Chapter I

Introduction

1-1 Background

Nowadays, quality of products and services is the important factor of any companies in increasingly competitive environment. According to the development of technologies, very high performance and complex machinery is created to replace human skills for producing faster and better products. Production becomes more dependent on machinery than human skills. As a result, availability and performance of machine need to be maximized and maintained in order to provide quality products and services to customers, to utilize resources, and to increase productivity of the company. Maintenance aims to maximize availability and performance of equipment. It helps in maintaining condition of equipment or machinery to be operated at the specified capability.

Decrease in availability and performance of machine is caused from machine breakdown or failures. This results in the stoppage of production process and reduction of machine performance to produce desired quantity and quality of products. Corrective maintenance (CM) is performed to correct these failures and make machine to be in good working condition for production. However, losses form decrease of machine availability and performance in production have been occurred. In order to avoid these losses, preventive maintenance (PM) should be performed in the system.

To maximize availability and maintain the good working condition of machinery require costs. These costs are both direct and indirect. Direct costs are costs of labor, tools, equipment, etc used in restoring or maintaining the availability of machinery. Indirect costs are loss of production opportunities to produce product, and costs of overtime and reschedule production plan. In order to minimize these costs, the concepts of corrective and preventive maintenance have to be optimized. The decision in selecting maintenance policy must be based on costs. Monitoring both direct and indirect costs resulted from each maintenance plan can help the decision-maker to select a suitable plan. A decision-maker can choose the proper maintenance plan by formulating preventive and corrective maintenance under a financial base decision.

1-2 Statement of the Problem

To select the suitable maintenance plan is a difficult task. A lot of information is required in the decision making process. Many factors, such as maintenance costs, production schedules, work hours, labor, work method, skills, and etc, are involved in making a decision. In the company that does not have systematic data collecting process, most decision making regarding maintenance is based on experience of the experts who have worked in the printing industry for more than 10 years.

A decision based on experience may cause two problems. Firstly, since it may not be based on enough related information, such as financial information, it is very difficult to estimate or control the maintenance and related costs resulting from this decision. Secondly, since a decision is made by a human expert who has worked for many years, it is not systematic and reliable enough to assure that maximum availability and performance of machine can be achieved.

To help the managers make correct decisions, tools that can support them are needed. There are many types of tools that help decision-makers such as Management Information System, Expert System and Decision Support System. DSS is one of the best choices to help managers make decisions. It is defined as a computer-based system that is used in direct support of managerial decision making (Keen and Wagner, 1979). DSS is designed to serve needs of decision-maker by analyzing and transforming data and information into various form of alternatives and estimating the results of those alternatives. MIS is focused on the information system function and provides indirect support for decision making by giving only useful information to users. DSS can support decision-maker more flexible than ES by using a what-if analysis to suggest alternatives in various conditions. In addition, it is not designed for selecting alternatives by itself. In contrast, ES is created to replace the decision-maker and, in complex decisions, may offer non-flexible method to solve the problem.

DSS can help the managers by collecting the maintenance and related data in a systematic way. It uses for analyzing such data into useful information and transforms the information into various alternatives. DSS can estimate the results of each alternative and recommend the best alternative that serves the objective of the company.

1-3 Objective of the Research

The objective of this research is to develop a Decision Support System to help the maintenance manager in making and selecting the suitable maintenance plans for the printing machinery.

1-4 Scope of the Research

(1) The firm selected for this research is Bangkok Printing (1984) Co., Ltd. The research will be limited to a study of the maintenance of the offset-type printing machinery. This machine is used for gathering information of machine failures and maintenance.

(2) A Decision Support System will be developed to be the prototype software that supports a decision-maker for making and selecting the suitable plans in maintenance of the machinery.

1-5 Research Procedure

(1) Identify the problems regarding the maintenance planning of the printing machinery.

(2) Set the objective of the research.

(3) Study the related literatures and theories.

(4) Analyze and design the decision support system for maintenance planning of printing machinery.

(5) Collect the data and knowledge regarding the maintenance planning.

(6) Build the models of the decision process.

(7) Collect the data and information used in the system.

(8) Develop the application software for the system.

(9) Implement and evaluate the system.

(10) Summarize and conclude the research and give the recommendation for the further development.

(11) Prepare a thesis presentation and the final report.

1-6 <u>Expected Results</u>

(1) The decision making in selecting the maintenance plan is made in a much more systematic and reliable way by using the Decision Support System.

(2) The decision-maker can monitor the estimated costs that will occur from alternative maintenance plans before making a decision.

(3) The Decision Support System in the maintenance planning will be used as a tool for training new manager or people who will be responsible for making decisions regarding maintenance.

(4) The Decision Support System in the maintenance planning will be a guideline to develop the DSS for use in other areas such as production, inventory, operating and etc.

(5) The prototype of the DSS in the maintenance planning can be applied to the other businesses outside the printing industry.