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Determining key capabilities in technology management using fuzzy analytic hierarchy process: A case study of Turkey

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Abstract

The importance of technology management is a vital determinant of long-run success or failure of organizations in today's world. Since technology is a major driver of the global economic development, business professionals seek more effective ways to manage existing and emerging technology. This study proposes a model to understand the links between competitive advantages, competitive priorities and competencies of a firm in the context of the technology management. We use the fuzzy analytical hierarchy process (AHP) to analyze these links. Moreover, we examine the perception of a group of managers from different Turkish firms regarding the technology management. The

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main result of this paper is that the concept of the management of technology arises to be much more important than both the product technology and the process technology. © 2005 Elsevier Inc. All rights reserved.

Keywords: Technology management; Fuzzy sets; Group decision making; Analytic hierarchy process

1. Introduction

Today's markets are creating a new competitive environment which causes manufacturing firms to shift from industrial systems driven by hard-automation to post-industrial systems where success depends on quick response to customer requirements for customized, high quality products [6]. In the post-industrial environment; high quality, reliability, timely delivery, enhanced customer service, rapid new product introduction, flexible systems, and efficient capital deployment are the primary sources of competitive advantage.

Since technology is a major driver of global economic development, business professionals seek better ways to manage technology development. Burgelman et al. [3] emphasize that technology is a resource, which, when managed for competitive advantage, requires the integration with the firm's strategy. Hayes and Pisano [7] argue that firms have to initiate a number of technologies to improve their competitive advantage. To be truly strategic, the challenge is to identify appropriate technology and formulate strategic plans that are consistent with their investment. When assessing the firms' technological needs, managers need to consider their firms' technological resource skills and competencies. However, managers do not necessarily possess all the skills required to develop a portfolio of technologies. As a result, this has translated into a critical need for people who are trained in managing different types of technological assets in varied commercial and non-commercial contexts.

The management of technology is a vital determinant of long-run success or failure of organizations. It allows organizations to enter new markets, renew existing product lines and keep up with rapid technological developments in the environment where they survive. Among all of the influences in an organization's environment, technology management is the key factor that may provide long term competitive advantages which must be kept under control by a firm. For a recent survey on this topic we can refer to the paper by Liao [15].

In this work, we propose a framework to explore the links between competitive advantages, competitive priorities and competencies of a firm in the context of technology management. Understanding these links may help firms to identify appropriate technology and formulate their strategic plans accordingly. Technology management decisions require a special type of knowledge and expertise. We have used a fuzzy analytical hierarchy process (AHP) model

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