CHAPTER 1

INTRODUCTION

The role of technology in fostering economic growth of nations and enhancing their industrial competitiveness has been widely recognized, through its domineering influence over industrial productivity. While the contributions of capital and laborquality to productivity growth range from 18% to 42% and from 10% to 18% respectively, the contribution of technology ranges from 44% to 72% in the most developed nations. The mounting pressure on developing economies to improve their productivity levels and become internationally competitive, has forced them to take the path of economic liberalization. In this context, governments in developing countries such as India, Brazil and China have initiated various steps, including integrating their technology, industrial and trade policies, and constituting and strengthening institutional mechanisms, for fostering technological progress. The growing awareness in many developing countries pertaining to the importance of management of technology has led to the formulation of technology planning exercises in order to cope with the ever widening technological gaps with respect to the industrialized nations. The technological needs of many developing countries are rapidly growing and highly diverse - mostly in agriculture and manufacturing. Policy planners and industrialists in these countries are generally convinced of the fact that technology can be utilized as a competitive weapon and nurtured as a strategic resource. Against this backdrop, this thesis focuses on the economic justification of new manufacturing technologies in developing countries.
1.1 THE INDIAN AUTOMOBILE INDUSTRY STATUS

India's Rs. 100 billion auto component industry exported components worth Rs. 856 million in 1995-96, up from Rs. 768 million in 1994-95, according to ACMA figures. The industry has been a consistent export performer over the past four years with an annual growth rate of more than 20% in dollar terms. Europe accounted for 28% of the total auto component exports from India followed closely by the US (27%) and Asia (22%), the remaining 23% shared by Canada, Australia and countries in West Asia and Africa, according to official figures. The automotive components and ancillary industry has taken big strides during the last couple of years following the introduction of the phased manufacturing programme by automobile majors. The modernisation scheme implemented by the manufacturers has been responsible for the indigenisation of auto components and the spare parts sector coming as it does when the industry all set to witness a boom. The component industry had invested more than Rs 1.4 billion during the last year on capacity enhancement and technology upgradation. With the automobile industry setting the pace, the Indian auto component industry is also upgrading and advancing its technology and manufacturing processes.

The financial justification of Advanced Manufacturing Technologies (AMTs) in the Indian automobile industry has been the subject of concern in the industry owing to the cost-benefit tradeoffs associated with such decisions. This has been identified as an inhibiting factor for the introduction of Flexible Manufacturing System (FMS) in auto sector. Throughout the extensive literature associated with FMS, the questions pertaining to the inability of firms to determine analytically whether such systems are viable, have
been elaborately addressed. This brings the capital budgeting decision-making into marked focus in FMS environment.

1.2 AN OVERVIEW OF THE THESIS

This chapter provides an introduction to the thesis, which has been organized into six chapters. The structure of the thesis has been presented in the following paragraphs.

Chapter 2 portrays the various issues germane to the Indian automobile industry. The market segmentation, the role of automotive components sector, and the future of the industry have been depicted.

The structure and technology status of the Indian Machine Tool industry have been elaborated in Chapter 3. The basic concepts of Flexible Manufacturing Systems (FMSs) and the research problem pertaining to their economic justification have also been defined in this chapter.

Chapter 4 provides a detailed description of the capital budgeting decision-making framework. It also provides a complete review of the literature on technology justification of advanced manufacturing systems.

Chapter 5 discusses the technology justification process with respect to AMTs. The choice of AMTs depends on several criteria, i.e., financial, production and strategic. An integrated Analytic Hierarchy Process-Goal Programming model has been formulated for justifying the choice of AMTs. The model output and results have also been presented.

The 6th chapter provides a summary of the thesis, and discusses its contributions and limitations. The scope for further research in this area is also indicated.