF) in predicting the exchange rate in order to known that price formed in the foreign exchange market with can predicted accurately, a basis for decision making to buy or sell.

2. Review of Literature

Predict the value of forex news, can use the fundamental data contained in one of the forex site is forex factory. Fundamental analysis is an approach that is to analyze or observe and refer to the indicators or many factors that become a country's problems that resulted in the ups and downs of the country's currency such as political factors, financial, economic and even psychological market factors [4]. Any good news that deals directly or indirectly with the economy can be an important fundamental factor to be observed. These broad and complex fundamental factors can be grouped into four broad categories [5] namely economic factors, political factors, financial factors, and external factors. Macroeconomics is one of the branches of economics that discusses aggregate economic behaviour, including prosperity and recession, output of goods and services, total economy, output growth rate, inflation rate and unemployment, balance of payments and also exchange rate [6].

The foreign exchange market, or known as Forex (foreign exchange) is the largest financial exchange in the world with volume daily transactions reached more than 2 trillion US dollars. Total transaction Forex more than 3 times more than all other trade transactions on earth. In other words transaction Forex is the greatest deal [7]. Forex trade meaningful money Forex is a sale and purchase transaction of one type of currency with another currency.

The basic principle of forex trading, same as all types of trades. Buy when the price is low and resale once the price rises. This applies to gold, real-estate, land, anthurium, and rice. Figures 1 and 2 are general principles in making investments and trades and intermediaries between traders and banks [8].

Figure 1. General principles of investment and trade

Figure 2. Intermediary between trader and bank

Many methods can be done in prediction in the forex market one of them Research conducted by Trilok et al, gives the result that in making predictions in the forex market can use several methods one of them is NN-RBF.

3. Method

The first stage of this research is data collection, where the data obtained are: Site website www.forexfactory.com After the data fundamental taken then the system on the run and conducted a need analysis of data input system so the predictions that can be used.

The outline of the stages of this study using NN-RBF as follows:

Vol 3-Sep2018
ISSN: 2541-3023

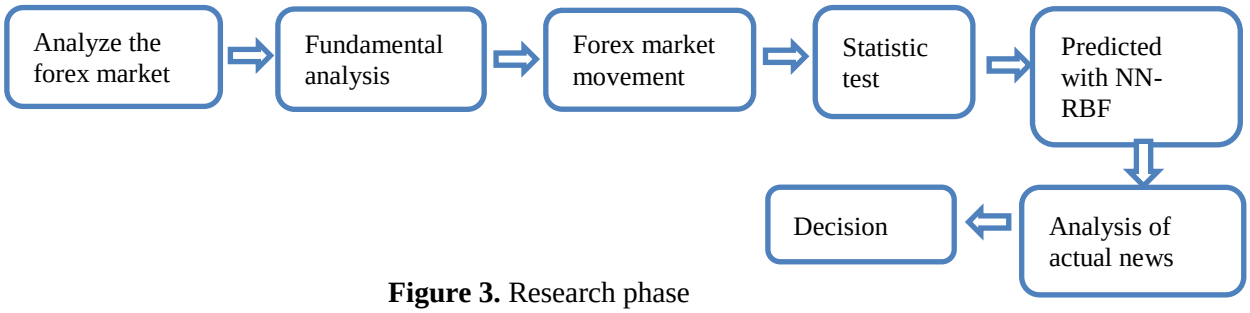

Figure 3. Research phase

To know a news has an effect on the value of foreign exchange, can use a correlation test where in the correlation test there is an interval or ratio scale. Below are guidelines to provide interpretation and analysis for correlation coefficient according to Sugiyono [9]:

Table 1. Correlation coefficient analysis

Correlation	Information
0,00 – 0,199	Very Low
0,20 – 0,3999	Low
0,40 – 0,5999	Medium
0,60 – 0,799	Strong
0,80 – 1,000	Very Strong

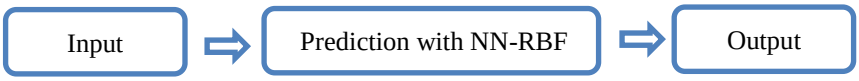

Figure 4. Prediction process with NN-RBF

The fundamental data included in the NN-RBF method, then using the existing tools in matlab is RBFN so produce the predicted results. To know the prediction with the NN-RBF method well, then used the formula:

$$MSE = \Sigma_{t=1}^{n} = \frac{(X_t - F_t)^2}{n}$$

Information
X_t = Actual data for a given period
F_t = Forecasting value in period t
n = Number of Data

4. Result and Discussion

After performing statistical tests on the news contained in the forex factory, then there are 7 news that have good statistical test results include correlation test where closer to the number 1 means the more true value of the data and test the significance where if the number is 0.00 - 0 , 05 then the data is significant, as table 1 below.

Table 2. Correlation test and significance test

News	Correlation Test	Significant Test
Average Hourly Earning	0,515	0,004
CB Consumer Confidence	0,978	0,000
Consumer Price Index	0,760	0,000
Gross Domestic Product	0,974	0,000
Manufacturing Index	0,685	0,000
Non-Farm Employment Change	0,882	0,000

Retail Sales	0,756	0,000

The result of this statistic test is supported by the mean score error test result which is closer to the number 0 using the NN-RBF method, the better the performance of the program is shown in table 3 as follows:

Table 3. Result MSE NN-RBF

News	MSE
Average Hourly Earning	$1{,}72.10^{-7}$
CB Consumer Confidence	35,70063
Consumer Price Index	$6{,}04.10^{-7}$
Gross Domestic Product	$3{,}65.10^{-7}$
Manufacturing Index	3,660
Non-Farm Employment Change	1,21000
Retail Sales	$1{,}55.10^{-7}$

