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Technology Management for Agile Manufacturing Through Information Technology—A Human Resource Approach

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ABSTRACT

With the spread of process of globalization leading to increasing need for competitiveness, management of technology assumes greater emphasis. The success of an enterprise will become dependent on how much technology-driven the organisation becomes and the agility of the manufacturing operations. Agile Manufacturing is the science of a business system that integrates management, technology and human resource in such a manner that provides cost and time effective flexibility to the system for change-over from one product to another. For achieving agility to respond to rapidly changing market demands/expectations, Information Technology (IT) can provide solutions for all operations/disciplines.

The crucial interface for three dimensions of a manufacturing set-up i.e. Technology, Management and IT, is the Human Resource. Because of the Indian socio-economic structure, acceptability of computer usage by a large percentage of personnel poses a challenge for the managers. Every organisation, therefore, has to pay particular emphasis on Human Resource Management in the form of training and informal tiered interfaces to create IT acceptability. The author's study at one of the plants, with advanced technology and multi product/customer environment, reinforces the positive role of HRM approach to ensuring growing and effective use of IT for enhancing productivity and agility of Technology Management.

1. INTRODUCTION :

Technology applications in industry can, in a broad sense, be classified into three segments viz. Research & Development, Manufacturing Technology for Conversion Technology and Servicing/Maintenance & Repair Technology. The path of progression of technology needs to be planned in such a manner so as to manage it efficiently and effectively by harnessing the resources for successful attainment of objectives of the enterprise. Stokke, et al (1991) had visualised "three phases of technological development over the next 20 years :

- 1990-1995 :** Economic and Political adjustments adapting to the needs of transition to facilitate the global flows of economic activity and technology.
- 1996-2000 :** The take off phase of new Economic Age of global interdependence.
- 2001-2010 :** The new competitive era bringing the challenge of staying technologically competitive in a now fully globalized system".

It is apparent that harnessing technology has become paramount for the success of an enterprise. As the process of globalization spreads, leading to increasing need for competitiveness, management of technology assumes greater emphasis. The success or even survival of an enterprise will gradually become predominantly dependent on how much technology-driven an organisation becomes and the agility of the manufacturing operations. To meet demands of global competition, an enterprise has to develop ability to respond to market demands for changes in product specifications or product mix with the shortest gestation period.

2. TECHNOLOGY MANAGEMENT

Based on the author's wide ranging experience in aerospace industry and academic pursuits alongside, as well as experience of contemporaries in other organisations and literature studies, a conceptual model for Technology Management was developed as shown in Fig. 1. The model has seven key elements :

- i) Available Technology
- ii) Improved Technology
- iii) Assimilated Technology
- iv) Deliverable Product
- v) Quality Management
- vi) Packing & Transportation Technology
- vii) User feed-back thro' Information Technology

The cycle of 'Available Technology' conversion to 'Assimilated Technology' results in a 'Deliverable Product', for which customer usage provides feed-back for the next technology cycle for an enterprise.

3. INFORMATION TECHNOLOGY:

The Technology Management model in Fig. 1 had studied the usage of Information Technology (IT) only at the stage of customer-to-enterprise feed-back. But there is substantial amount of data/information

6.6. To make the personnel get involved in the usage of this system structured training was designed and is being continuously monitored.

- i) Training in use of remote terminals in class room environment
- ii) On-the-job training
- iii) Basic familiarisation training on micro-processors
- iv) Training in operating and application softwares.

6.7. In this elaborate training and acceptability programme, not only the emphasis was on providing basic skills in on-line and off-line computer usage, but also on educating regarding advantages of adopting IT applications. The results have been heartening. These training programmes have now been running for last few years so that progressively entire population of the plant will get exposure to IT means and procedures. Due to continuous advances in softwares for networked systems and stand-alone micro-processors, there is also need to upgrade inputs to those personnel who have acquired proficiency in IT usage. For this purpose refresher and upgradation programmes have also been planned.

6.8. In order to percolate the usefulness of IT for the operating personnel, the System personnel review the applications in key usage areas by on-the-spot studies and by consultations at the HOD level so that for each new application introduced on the IT system, feedback reviews are carried out with the users to find out the effectiveness of the application. The coverage of major IT applications achieved is illustrated in Fig. 3.

6.9. Prior to adoption of Information Technology, manual handling of such massive data/information did not allow the operations to have the agility demanded by the customers. The switch-over and subsequent continuity has been achieved through effective Human Resource Management (HRM). The unit has a manpower of over 3000 personnel. To ensure that the continuous process of technology upgradation and assimilation results in more productive deployment of the physical and human resources, a massive amount of information flow through the complete organisational system has to be maintained. The structured HRM interventions in the form of formal training and informal tiered interfaces have resulted in high IT acceptability.

6.10. By constant attention to the training, refresher

and upgradation needs of the personnel the Unit has been able to be at the cutting age of technology while meeting the expectations of a very wide variety of customers. The Agility to handle the complex product, technology and customer mix is, therefore, being continuously improved through progressive spread and adoption of IT in all spheres of operation. This has become a cyclic process which has to maintain the continuum to ensure absorption of advances in manufacturing technology as well as Information Technology as illustrated in Fig. 4.

7. CONCLUSION

The experience at this case Unit of HAL amply demonstrates that the Human Resource in a manufacturing organisation is the key element in ensuring high rate of success to provide Agile capability to the organisation. To have a competitive edge, an organisation has to create structured HRM interventions for effective use of Information Technology which would enhance productivity of Technology Management.

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