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Success factors for information technology supported international technology transfer: Finding expert consensus

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Abstract

Information technology (IT)-supported international technology transfer (ITT) is complex, risky, and fails often. No empirical studies are available on the factors that affect the success of IT-supported ITT. We review applicable theories (i.e. diffusion of innovation theory) and empirical research in conventional technology transfer to develop such a model. We carry out a multiple focus group method to rank factors that affect the success of IT-supported ITT and then apply a branch and bound method to derive a consensus ranking of these factors. The identified consensus ranking sheds light on factors that are similar to those of DOI theory and suggests a pattern of factors that affect IT-supported ITT.
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1. Introduction

Companies invest a high percentage of their turn-over into research and development (R&D) as technology life cycles become shorter and markets increasingly competitive, and turbulent [22,28,32,33]. The Internet and associated telecommunication services such as teleconferencing and electronic data interchange (EDI), electronic banking, and resulting improved logistics have created more open environment for companies to operate globally. As a result companies significantly globalize their operations and manage shortened technology life cycles through international technology transfer.

International technology transfer (ITT) has become an important research topic in technology diffusion [1,3,22,31,38]. Successful ITT provides benefits for all parties including suppliers, technology supplying countries, technology receivers among others [1,22, 31,38]. Yet, ITT is complex and risky [1,22,38] due to the complex processes, dynamism of the technology, low technology absorption capacity of recipients [1,29], and demand for significant resources (e.g. financial, human

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and physical resources) [38]. Due to these challenges companies carrying out ITT often fail to maintain schedules, manage costs, and achieve quality, and many projects end up being cancelled [22,31].

Information technology (IT) can help resolve some of the difficulties associated with international technology transfer[1] [30]. In particular global networks and new training tools are more readily available and easier to use, thus providing for speedier and more secure transfer of technology.

IT-supported ITT[2] demands new resources and capabilities in place to be successful. Yet there is paucity of studies that analyze factors that affect the success of IT-supported ITT. This study seeks to fill this gap. We will seek to identify a list of factors that affect the success of IT-supported ITT. The main research questions are the following: what are the factors that affect the success of IT-supported ITT? What is the relative significance of different factors? And how can we determine such relative significance?

The remainder of the paper proceeds as follows. We carry out a literature review on technology transfer in Section 2. Section 3 formulates a framework for factors affecting IT-supported ITT. The research methods applied in this study are described in Section 4. Section 5 briefly describes four investigated high-tech companies. Section 6 evaluates and ranks factors by using a multiple focus group method and a recursive branch and bound method. Finally, conclusions and implications are discussed in Section 7.

2. Literature review

We conceptualize technology as knowledge systematically applied, as well as the skills and competencies of individuals and teams [1,3,31,38]. In addition, technology involves the work-organization that enables the innovative design of products, services, efficient production being brought to market quickly, practical solutions to problems, etc. We define high technology as that which requires high utilization of scientific manpower, engineering manpower, and extensive R&D expenditure to be at the forefront of technological leadership [8,10,31]. High technology is expected to change relentlessly, and its life cycle is expected to become shorter while markets grow competitive.

2.1. International technology transfer

We define international technology transfer as a process by which a technology supplier communicates and transmits the technology through multiple activities to the receiver, across national borders. This will ultimately enhance the technological capability of the receiver [1,3,31,38]. We view ITT from a holistic perspective of both technology transfer and utilization. ITT is not a singular event but rather forms a process that starts with identifying the needs and demands for technology, and follows by activities relating to technology transfer and implementation, and finally culminates in the assurance that the technology has been acquired by the recipient as per plan and schedule.

2.2. Information technology support

Multiple IT tools can support complicated tasks associated with ITT. Information technology can increase capacity as well as decrease costs of information storage, processing, and communication [2]. IT adds value to an organization by providing support to the administrative infrastructure, business processes, and the operational skills of the staff. IT increases global connectivity, overcomes distance, decreases time barriers, reduces communication costs, cuts costs through automation, facilitates information sharing, and facilitates access to the advice of remote experts [22,29, 31–33].

2.3. Factors affecting the success of ITT

We are concerned with the success of an ITT project, where IT is deployed and used. In this study we are interested in factors that contribute to this success. A literature review on ITT reveals that the following factors contribute to success of technology transfer:

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[1] In *conventional technology transfer approach*, (transfer of knowledge, skills, and equipment across national borders) several activities are executed such as (a) international market research for technology transfer is conducted by using local trade magazines and visiting foreign countries, (b) the selection of a technology recipient is performed by using external consultants, face-to-face meetings and interviews, (c) negotiations are carried out through face-to-face meetings, (d) transferring of knowledge and skills are facilitated through extensive face-to-face and on the site training, and (e) evaluation and problem solving is done by visiting the facilities of the technology recipient [1,38]. The conventional method requires extensive traveling, is very expensive, and time consuming.

[2] IT-supported ITT process refers to the IT-enabled entire process through which various methods, processes, knowledge, skills, hardware, and software are transferred from the technology supplier to the technology recipient across national borders that allow the technology recipient produce high quality products or services more efficiently [31].