CHAPTER I

INTRODUCTION

1.1 Research Object Overview

1.1.1 Indonesia Stock Exchange (IDX)

Indonesia Stock Exchange (IDX) is an institution that organizes stock buying and selling activities. IDX is the official capital market in Indonesia. (Mumpuni & Darmawan, 2017). According to the history in Indonesia Stock Exchange's official website, capital markets have existed long before Indonesia became independent. Capital market or stock exchange has been present since the Dutch colonial era and precisely in 1912 in Batavia. The capital market was then established by the Dutch Indies government for the benefit of the colonial government or the VOC.

Although capital markets have existed since 1912, the development and growth of capital markets have not gone as expected, even in some periods of capital market activity vacuum. This is caused by several factors such as World War I and II, the transfer of power from the colonial government to the government of the Republic of Indonesia, and various conditions that cause stock exchange operations cannot run properly. The Government of the Republic of Indonesia reactivated the capital market in 1977, and several years later the capital market grew in line with various government incentives and regulations.

With rapid and dynamic growth, stock exchanges need to be addressed more seriously. In order to maintain objectivity and prevent the possibility of the conflict of interest, the coaching and operational functions of the exchange should be separated and developed with a more professional approach. Finally, the government decided it was time to privatize the stock. So that the end of 1991 was established Jakarta Stock Exchange Limited Liability Company and inaugurated by the Minister of Finance on July 13, 1992.

The growth of stock exchanges in subsequent years has accelerated, especially since the trading automation system was conducted on May 25, 1995. All trade indicators such as value, volume, and frequency of transactions show remarkable growth.

December 3rd, 2007, in line with market developments and demands to further improve efficiency and competitiveness in the region, officially, Jakarta Stock Exchange (JSX) merged with Surabaya Stock Exchange (SSX) and changed its name to Indonesia Stock Exchange (IDX).

Figure 1.1 Indonesia Stock Exchange Logo

Source : www.idx.co.id

The vision of IDX is becoming competitive stock exchange with world-class credibility while its mission is creating competitiveness to attract investors and issuers through empowering exchange members and participants, creating value-added, cost efficiency, and implementing good governance.

As trade activity increases, the need to provide a complete information to the public about the development of exchanges is also increasing. One of the required information is the stock price index as an indicator or a reflection of the stock prices movement. Currently, Indonesia Stock Exchange has 11 types of stock price indexes that are continuously disseminated through print and electronic

media, as the guidelines for investors to invest in the capital market. One of the types of stock price indices is the Indonesia Stock Exchange Composite (IDX Composite).

1.1.2 Indonesia Stock Exchange Composite (IDX Composite)

IDX Composite was first introduced on April 1, 1983, as an indicator of stock price movements in the Stock Exchange. According to the information in Indonesia Stock Exchange's official website, IDX Composite use all listed companies as the component of Index calculation. In order for the IDX Composite to be able to describe the fair market condition, the Indonesia Stock Exchange is authorized to issue and or not to include one or more listed companies from the calculation of IDX Composite. The basic consideration, among others, is that if the total shares of the listed company are owned by the public (free float) is relatively small while the market capitalization is large enough so that the change of listed company's share price has the potential to affect the fairness of the movement of IDX Composite.

1.2 Research Background

According to Bursa Efek Indonesia, the capital market is a marketplace for various long-term financial instruments (e.g. stocks, bonds, mutual funds, etc.) that can be traded. The capital market has an important role for the economy of a country since the capital market operates two functions, first as a means for business financing or as a media for the company to obtain funds from the investors. Funds obtained from the capital market can be used for business development, expansion, additional working capital and others. Second, the capital market becomes a media for people to invest in financial instruments. Thus, people can place their funds in accordance with the profit and risk characteristics of each instrument.

Tandelilin (2010) explains that capital market always fluctuates and will cause uncertainty to gather the returns on investment in the future. The uncertainty reflects the risks that will be faced by investors. Investors usually want to maximize the expected return based on the risk rate. Thus, market growth of stocks needs to be observed in order to minimize risk in investing. A condition of the capital market is reflected by Composite Stock Price Index (CSPI) of a country. CSPI of Indonesia is known as Indonesia Stock Exchange Composite (IDX Composite).

