

Chapter 82

Financial Early Warning System for Risk Detection and Prevention from Financial Crisis

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ABSTRACT

Risk management has become a vital topic for all enterprises especially in financial crisis periods. All enterprises need systems to warn against risks, detect signs and prevent from financial distress. Before the global financial crisis that began 2008, small and medium-sized enterprises (SMEs) have already fought with important financial issues. The global financial crisis and the ensuing flight away from risk have affected SMEs more than larger enterprises. When we consider these effects, besides the issues of poor business performance, insufficient information and insufficiencies of managers in finance education, it is clear that early warning systems (EWS) are vital for SMEs for detection risk and prevention from financial crisis. The aim of this study is to develop and present a financial EWS for risk detection via data mining. For this purpose, data of SMEs listed in Istanbul Stock Exchange (ISE) and Chi-Square Automatic Interaction Detector (CHAID) Decision Tree Algorithm were used. By using EWS, we determined the risk profiles and risk signals for risk detection and road maps for risk prevention from financial crisis.

INTRODUCTION

The financial crisis and keep away from risk have affected nearly all countries and firms. The last financial crisis that began in the latter half of 2008 has been called by leading economists the worst

financial crisis since the Great Depression of the 1930s. This global financial crisis caused to the failure of key businesses, declines in consumer wealth estimated in the trillions of U.S. dollars, a significant decline in economic activity, decrease liquidity, and increase risk. World Bank reported that rates of average economic growth in the developing world declined from 6.4 to 4.5

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percent in 2009, according as global financial crises (WB, 2009a). Also, firms have affected in different degrees, depending on their size, location and risk features. In such a context, small and medium-sized enterprises (SMEs) that have heavy dependence on bank credit, and limited recourse to finance affected more than bigger firms.

SMEs are defined as independent firms which employ less than a given number of employees. In general, one of three defining measurements is used for statistical definitions of a SME; number of employees, turnover, and the size of the balance sheet. These measurements vary across national statistical systems. For example, the most frequent upper limit is 250 employees, as in European Union, while the United States considers SMEs to include firms with fewer than 500 employees. Financial assets are also used to define SMEs. In Europe, firms with annual turn-over less than €50 million or with annual balance sheet less than €43 million are defined as SMEs. SMEs play a significant role in all economies and are the key generators of employment and income, and drivers of innovation and growth. Access to financing is the most significant challenges for the creation, survival and growth of SMEs, especially innovative ones. The problem is strongly exacerbated by the financial and economic crisis as SMEs have suffered a double shock: a drastic drop in demand for goods and services and a tightening in credit terms, which are severely affecting their cash flows (OECD, 2009a). As a result, all these factors throw SMEs in financial distress.

Risk management has become a vital topic for all institutions, especially for SMEs, banks, credit rating firms, and insurance companies. The financial crisis has pushed all firms to active risk management and control financial risks. Strategically, asset/liability management systems are important tools for controlling a firm's financial risks. But, it is not enough for to understand and manage the financial risks that can cause insolvency and distress. Managers need also to manage operational risks that can arise from execution

of a company's business functions, and strategic risks that can undermine the viability of their business models and strategies or reduce their growth prospects and damage their market value (Berliet, 2009).

All enterprises need Early Warning System (EWS) to warn against risks and prevent from financial distress. But, when we consider the issues of poor business performance, insufficient information and insufficiencies of managers in finance education, it is clear that EWS is vital for SMEs. Benefits of an EWS can summarize as early warning before financial distress, road maps for good credit rating, better business decision making, and greater likelihood of achieving business plan and objectives.

The aim of this chapter is to present an EWS based on data mining. For this purpose, an EWS model was developed for SMEs for risk detection and an implementation was presented for demonstration of EWS. Data of SMEs listed in Istanbul Stock Exchange (ISE) and Chi-Square Automatic Interaction Detector (CHAID) Decision Tree Algorithm were used for implementation. Remaining of this chapter is organized as follows: Section 2 presents definition and financial issues of SMEs. Section 3 contains impacts of financial crisis on SMEs. In Section 4, EWSs are presented as a solution for SMEs. Implementation of data mining for early warning system and methodology is presented in Section 5. Section 6 provides the results of the study. Concluding remarks, future implementations based on EWS and strategies were suggested in the Conclusion Section.

SMEs AND FINANCIAL ISSUES

SMEs are defined as enterprises in the non-financial business economy (NACE, Nomenclature statistique des activités économiques dans la Communauté européenne (Statistical classification of economic activities in the European Community)) that employ less than 250 persons. The comple-

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