ORGANIZATIONAL PREPAREDNESS

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Abstract

Effective technology management depends mostly on the emphasis laid by the organization on learning at all levels. This paper based on several case studies and empirical analysis of over 200 organizations describes the organizational issues involved in successful technological transformation. Flexibility, planning, emphasis on training and development and unique experiments such as gang-planks (gatekeepers) facilitate technological innovation.

I. Introduction

Technological change in capital goods sector has been recognised as the most powerful and important instrument to bring about rapid and extensive economic growth [1, 5]. This sector employing both both market (formal) and non-market (informal) information promotes capital-saving technical changes which have cascading effects on the economy [2]. Previous studies of technological change have dealt with industry level variables for analysis [3,5,7]. These studies assume differences among firms to be transitory or unimportant unless based on economic of scale. However, recent research contends that firm-market characteristics play a dominant role in the technological change in the sector [3,4,8]. Recently the focus of analysis has shifted to investigate what mechanisms foster/inhibit the process.

Previous studies have focused on certain aspects of the transformation process. Kim and associates [5,6,7] on the basis of their analysis of Korean firms observe, that management capability and technology policy of a firm are important for its long term development. In view of the fragmentary knowledge about the dynamics of the

process, exploratory qualitative methods are the best way to arrive at a comprehensive view of the technological change process at firm level. This article, based on several case studies and analysis of over 200 firms, presents what organizational mechanisms foster/inhibit the technological change process at various stages - adoption, adaptation and innovation.

Dominant Factors

The case analysis and empirical analysis of the organizations offered quite interesting insights into the dynamics of technological transformation in Indian manufacturing firms. The most important factors influencing the technological transformation process in Indian manufacturing organizations were planning, top management support, donor characteristics, training and development, vendor management, national plan priorities, and university-industry linkages. Following paragraphs provide a descriptive account of critical elements.

The management of technological transformation depends upon rational decision-making behavior. The decisions made at the technology selection has cascading effect on the technological efforts a firm undertakes. Appropriate selection mechanisms like formal structures represented from different functions can effectively search and scan for any technological opportunities and threats. Involvement of S & T personnel in the technology selection not only influenced early adoption but also a more rational technology content selection. The firms thus benefit from paying for the right mode of technology transfer when formal groups inclusive of S & T personnel select a technology for absorption and development. Hence,

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setting up of formal structures to monitor, select technologies is important.

The success of technological transformation process in a firm is dependent upon productive structure which allow for a more effective exploitation of the resources. Development and sustenance of mechanisms fostering effective utilization of resources', such as quality circles, kink groups, Value engineering groups fosters successful learning effects.

The effectiveness of technological transformation process depends upon exploiting the complementarities between research and the production activities. The effectiveness depends upon integrative efforts and structural differentiations within the firm. Hence, the development of mechanisms to integrate technology efforts with other functions, is necessary to rationalise both resource allocation and utilization.

Continuous professional technical and managerial training and development enhancing organizational skills were found to be hallmarks of innovative firms. Emphasis on effective HRD practices foster creative organizational climate triggering inventive ideas. Hence there is a need to promote HRD practices to develop and exploit the potential of employees as a means to ensure creative climate.

The linkages between industry, university whether formal or informal prove to be of great importance in the industrial research system. These linkages are generally informal, most of the time person to person contact which can be developed at no additional cost. The firms need to resort to promotion of internal mechanisms to encourage formal or informal links with external technology sources'.

Adoption was dominated, especially during the early stages, by technical or engineering considerations. Human aspects and implications are not explicitly considered, or only in so far as certain effects might be seen here as a result of the decision to invest in new technology, based upon, financial, administrative or technical projections. The only explicit way the employee issues formed part of the early adoption i.e., selection was in financial or economic terms, that is to say, in terms of labour as a cost of production. More strictly qualitative issues and implications of the technology, such as job design and working practices, were typically ignored or not considered at all until the later stages of the adoption process (or early stages of the adaptation process) and the selection was totally in a sense technological deterministic way. The technological determinism was largely influenced when the committee had an engineering personnel involved in the selection of the process. The staff and employee involvement per se was largely superficial throughout the selection process. In the later stages of adoption industrial engineering, and training specialists carved into the process of adoption establishing production and normalizing the structure of the firm. Thus, technology selection is technology-deterministic.

Adaptation, unlike adoption, did not usually involve formal systems and budgetary allocations. The adaptive efforts were found to be significantly related to the effectiveness of the differentiated units. Most firms adopted a as and when required strategy for adaptive efforts. The adaptive efforts were carried out by the R & D and production personnel mostly as corrective and improvement measures i.e., process adaptations and to a

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lesser extent in product. The product adaptations were found in firms with high importations or when scale variations were required or the improved product parameters incorporated to combat and achieve a 'niche'. Hence, in Indian manufacturing firms, adaptation efforts are differentiation activities.

On questions of adaptation, involvement of employees and staff by providing encouragement for alternate designs and material/manufacturing forms was imperative. The acceptance of failures in experimentation and the top management's realization of long-term benefits were found necessary to trigger off product adaptations. Support for 'street smartness' by shop-floor staff and an emphasis on quality engineering was found to be influencing process adaptations. The personnel functions such as training, team-building exercises were found in process adaptive firms. The existence of employee suggestion and reward systems were seen as the effective vehicles spurring employee involvement and responsibility in successful process adapters. Thus, importantly, top-management support is crucial for successful transformation.

The supplier who could access the control of firm through the collaboration content can largely influence the technology adoption and development. The early adoption was smoothly operated involving hands on training of personnel at the mother plant, tips in selection and configuration of machines and on site training by skilled technicians flown from the collaborator firm. The transfer of R & D information, a clause in their agreement, was found not to be honored by many collaborators. Another interesting point which needs more rigorous analysis was that ventures in which the collaboration was financial, the seller had

considerable influence over the technological activities of the firm. The repeated technological agreements were found to be common, many a time for a scale variant, in ventures wherein the seller firm had representation on the board. It was found, to a limited extent, that there were conscientious efforts from the representatives of the collaborating firm discouraging backward engineering and experimentation fearing swaying away from dependency. Thus, supplier dominance has long-term impact on technological transformation.

The product focused manufacturing strategy with general purpose machines provided the firms the plant flexibility required to meet variances in customer demand. Customer focused manufacturing coupled with multi-skilled workforce helps the firm in attempting product variants or addition of features. Hence, importantly focused manufacturing fosters effective product management.

Lack of a long-term leadership influences the emergence of profit maximization culture which may inhibit innovative efforts. Indiscriminate transfer and lack of managerial skills seem to be affecting truncation of technological transformation in public firms. Continuous focused leadership influences the technological transformation process.

Failure to recognise vendors as nodes of product improvement and innovation seem to have an impact on the technological transformation of the firm. Effective management of vendors and institutes of learning provide the firms capabilities to exploit technological opportunities. Linkages influences successful technological transformation process.

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Conclusions

Effective technology management depends mostly on how much emphasis the organization places on technology development. The role of flexibility, top management support, interdisciplinary teams are quintessential for technology transformation at firm level.

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