



Pergamon

Journal of High Technology
Management Research 13 (2002) 157–175

THE JOURNAL
OF HIGH
TECHNOLOGY
MANAGEMENT
RESEARCH

Impact of advanced manufacturing technology on organizational structure

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Abstract

Advanced manufacturing technology (AMT) has been introduced in Indian manufacturing industries to have a competitive edge in the global market. Despite the claims that attractive benefits can accrue through the use of AMT in manufacturing firms, only modest benefits are reported. Productivity of AMT organizations is found to be low even after several years of implementation of AMT. One of the reasons attributed for low productivity is the organizational structure that remains mechanistic and not compatible with new technology in most of the AMT firms. This paper presents a framework to implement AMT in an existing environment with organic structure to achieve superior performance. Data collected from 927 employees of 27 AMT firms in a cross-sectional survey revealed significant information to change existing organizational structure and make it compatible with change in technology to achieve higher productivity. © 2002 Elsevier Science Inc. All rights reserved.

Keywords: Advanced manufacturing technology; Organic structure

1. Introduction

Developing countries like India, where technological change is the thrust in manufacturing industries, have introduced advanced manufacturing technology (AMT) to have a

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competitive edge in the global market. Despite the claims that attractive benefits can accrue through the use of AMT in manufacturing firms, only modest benefits are reported (Virmani, 1990). The superior performance of AMT firm, even in higher levels of AMT, in terms of maximum labor productivity, superior quality, and greater flexibility in response to changing market demand is still to be achieved. Firms, in which lower levels of AMT have already been introduced, are unable to progress to higher levels to achieve manufacturing prosperity (Datta, 1990; Nemetz & Fry, 1988; Virmani, 1990). One of the greatest challenges facing manufacturing firms in today's business environment is the implementation of AMT in the existing environment, which has effected a number of changes in the work place. Technology used in an organization affects the structure of work. Reorganization of AMT firm consequent to implementation of AMT is usually feared because it means disturbance of the status quo, a threat to people's vested interests in their jobs and an upset to established ways of doing things. For these reasons, the needed reorganization is often deferred, resulting in a loss of effectiveness and an increase in the cost of manufacturing (Kotter & Schlesinger, 1979). If the organization's design is not appropriate for the work to be performed, behavioral problems can easily set in and the effectiveness of the decision-making system can be seriously undermined. Drucker (1988) has stated:

Organizational structure is an indispensable means and the wrong structure will seriously impair business performance and may even destroy it. Future organizations will be information based and composed largely of operation specialists and will have no middle management at all.

The firm's technology influences the organizational structure at operational and administrative levels, and consequently, the performance of the firm (Parthasarthy & Sethi, 1992). New technologies are most likely to yield productivity gains when they are coupled with changes in the organizational and human behavior (Preece, 1995). One of the reasons attributed to the low performance of AMT firm is the organizational structure of that firm which remains static in the changed environment. The most neglected factors during the implementation of AMT are overall strategic plan, organizational design, design of jobs, skills of blue-collar employees and their work attitudes (Bailey, 1993). In a developing country, the ability to adopt technological change is the measure of success (Noori, 1997), as the firms face many uncertainties. We are interested to know about the impact of new technology on organizational structure, whether the organizational structure remains the same or different after the implementation of AMT.

There has been substantial research documenting the effects of AMT on organizational structure, but much has been in a developed country's perspective and less is known about the implications for a developing country. A systematic empirical investigation of the effects of AMT on employees and organizational structure is required in a developing economy to understand the implications of AMT in the context of their socioeconomic conditions. Such a study is important because many firms which have already implemented AMT and invested huge money in their manufacturing operations face problems and are unable to progress to higher levels of AMT. Hence, this research is a more broad-based quantitative investigation

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