CHAPTER I
INTRODUCTION

This chapter will discuss on the importance and the background of this research.

1.1 Background and problem statement

Although we do not interested in terms of material handling but in everyday life can be found material handling equipment almost anywhere especially in trade and industry. In fact, modern life, it is extremely rare not to be used for materials handling such as lifting, moving, storage and other activity.

The study on metal processing industries have discontinuous process, it was found only five percent of the total production time is work on the machine the other ninety-five percent is waiting and movement (Srisom and Sriuthai, 2004) and each industry, the cost of material handling will be approximately 30 – 70 percent or more of the total cost of production but it depends on the type of industry (Srisom, 2003). The initial cost of manufacturing operation can reduce 15 – 30 percent by manage efficient material handling (Sule, 1994; Kulak, 2005; Sujono and Lashkari, 2007; Tuzkaya et al., 2010). Thailand is developing country which is one country have industry growth (Figure 1.1) and continuous economic growth because Thailand has appropriate factor support, such as labor, natural resources and other factors. In every business, there are material handling's activities and including a small and medium enterprise (SME) or even in daily life. Today, there is not only high domestic competition among businesses, but also high international competition. As the World Economic Forum (WEF) ranking that is about ranking of competitive capability all over the world. It presented that Thai is ranked in 38th from the total of 139 countries (http://www.weforum.org/reports/global-competitiveness-report-2010-2011-0). A competitive advantage that Thai can compete with other

countries is cheaper price or higher quality of product than others. From previous information that 30-70% of product value involved with material handling, if businesses can improve the efficiency of material handling to be better, then these businesses can save the 15-30% of total costs (Sule, 1994; Kulak, 2005; Sujono and Lashkari, 2007; Tuzkaya et al., 2010). To increase the efficiency of production, businesses should be put right quality of material to the right place at the right time (Amstead et al., 1979; James, 1977). Therefore, it seems that the decision of suitable material handling system selection is so importance as a way to increase profits and reduce costs (Kulak 2005). Each industry has different material handling activity, whether loading or unloading depending on type of industry. Most of the currently, the decision to invest in material handling equipment relies on leader or executive of each company. But "material handling equipment selection problem is an important decision making area for the companies, since it has a direct effect on manufacturing and service productivity".

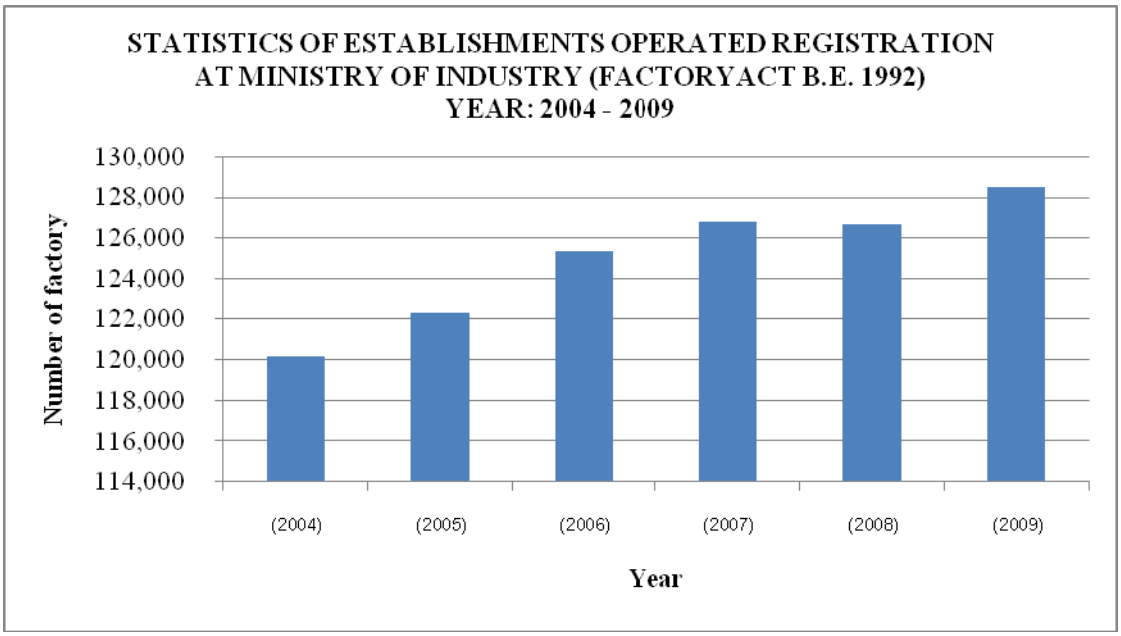

Figure 1.1: Statistics of establishments operated registration at ministry of industry (factory B.E. 1992) Year: 2004 – 2009

Source: http://service.nso.go.th/nso/nso_center/project/table/files/2200300/

For the investment analysis in choosing the material handling system, it is extremely complex and there are more solutions for particular situation (Swaminathan et al., 1992). The material handling selection problem, it is importance (Chan et al., 2001) and there are many factors concerned that should be considered. It may be affected by significantly constrains or other factors such as the product size, the characteristics of the product that it is handled, space and time required etc (Marcello et al., 2001). These main factors consist of material handling equipments, manufacturing type, working area, product appearances, environment, functional equipments, Material handling method and other factors (Figure 1.2).

