

# Planned Organizational Change Consequent to Advanced Manufacturing Technology Adoption

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**Abstract:** Organizational change consequent to the implementation of advanced manufacturing technology has been mentioned in the production management literature. However, this literature lacks a body of research studies to validate these claims in developing economy. As technology is linked to competitive advantage of many manufacturing firms, the implementation of new technology in the existing resources should be carried out with planned organizational change. This paper highlights the importance of technology-organizational change and the fit between them in the modern manufacturing firms in developing country's social economic framework in the context of global competition.

**Keywords:** Organizational change consequent, advanced manufacturing technology, production management literature, social economic framework, global competition.

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## I. INTRODUCTION

Change is inevitable in the history of any manufacturing organization. Manufacturing firms that do not change or keep pace with the changing environment soon become defunct. To function effectively, such firms have to achieve an equilibrium that is dynamic within the internal environment in terms of technology and employees and the external environment in terms of social, political, economic and cultural factors. The change in technology affects any organization when it is implemented. The change forces organizations to cope with the environment to become more adaptive otherwise they become extinct. (Kotter & Schlesinger, 1979)

Technology changes faster than people's behavior. Any attempt to change the organization to meet changes in technology is usually met with a lot of resistance especially by the blue collar employees. Thus, while the process of organizational change is going on, a parallel process of preparing employees to accept the change is necessary. In many ways the introduction of new technology is as painful for traditional management as it is for traditional employees.

## II. HUMAN FACTORS

Once an organization structure exist changing it will need to be done carefully so as not to alienate or frustrate key players, but to efficiently guide the behavior of individuals and groups so that they would be productive, efficient, flexible and motivated. Human factors, herewith, refers to employee reactions that arise in most periods of technological change. The current trend in sophisticated automation have the power to democratize manufacturing industries, starting at the lower end of the value chain, but increasingly moving toward complex decision-making roles. Contract manufacturing companies that specialize in mass production are using robots to push back against rising wages and to increase competitiveness (Dornfeld, 2011). Psychologically unprepared employees will naturally resist new technology for reasons such as uncertainty, phobia, alienation, technological stress, job security, fear of loss of role identity, de-skilling among others.

Successful adoption of advanced manufacturing technology (AMT) does not only depend on whether the employed technology is in a state-of-the-art or not but also requires employees support. Cascio (2010) stated that the behavior, attitudes and qualities of the employees can add an edge to the competitiveness of an organization and make its

advantages more distinctive. This approach can improve relational requirements and skills of human capital of the company, which is supposed to exploit the new technologies (Noe et al., 2008). Several studies suggest that technology implementation is more likely to be successful when the technology and employees issues have been designed to complement and integrate with each other (Ghani, 2002; Rosnal et al., 2003).

Advanced Manufacturing Technologies requires workers to be equipped with a variety of new skills at various levels. The operating and technical people responsible for running, maintaining, and organizing the new technologies require new skills, attitudes, system procedures and social structures. Higher knowledge intensity is required by workers in automation, even low level jobs will require more responsibility for results, more intellectual mastery and abstract skills and more carefully nurtured interdependence (Cagliano, 2000). The increase in task complexity linked to integrated manufacturing requires employees to expand their scope of attention and process significantly more information. These changes are necessary as the competitive advantage of AMTs hinges on the creation of a flexible, multi-skilled, knowledgeable workforce.

Kochan (1988) in his study examined the degree of technological automation and human resources management practice and found that firms with poor productivity and quality performance were the plants that were the lowest on Human Resource Management (HRM) dimensions regardless of automation level. Certainly, it takes some time for plants to realize the potential benefits of an AMT investment. This is largely because of the learning curve associated with these technologies that may delay performance gains. As a fairly complicated technology, employees need extensive training and experience to master the new technologies. Therefore, time may act as a confounding variable in obtaining AMT benefits in an organization (Boyer et al, 1997).

Dauids & Martin (1992) have estimated that firms introducing new technology spend more than 90% of resources on technology while less than 10% is attributed to human resource development for training and educating the work force. The long-term success or failure of AMT depends on the importance of human factor consideration in the implementation of new manufacturing technology (Fallik, 1988). If ignored these may result in employees' resistance to implementation of new manufacturing technologies in their firms causing reduction in productivity which ultimately leads to failure of technology adoption.

