IMPLEMENTATION STRATEGIES FOR INTEGRATED PRODUCT DEVELOPMENT - A STUDY OF SELECT INDIAN ORGANIZATIONS

by

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Submitted

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to the

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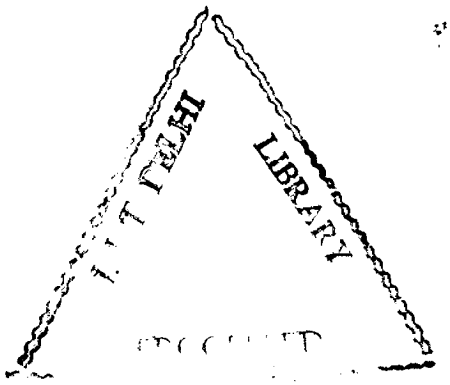

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CERTIFICATE

The thesis entitled "Implementation Strategies for Integrated Product Development: A Study of Select Indian Organizations" being submitted by Mr. Narender Singh to the Indian Institute of Technology Delhi for the award of the degree of Doctor of Philosophy (Ph.D.), is a record of bonafide research work carried out by him. He has worked under my supervision, and has fulfilled the requirements for the submission of this thesis, which has attained the standard required for a Ph.D. degree of the Institute. The results presented in this thesis have not been submitted for the award of any degree or diploma.

Dated: 18 Dec 2002

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ABSTRACT

This thesis aims at studying the implementation of integrated product development (IPD) by the Indian organizations, particularly the management practices and strategies for addressing the quality-cost-time paradigm in the globalised business environment. It also aims at identifying the dominant success strategies and to understand the need for changes in management practices and organizational/structural factors for success in IPD projects. Another objective of the study is to evolve a strategy-model for success in implementation of IPD under the developing economy parameters.

The review of the literature has identified seven important strategy areas for success in IPD projects. These areas are: (i) pre-development project planning and analysis, (ii) concurrent/overlapping development phases, (iii) use of cross-functional development teams, (iv) management of IPD projects, (v) organizational and structural issues, (vi) flexibility in product development and (vii) use of special tools and techniques to address the quality-cost-time issues. Project level strategy issues in the seven areas have also been identified. Based on the literature survey, a conceptual model for success in IPD projects has been evolved. Based on the above, the study variables have been identified and relevant constructs have been defined. Research hypotheses have been framed for each of the seven strategy areas for the study.

The study is divided in three phases, namely the pilot/exploratory study, questionnaire based survey study for evolution of strategy model for IPD success, and detailed case studies of select Indian organizations to verify and further refine the strategy model. The exploratory/pilot study has been carried out with purposive sample of three integrated product development projects from three different areas namely aerospace, electronics and engineering. Interviewing and observation methods have been used in preparation of the cases, which are analysed using the Situation-Actor-Process: Learning-Action-Performance (SAP-LAP) framework of flexible systems methodology.

The questionnaire-based survey has been limited to the organizations in engineering, electronics, electrical and allied sectors due to the constraints of time and cost. The unit of analysis is the IPD project undertaken by Indian organization(s) in India.

The questionnaire was developed through the inputs from the literature survey and the exploratory case studies. After establishing the reliability of the questionnaire, it was mailed to various organizations selected through snowball sampling technique. About 180 responses were obtained from more than 90 organizations, with some of the organizations responding for more than one project. The qualitative data collected through questionnaire survey has been validated for its constructs. Statistical analysis has been carried out for testing the research hypothesis. The conceptual model of IPD success strategies, evolved on the basis of literature survey has been empirically tested through bivariate and multivariate analysis of the responses received through the survey study.

The cases have been prepared using interview and observation methods for six IPD projects from engineering and electronics/electrical/allied sectors undertaken by Walchandnagar Industries Ltd (WIL), Greeves Ltd., Taneja Aerospace & Aviation Ltd (TAAL), Bharat Electronics Ltd (BEL), Intellistudent Services Pvt Ltd, and O/E/N India Ltd respectively. The case projects were selected on the basis of purposive sampling. In each sector, one project has achieved 'high success', one has achieved 'moderate success' and one has achieved' low success' or 'market failure'. The cases have been exhaustively presented and the learning issues have been evolved through SAP-LAP framework of flexible systems methodology. The learnings from questionnaire survey and case studies have been synthesized and a validated strategy model for success in integrated product development has been presented.

The limitations of the study are outlined and specific suggestions have been made regarding possible future extensions of research work reported in this thesis. It is hoped that this research may guide the Indian organizations in implementation of integrated product development in a more efficient manner and new frontiers of strategy formulation and management practices for IPD projects may be opened up.

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