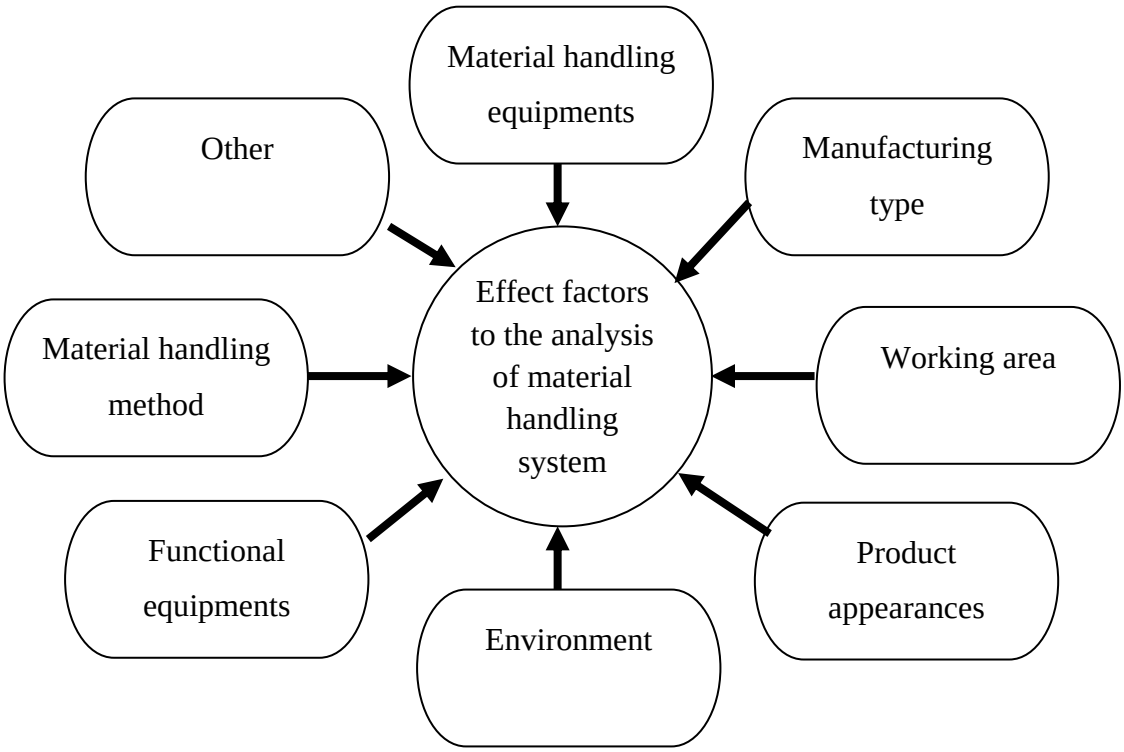

Figure 1.2 Effect factors to the analysis of material handling system
Source: Tragoonsubtavee S., 2003

Many researchers have aimed to identify the suitable criteria with various methods for the material handling equipment selection. For example, Braglia et al. (2007) has presented AHP model of the material handling device selection in Cellular manufacturing and its main criteria are cost, benefit and compatibility while

Chan et al. (2001) has presented the integration of expert system with AHP model in designing the material handling equipment selection system which consist the main criteria of performance measures, technical, economic, and strategic. In 2010, Tuzkaya et al. (2010) have integrated the Fuzzy multi-criteria decision making methodology for material handling equipment selection and there are the criteria of operational, economical, environmental, and strategic considerations. There are no researches that concerned about criteria for the conveyor system selection. For this research, it is aimed to study and identify criteria and sub-criteria that affected to the decision for investment analysis or choosing of the material handling conveyor system. The collection of factors will be considered on each side fully.

Delphi method was developed by Norman Dalkey of the RAND Corporation. It is widely popular among researchers of fields, such as education, business, education, health care, engineering and other fields Gupta and Clarke, 1996; Loo, 2002). It is a repetitive process to collect knowledge and consensus from multiple experts by using series of questionnaires. It also can reduce the negative face-to-face interactive among respondents. For this study, Delphi method was used in selecting the suitable criteria and sub-criteria for conveyor system selection.

The analytic network process was introduced by Saaty and it was an original of the analytic hierarchy process (Saaty, 2004). ANP can generate the dependence and feedback among criteria. A systematic ANP approach aimed to set priorities and tradeoff among objectives and criteria .It can help decision makers to select which is the best alternative. This study is employed the ANP as tool in evaluating the criteria and sub-criteria for conveyor system selection.

1.2 Objectives

1.2.1 To survey and collect the factors affecting the decision and invested in transport by conveyor system.

1.2.2 To develop a model for supporting decision maker in the convey system selection.

1.3 Scope of work

This research has studied and focused on collecting the key factors that affected to the decision of material handling investment in conveyor system through Delphi method. The key factors identified will be used to build a conveyor selection model support based on Analytic Network Process (ANP) method.

1.4 Expected results

1.4.1 Suggest key factors which used for a decision to help consider and investment in material handling conveyor system.

1.4.2 Provide the conveyor selection model that aimed to support decision making of executive or plant manager who are interested for conveyor system investment analysis while this model is also useful as to increase reliability for manufacturers of conveyor and to encourage clients to be more participated in conveyor system selection.