### III. EMPLOYEES WORK ATTITUDES

Technological change affects and demand changes in design and manufacturing activities. Consequently jobs/tasks of employees have to be redesigned. To achieve superior performance a firm must try to maximum fit between technology, structure and employees. Issues of technological change are identified as apprehensions regarding job security and job displacement. Employees, particularly operators, resist technological change fearing that new technology would reduce or eliminate the need for their particular skills. Marx (1976) best articulated technologies as having potential to deskill the worker, to isolate him/her from the means of production and to diminish the worker's power and influence. As such there is need to considered AMT as an independent variable, whereas structure as the dependent variable with worker's work attitude as a moderating variable.

Reorganization of AMT firm 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 loss of effectiveness and an increase in cost of manufacturing (Kotter & Schlesinger, 1979). The structure of a firm is more difficult to alter since change involves redefining jobs, changing the reporting relationships, and even eliminating some units. If the organization's design is not appropriate for the work to be performed, behavioural problems can easily result, and the effectiveness of the decision-making system can be seriously undermined.

According to King & Anderson, 1995, the type of technology influences job satisfaction. Mass production technology provides the lowest level of job satisfaction as the job is narrow and routine, whereas the batch production provides a higher level of job satisfaction (Gannan, 1977). As the nature of job in AMT is of batch production and the operator performs the role of a supervisor in operating and monitoring the production, job satisfaction is high (Pestonjee, 1991).

#### IV. IMPLICATIONS TO MANAGERS

The major concern of management in implementing new technology is the attitude of the unions. Companies have to put in a tremendous effort to get the change accepted by the unions. Many employers are opposed to the participation of unions particularly in decisions about new technology. If the unions are not consulted in advance about technological change, their initial response will be negative. It has been contended that unions do not resist technological change but generally prefer to negotiate on its consequences and for sharing the benefits (Virmani, 1990).

Along with technology development, there is no doubt that the human resource is the greatest asset for any organization, without which the use and development of technology will not happen (Ghani, 2002). Under AMT implementation, the worker's discretion and scope of responsibility is expected to increase. It is obvious that providing workers with opportunities to improve their intrinsic motivation and job satisfaction by means of employee-involvement practices could be deemed an acceptable policy to align the goals of employees with the firms' (Waldeck, 2007).

Human resources can provide the firm with a source of competitive advantage with respect to its rivals. On the top of that, effective management of people is critical to the successful implementation and use of new technological systems. In policy terms there is again a growing recognition that the main problems in technology transfer are not in the technology itself but in the managerial capabilities of firms (Bessant, 1994). The impact of management and manager's personal characteristics, experience, style and background on decisions making is very important for new technology adaptability. Generally, adopting effective management practices, capable of keeping pace with the changing technological environment, is particularly important to success in global markets.

#### V. PLANNED ORGANIZATIONAL CHANGE

Change is a complex process. Planned organizational change is a change activity that is intentional, goal-oriented, and purposeful. The purpose of planned organizational change is to improve the ability of the organization to adapt to changes in its environment and to change employees' behavior. A planned change process in the context of technological change overcomes psychological barriers to technological change. This type of change includes programs to break employees resistant to change, proper communication, psychological barriers, structural characteristics, employees' behavioral characteristics etc.

Implementation of new technology in many organizations has failed mostly for reasons of organizational and human dimensions, regardless of technology level. Several studies suggest that technology implementation is more likely to be successful when the technology, organization, and people issues have been designed to complement and integrate with each other (Preece, 1995; King & Anderson, 1995).

Employees' resistance to change factor can lead to work slowdowns, poor employee morale, high maintenance cost, and even sabotages (Davids & Martin, 1992). When new technology is implemented, "total productivity" at first drops because of natural response of employees' resistance to accept new technology. However, as employees get used to new technology their acceptance rate improves and their attitudes towards new technology become more positive. As a matter of fact, their proficiency and skill rate also return to normal levels. A proactive approach to minimize the resistance to change is to develop a program to explain the benefits of new technologies to the employees (Chattopadhyay & Pareek, 1982).

#### VI. PROPER COMMUNICATION ON THE CHANGE PROCESS

Many implementation efforts fail because of under estimate the scope or importance of preparation of employees. Some employers feel if employees are informed in advance the employees will go on strike. Inadequate communication results in confusions and rumors among employees. Improper communication develops uncertainty, which in turn leads to reluctance and less commitment among employees (Davids & Martin, 1992). The implementation of new technologies has been successful in firms in which the unions have been consulted in advance (Virmani,1990).

