

Abstract

Technology, as widely accepted, is essential for improving the economy of a nation, especially in developing countries where industrial growth is assigned a very important role. This thesis is concerned with the study of diffusion of technology from the publicly-funded research laboratories of the Council of Scientific and Industrial Research (CSIR) of India. In this direction, a detailed study has been taken up to analyse the extent of effective diffusion of technology outputs from the R&D organisations to the downstream enterprises and to identify the critical success factors and the linkages important in the context. The responsibilities of the premier R&D organisations of India today include development of new technologies by means of innovation capabilities, and catering for their successful commercialisation.

The thesis investigates the existing practices of diffusion of technology from the research laboratories with the help of questionnaire survey, field visits, analysis of secondary data and interviews with the scientists of the laboratories. Motivational analysis of the scientists of the laboratories and technology attribute analysis is carried out to assess the influence on successful technology diffusion. The effects of the external and the internal parameters of influence on technology diffusion are examined by means of application of technology diffusion models. Finally, dynamic modeling of the technology diffusion scenario as existing in the country today is carried out.

Analysis of the questionnaire responses led to the identification of detailed steps involved in the process of technology development and transfer from the laboratories. Further, the survey yielded results about the varying responses of the scientists regarding the technology transfer, marketing of technologies, technology transfer performance of the laboratories, changes being brought about in the process of technology transfer with time,

special features to enhance the technology transfer process and suggestions to help improve the technology transfer in the laboratories.

An analysis has been undertaken to study the characteristics of the working environment in the laboratories. Further, the features making the working environment in the laboratories conducive for new technology development have been analysed vis-à-vis the major theories of motivation, to yield the motivating factors of the laboratories. The technology attribute analysis is carried out by using relative weights and Thurstone scaling. The relative weight analysis yields the relative importance of the technology attributes whereas the distances between the attributes were measured with the help of Thurstone scale.

An assessment of the status of technology diffusion of Indian R&D, and the influence of the parameters of imitation effect and innovation effect on technology diffusion are made on the basis of the estimated industrial production based on the know-how developed by the CSIR laboratories. It is observed that the adoption pattern follows an S-curve thereby suggesting that all the technologies developed reach a stagnation level paving way for better developments.

Dynamic modelling of the diffusion of technology from the CSIR research laboratories was carried out by making use of the data obtained from the questionnaire responses, expert opinions, relevant literature study and secondary data. Causal loops existing in the areas of technology development and transfer and research project dynamics lead to the building up of the model. System dynamics models are developed in important sectors. Several policy runs are made and it has been found that in all the policy runs the technologies transferred have shown an improvement.

Key words: Technology Diffusion, Technology Transfer, Indian Research Laboratories, Technology Attributes, Scientists' Motivation, Technology Diffusion Studies, Internal and External Parameters of Influence, System Dynamics Modelling.