The results of the use of forex factory prediction method without any use of NN-RBF method, then the results of the MSE can be seen in table 4 below:

Table 4. Result MSE forex factory

Berita	MSE
Average Hourly Earning	$3{,}314.10^{-5}$
CB Consumer Confidence	4,25455
Consumer Price Index	$7{,}44828.10^{-6}$
Gross Domestic Product	$1{,}93546.10^{-5}$
Manufacturing Index	7,62711
Non-Farm Employment Change	5651,8
Retail Sales	$6{,}40152.10^{-5}$

The results of this study are supported by efficient market theory ie stock prices reflect all available information [10], where

4.1 Average Hourly Earning

Average hourly earning has value *pearson correlation* or positively related 0,515 (table 1) with a significant level of 0.004, indicating that the news has an effect on the foreign exchange rate, and has a value of MSE 1.72.10-7 (table 2) indicating that the NN-RBF method is well used in conducting prediction on average hourly earnings news compared before using NN - RBF method has MSE 3,314.10-5 (table 3).

4.2 CB Consumer Confidence

CB Consumer Confidence has value *pearson correlation* or positive relation 0.978 (table 1) with a significant level of 0,000, indicating that the news has an effect on foreign exchange rates, and has MSE 35.70063 (table 2) indicating that the NN - RBF method is good for predicting CB consumer confidence report compared before using NN method - RBF has MSE value 4.25455 (table 3).

4.3 Consumer Price Index

Consumer price index has value *pearson correlation* or positive relation 0.760 (table 1) with a significant level of 0,000, indicating that the news has an effect on the foreign exchange rate, and has MSE 6.04.10-7 (table 2) indicating that the NN-RBF method is well used in doing prediction of consumer price index news compared before using NN method - RBF has MSE value 7,44828.10-6 (table 3).

4.4 Gross Domestic Product

Gross Domestic Product has value *pearson correlation* or positive relation 0.974 (table 1) with a significant level of 0,000, indicating that the news has an effect on the foreign exchange rate, and has MSE value 3.65.10-7 (table 2) indicating that the NN-RBF method is well used in doing prediction of the gross domestic product news compared before using the NN - RBF method has MSE 1,93546.10-5 (table 3).

4.5 Manufacturing Index

Manufacturing Index has value *pearson correlation* or positive relation 0.685 (table 1) with a significant level of 0,000, indicating that the news has an effect on the foreign exchange rate, and has MSE 3,660 (table 2) indicating that the NN - RBF method is good for predicting the manufacturing news index compared before using the NN method - RBF has MSE value of 7.62711 (table 3).

4.6 Non – Farm Employment Change

Non – Farm Employment Change has value *pearson correlation* or positive relation 0.882 (table 1) with a significant level of 0,000, indicating that the news has an effect on the exchange rate, and has a value of MSE 1.21000 (table 2) indicating that the NN-RBF method is good for predicting news non-farm employment change compared before using the NN method - RBF has MSE 5651.8 (table 3).

4.7 Retail Sales

Retail Sales has value *pearson correlation* or positive relation 0.756 (table 1) with a significant level of 0,000, indicating that the news has an effect on the exchange rate, and has a value of MSE 1.21000 (table 2) indicating that the NN - RBF method is good for predicting news non-farm employment change compared before using the NN method - RBF has MSE 5651.8 (table 3).

5. Conclusion

After statistical tests on the news, there are 7 items that have a high and significant influence on the exchange rate, there are average hourly earnings, consumer confidence, consumer price index, gross domestic product, manufacturing index, non-farm employment change and retail sales . The news is used to employ predicted the value using the NN - RBF method. The mean square error results close to zero which means the NN - RBF method can be used in making predictions, this result supported by the fama theory that stock prices reflect all available information, it is suggested a solution for traders to use NN-RBF method in making predictions in the forex market. This study is one the use only one method of prediction. No other method is used to compare the prediction found and only use one currency is EUR/USD.

Reference

[1] V. B. and M. K. A. Darazhanov 2011 *100% Forex - Belajar Menghasilkan Uang*. Jakarta: Erlangga.
[2] M. Yamada and T. Ito 2017 *Jurnal The forex fixing reform and its impact on cost and risk of forex trading banks R*, vol. 21, pp. 157–162.
[3] T. Nath, A. Kumar, S. Dehuri, and S. Cho 2018 *Jurnal A novel committee machine and reviews of neural network and statistical models for currency exchange rate prediction : An experimental analysis, J. King Saud Univ. - Comput. Inf. Sci.*
[4] M. Abuhamad, M. Mohd, and J. Salim 2013 *Jurnal Event - Driven Business Intelligence Approach for Real Time Integration of Technical and Fundamental Analysis in Forex Marke*t vol. 9, no. 4, pp. 488–499.
[5] E. K. O. Kadiri and O. A. Alabi 2015 *Jurnal Importance of Technical and Fundamental Analysis in the Foreign Exchange Market* vol. 5, no. 2, pp. 181–194.
[6] M. J. Dombusch, Rudiger, Stanley 1996 *Makro Ekonomi* in *Edisi Keempat*, Jakarta: Erlangga.
[7] Frento T. Suharto 2012 *Jurnal Mengungkap Rahasia FOrex*. Jakarta: Elex Media Komputindo.
[8] T.S. Frento 2012 *Jalan Pintas Menjadi Kaya*. Jakarta: Kompas Gramedia.
[9] Sugiono 2012 *Metode Penelitian*. Bandung: Alfabeta.
[10] E. F. Fama 1998 *Market efficiency , long-term returns , and behavioral finance* vol. 49, pp. 283–306.