IDX Composite records and combines stock price movements of all shares in IDX. IDX Composite became the main benchmark of stock investment performance in Indonesia. IDX Composite serves to provide an overview of the economic conditions that occur in Indonesia. By looking at the stock index of IDX Composite, people can know the picture of economic condition in Indonesia. (Mumpuni & Darmawan, 2017)

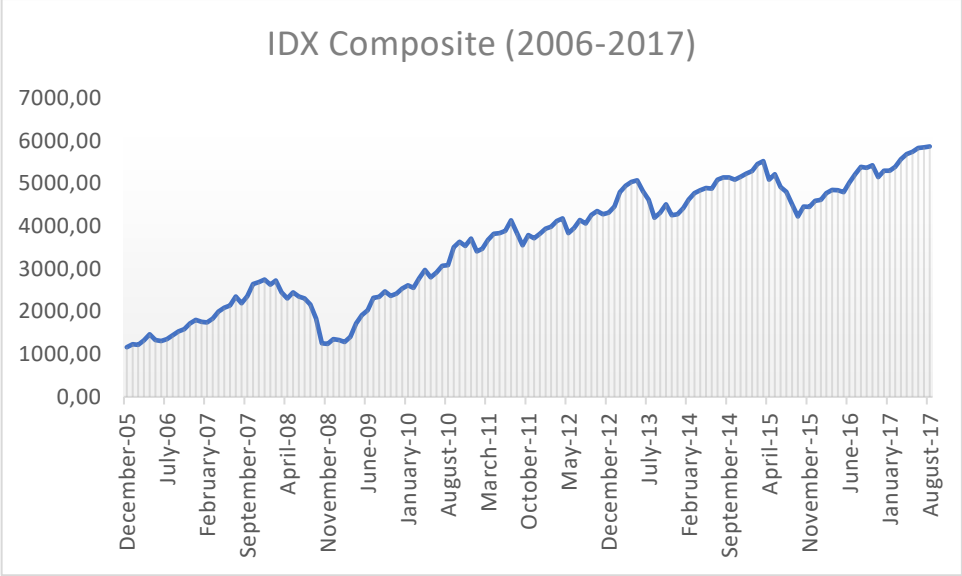

Figure 1.2 IDX Composite Growth

Source: processed data results from Bank Indonesia (2018)

Figure 1.2 shows a growth of IDX Composite in a decade in the range of the year 2006-2017. By viewed as a whole, it is true that IDX Composite of Indonesia is growing positively, but by looking it thoroughly in recent times has

declined dramatically. Investors are very concerned about this phenomena since their risk and return is based on the stock price index movement.

According to Bodie et al (2011:728-730), in analyzing stock market, it often makes sense to start with the broad economic environment and even the international economy. The macroeconomy is the environment in which all firms operate. Some key economic statistics used to describe the state of the macroeconomy are Inflation Rate, Interest Rate, Money Supply (M2) while one obvious factor that affects the international competitiveness of a country's industries is the exchange rate between one country's currencies and other currencies.

Stability of economy will have an impact on the guaranteed investment that will trigger a financial transaction. At the time when the economy is in a good condition, investors will see the condition as a positive signal. Much previous research has proved that interest rates, inflation rates, exchange rates, and money supply (M2) as macroeconomic variables that have a relationship with stock prices, some of them are Osamwonyi et al (2012), Khan & Zaman (2012), Hunjra et al (2014), Kaur et al (2016), and many more.

Predicting stock price index movement has been considered one of the most challenging applications of time series prediction. Lubis et al (2015) stated that there are two approaches that can be used to predict stock prices, i.e by approaching fundamental analysis and technical analysis. Fundamental analysis is an analytical method that is done by observing the fundamental economic factors that affect the stock price change. In contrast to fundamental analysis, technical analysis does not pay attention to the factors that affect the stock price changes, but by observing changes in stock prices in the past, so that from the price changes can describe a pattern of changes that continue to repeat. This research will combine those two approaches in the assumption of getting better accuracy. An accurate prediction of stock price index movements is essential for developing an effective market strategy. Thus, the investor can minimize the market risk and the opportunity to make a profit with stock index trading.

Stock prices historical data is one of the forms of big data. Therefore use data mining for stock prices historical data is appropriate. Data mining is a process of analysis in order to explore amounts of data with the aim of obtaining a pattern of interconnection between variables and validate that pattern into a new subset.

All variables used in this research except money supply (M2), i.e. IDX Composite, interest rates, inflation, exchange rates are nonlinear data model. Based on Weiss & Indurkhya (1998:123), math operations for nonlinear solutions are unlimited and complex. Big data and fast processing make nonlinear math solutions feasible and even imperative since the performance is superior. A family of nonlinear solutions called artificial neural networks (ANN), the predictions are known as elegant and powerful. ANN is capable of approximating even the most complex functions.

Artificial Neural Network (ANN) is a popular prediction method since it has high accuracy. ANN also have an ability to discover relationship in the input dataset without a priori assumption of the knowledge of the relation between the input and the output. ANN independently learn the relationship inherent between the variables. Therefore, neural network suits better than other models in predicting the stock price index.

According to Weiss & Indurkhya (1998:125), the most popular algorithm for artificial neural networks is ANN backpropagation. ANN Backpropagation is a method that can solve complex pattern at it best. The term "backpropagation" is derived from the way this algorithm is able to lower the gradient to minimize the errors. Then it can be concluded that ANN Backpropagation is good at prediction with minimum errors.