The problematic areas of technological change to be communicated are job security and job displacement (Coates, 1983). Employees, particularly blue collar workers, resist technological change fearing that new technology would reduce or eliminate the need for their particular skills. New technology has the potential to isolate and deskill the worker to diminish

the power from the worker. Most of the blue collar employees want to have some benefits out of the new technology (Wilkinson, 1989). There are operators who are more comfortable with existing technology. They feel powerless and are detached from new technology. Some feel that they should retire at an early age. Some are alienated from new technology (Jermier, Knights & Nord, 1994).

## VII. PSYCHOLOGY BARRIERS TO THE CHANGE PROCESS

New technology creates phobia among unprepared operators. The anxiety and emotional fear towards new technology lead to committing mistakes that would cost heavily in a firm (Davis, 1994). Technological change induces stress among operators, which is caused by anxiety and tension associated with technological change (Ghani & Sugumar, 1997). According to Argote, Goodman, and Schkade (1983), unprepared workers in new technology experience more stress than they had in their prior jobs. Fear of work overload caused by reduction of cycle time is another factor of concern among blue collar workers.

Human resistance that arises in most periods of change originates from psychological barriers to technological change of employees. Resistance to change is rational but it should be eliminated by a planned change process to achieve superior performance. When the level of technological change is higher, the planned change effort should also be higher to eliminate psychological barriers to technological change.

Human resistance that arises in most periods of technological change originates from psychological barriers. Resistance to change is rational however it can be eliminated by a planned change process to achieve superior performance. When the level of AMT is higher, the planned change effort should also be higher to eliminate psychological barriers to technological change. New technology creates phobia among operators.

## VIII. BEHAVIORAL CHARACTERISTICS OF EMPLOYEES

The behavioral characteristics of employees during new technology implementation must be adaptive to achieve superior performance. The strategies that will enable the employees to adopt to new technology are noneconomic motivation, informal and personal group relations, democratic and participative leadership style and group-based incentives. When the new technological level increases, the behavioral character of employees should be more adaptive by planned change process.

Employees are most likely to respond to change efforts made by someone who is liked, credible, and convincing. Change agents play a very important role in change situations. Credibility, expertise, and objectivity of change agent contribute for change in attitudes of employees. The degree of organizational commitment, job involvement, and job satisfaction is the indication of change in work attitudes of the employee.

## IX. STRUCTURAL CHARACTERISTICS TO THE CHANGE PROCESS

Implementation of new technology occurs through organizational structure, which involves decisions relating to division of task, decision-making authority, coordination mechanisms and so on. Flexibility in structure involves managing variety rather than volume, change rather than routine and judgement rather than standard procedures. New technology calls for an integration of product planning and execution that had hitherto been considered as separate and sequential. Traditional structure that emphasizes a high level of differentiation in task and authority would be inappropriate for these conditions. Instead a flexible structure that incorporates diverse disciplines under one banner by using task forces and committees that make decisions based on expert knowledge rather than traditional managerial authority is needed. The resulting arrangement is an organic structure that is flexible, adaptive, and multiskill oriented. Theoretical arguments and empirical findings support organic structure for new technology implementation period (Johnes & Snelson, 1988).

## X. CONCLUSIONS

The rapid development in both availability and range of choices in manufacturing technologies opens up major opportunities not only for improving what has always been done but also for more radical alternatives that lead to a key condition for long term competitiveness in developing countries. Changes in communication and interaction related to AMT implementation have been shown to result in greater satisfaction. However, many AMT projects in developing

countries fail to meet the expectations of their adopters and increasing signs of difficulty begin to emerge which suggest that the translation of potential benefits into real competitive advantage has not always been as simple as signing the cheque for a new piece of equipment.

Applying and adopting new technologies indicates that there are broader issues that have to be considered. Management of firms that are considering the adoption of AMT need to recognize, understand and address these issues in order to overcome or circumvent the problems of previous installations. To have a successful AMT implementation, the questions like “what are the organizational factors which make a firm more competitive and adept at using AMT in improving its performance?” and “Is AMT’s impact on company performance more pronounced if associated with a compatible organizational change and practices?” should be answered.

What seems to be missing in literature is a unifying framework or model within which the various claims of interrelationships among the concerned factors could be analyzed. Though several attempts have been made to find and analyze the strategic significance of AMT and its impact on company performance in different form of models, there is a lack of model/framework which cumulate studies that systematically build upon each other rather than to be isolated representations and will be able to direct managers and AMT adopters in improving company performance. This paper is a step in paving the way for a framework with the right mix of organizational change and technology.

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