

## CHAPTER 1: THE PROBLEM

This study concerns about economic crisis and how to identify its problem clearly. This chapter is outlined into seven sections: 1. Rationale of the study; 2. Theoretical framework approach; 3. Conceptual approach; 4. The problems; 5. Hypotheses; 6. Assumptions; 7. Scopes and delimitations, and 8. Significance of the study successively.

### 1.1 Rationale

Every country has its own history of economic crisis. For instance, Indonesia suffered an economic crisis in 1998 which certainly debilitated so many important sectors. Since the economic sector is the most important thing, thus all sectors will be impacted when the economic condition in a country crashed. This crisis usually leads to a catastrophe in financial stability. To prevent the impact of the crisis, a system that can predict its serious effect should be developed. The system aims to be able to forecast the economic condition when a crisis attacks. Such a system can be utilized by governments, companies, and civilians as an anticipation mechanism prior to an economic crisis happening.

Since 1999, studies regarding the predictability of economic crisis have been carried out. There are three common models that have been used as a base for the current development study. The first was the signals approach with the authors were Kaminsky, Lizondo and Reinhart (1998), Kaminsky and Reinhart (1999), Goldstein (2000), Alvarez-Plata and Schrooten (2004), Peng and Bajona (2008). The second model is parametric structural models, which were performed by Frankel and Rose (1996), Berg and Pattillo (1999), Kim and Moon (2001), Komulainen and Lukkarila (2003), Kumar, Moorthy and Perraudin (2003), Beckmann, Menkhoff and Sawischlewski (2006), Kalotychou and Staikouras (2006) and Bussiere and Fratzscher (2006). The last model was techniques of computational intelligence like ones have been done by Kim, Oh, Sohn and Hwang (2004), Niemira and Saaty (2004), Kim, Hwang and Lee (2004), Pang and Feng (2006), Yu, Lai and Wang (2006), Celik and Karatepe (2007), and Sohn, Oh, Kim and Kim (2009).

The prior studies succeeded in establishing a system to measure the result of forecasting the impact of an economic the crisis. Those studies were used to predict the effect based on each source crisis caused without involving any internal correlation among them. As the growth of many sectors is affected by the economic aspect, the separated mechanism while predicting crisis causes will be no longer appropriate in implementing this prediction system. A further study to foresee the crisis impacts which encompasses all the crisis causes

simultaneously should be developed. By incorporating all causes involved, the complexity and dynamics of real-world economic problems can be reached. Because of that, this study will comprise sophisticated analytical techniques by applying data mining method. The purpose of the study is to develop a system to predict the economic crisis in Indonesia by using time series analysis and system dynamics optimized by a genetic algorithm using economic indicators data.

### 1.2 Theoretical Framework

This research has a concept as shown in the following figure.

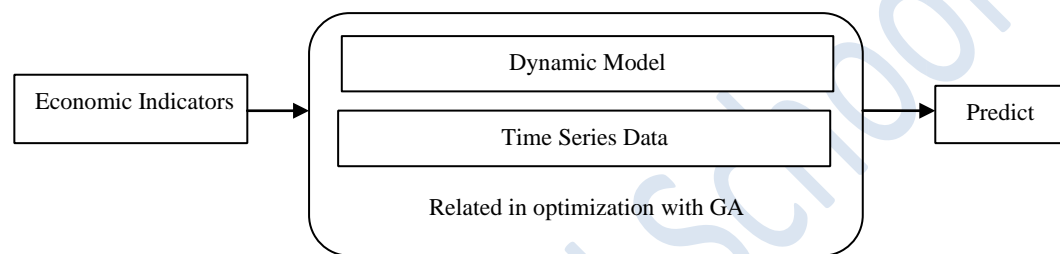


Figure 1. Steps of Prediction System of Economic Crisis

The explanation of Figure 1, firstly, the economic indicator data insert into the system. Second, the system will generate algorithm GA to find the historic optimal using a dynamic model and time series analysis. In this step, the best-fitting value of the prediction data to the actual data will be calculated using the least square equation. Third, the output prediction of the economic crisis is obtained.

### 1.3 Conceptual Framework/Paradigm

The variables applied to conduct measurement in this study are summarized in Table 1 and Table 2.

Table 1. Variables

Variable	Variable's information
The number of indicators	The variable indicates mention of GDP, inflation, population, and oil.

Table 2. Parameter Dynamic Model

Parameter	Parameter's information
The coefficient in the dynamic model	The coefficient in getting optimal prediction uses Genetic Algorithm

The variables used are input time-series data about the economic indicators. The coefficient in the dynamic model is used to see the influence amongst the indicators. Also, the coefficient in the model dynamic is aimed to get the best value for the actual data.

#### **1.4 Statement of the Problem**

A prediction system of economic crisis in Indonesia using data economic indicators with time series analysis and system dynamic optimized by the genetic algorithm will be built.

#### **1.5 Hypothesis**

An economy is usually classified as a manifestation of complex social systems. A complex system comprises many different objects or elements. The trend of complex systems is dynamic, unstable, discontinuous, and irreversible with multiple possibilities to predict the state of the economy using data about economics in the form of time series. Besides, prediction in data mining needs a method to get the optimal result of the system. Therefore, this research will develop a prediction system of economic crisis using time series analysis and system dynamics optimized by a genetic algorithm.

#### **1.6 Assumption**

The limitations of the research were:

1. Other factors of economic indicators are mentioned implicitly.
2. The coefficients in the dynamic model are optimized by the Genetic Algorithm (GA).
3. This research topic ignores the political conditions and disasters.

#### **1.7 Scope and Delimitation**

The scope of the research may help the ministry of trade, ministry of industry, ministry of finance, Bank Indonesia (Central Bank), and entrepreneurs. Meanwhile, the delimitation of this research is the data set source used, i.e., World Bank (<http://data.worldbank.org/>) and IMF (<http://www.imf.org/external/data.htm>). The data was used for data training, data validation, and data testing. The data are GDP (Gross Domestic Product), inflation, oil, and population in Indonesia per year from 1980 to 2011.

#### **1.8 Importance of the Study**

Economic as the word comes from “ecos” and “nomos” which means knowledge about values of life, give impact to the activities in daily life. If the economy of a nation collapses, it will influence the whole sectors in the country directly or indirectly. Therefore, the prediction of economic crisis is of importance to study.