Based on the research background, the author would like to conduct a research which entitled **"Indonesia Stock Exchange Composite Prediction based on Macroeconomic Variables Using Artificial Neural Network Backpropagation".**

1.3 Problem Statement

Stock is a high risk and high return investment. The risk-comparison scale for both losses and profits are not much different. But the temptation to the lure of profits that can be given in the play of shares, sometimes make people less cautious and eventually fail to invest in stocks.

To make the right and profitable decision on investment, investors not only seek the current situations of the capital market, investors also have to know the situation of the capital market that will occur in the future. The capital market always fluctuates and will cause uncertainty to gather the returns on investment in the future. This causes investors have to predict the changes in the capital market by looking at stock price index as the reflection. In the process of prediction, investors falso need to analyze the macroeconomic changes that are and will occur. Tandelilin (2010:344)

There are two approaches that can be used to predict stock prices, i.e. by approaching fundamental analysis (observes economic factors that influence the movement of stock prices) and technical analysis (observes the pattern of historical data that continue to repeat). Some research conduct only fundamental analysis and some only technical analysis. Therefore, this research hybridized both approaches in assumption to receive more optimal prediction, by predict of IDX Composite using macroeconomic variables. Macroeconomic variables that being used are exchange rate, inflation rate, and interest rate.

Most of the macroeconomic variables including stock price index are very fluctuating and very complex, it means that the models of these data are nonlinear. This research will use Artificial Neural Network (ANN) Backpropagation since it modelling the neurophysiology of human brain which can adapt with nonlinear models and can lower the gradient to minimize the errors.

1.4 Research Questions

According to the explanation above, the research questions are formulated as follows:

1. How to predict IDX Composite using macroeconomic variables by adopting Artificial Neural Network Backpropagation?
2. How many months before the prediction month yields the best predicted results?
3. How much accuracy level and errors of IDX Composite prediction using macroeconomic variables that generated by Artificial Neural Network Backpropagation?
4. Based on the accuracy level and the errors of the prediction, are macroeconomic variables (Interest Rate, Inflation Rate, Exchange Rates, and Money Supply (M2) is the proper indicator to predict IDX Composite?

1.5 Research Objectives

According to the research questions above, the objectives of this study are as follows:

1. To comprehend ANN Backpropagation ways of work in predicting IDX Composite with macroeconomic variables so readers will be able to apply the method.
2. To determine the best time to predict IDX Composite by using monthly historical data.
3. To know the level of accuracy and error obtained by ANN Backpropagation in predicting IDX Composite with macroeconomic variables.
4. To know whether macroeconomic variables are the proper indicators to predict IDX Composite or not.

1.6 Significants of the Research

1.6.1 Business Aspects

In term of business, this research is expected to be useful information for investors and consideration for investors and issuers in conducting stock trading activities. For economic policymakers (government), this results can be used as information that macroeconomic variables is an indicator of investment activities in the capital market. This research also expected for business people especially issuers to realize the importance of big data use in making decisions.

1.6.2 Academic Aspects

In term of academic, this research is expected to be useful for economics, investment knowledge, and implementation of big data and data analytics on economic life, especially investment activities. The results of this study also can be used as a reference for academicians to add insight and knowledge, and can be used as a reference guide for future researchers.

1.7 Scope of the Research

This study has restrictions aimed at preventing widespread problems and maintaining consistency of the researcher's objectives. The scope is as follows:

1. This research uses Indonesia Stock Exchange Composite as the reflection of the capital market condition and uses interest rate, inflation rate, exchange rate, and money supply (M2) of Indonesia as macroeconomic indicators.
2. Dataset used is monthly data. Period of the dataset observed is in 12 years (December 2005 – November 2017)
3. Prediction using Artificial Neural Network Backpropagation.

4. Observing whether each variable of macroeconomic (interest rate, inflation rate, exchange rate, and money supply (M2) affects stock price index negatively or positively is not part of the research.

1.8 Writing Systematics

The writing systematics of this research are as follows:

CHAPTER I: INTRODUCTION

This chapter briefly presents a general explanation of the research. The content includes an overview of research object, research background, research questions, objectives, the significance of the study, and writing systematics.

CHAPTER II: LITERATURE REVIEW AND SCOPE OF THE RESEARCH

This chapter presents clearly, concisely and concisely the results of literature review related to the topic and research variables to be the basis for the preparation of the framework and formulation of the hypothesis.

CHAPTER III: RESEARCH METHODOLOGY

In this chapter, the researcher describes the characteristic of the research, operational and variable measurement, steps, sample, resources, and data analysis method.

CHAPTER IV: ANALYSIS AND DISCUSSION

This chapter provides results of the research systematically in order to be analyzed by using the methodology and also discussion.

CHAPTER V: CONCLUSION AND SUGGESTION

The last chapter of the research presents the conclusion which is derived from all the data processing and analysis and recommendation for further development field of the research.