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An empirical study on the correlation between the knowledge management method and new product development strategy on product performance in Taiwan's industries

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Abstract

Due to the advances in science and technology and the rapid changes in the market, a product's life cycle has become much shorter than before. Enterprises must constantly innovate and conduct research on new products, choose appropriate products with new technology, cope with customer demands and the threat from new competitors. A new product development (NPD) strategy is an important activity that helps enterprises to survive and make continuous improvements. This study will conduct a performance analysis for Taiwanese high technology companies implementing knowledge management (KM) and new product development strategy. The following results were obtained: (1) There is a positive effect on new product development performance for those companies that strongly implement knowledge management method; (2) Different new product development strategies taken by companies lead to variations in performance; (3) The innovation is more effective than a copying strategy. High technology companies that use an effective knowledge management method to establish NPD strategies will have success.

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Keywords: Knowledge management (KM); New product development (NPD) strategy; New product development performance

1. Introduction

Due to the advances in science and technology and the rapid changes in the market, a product's life cycle (PLC) has become much shorter than before. Enterprises must constantly innovate and conduct research on new products, choose appropriate products with new technology, cope with customer demands and the threat from new competitors. A new product development (NPD) strategy is an important activity that helps enterprises to survive and make continuous improvements. Most enterprises have now placed great emphasis on shortening the time for a new product coming into the market. Firms have adopted knowledge management (KM) method and new product development strategy. However, few enterprises have introduced the knowledge management concept into new product development decisions during the stage of a new

product development. This study will conduct research on the correlation between the knowledge management method and new product development strategy performance. The objectives of this paper are (1) to discuss the correlation between the knowledge management method and new product development performance; (2) and the correlation between the new product development strategy and new product development performance.

2. Literature review

2.1. Knowledge management method

Wiig (1995) proposed that knowledge management is a group of clearly defined processes or methods used to search important knowledge among different knowledge management operations. Knowledge management was alternatively used to confirm new product strategies and strengthen human resource management in achieving the enterprise's goals. Nonaka and Takeuchi (1995) proposed

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that knowledge creation was generated by the interaction of tacit knowledge and explicit knowledge. Using a knowledge transformation model, we understand the creation of organizational knowledge as the consequence of the sustained interaction between tacit knowledge and explicit knowledge. The four transformation models are (1) unification: converting tacit knowledge into tacit knowledge; (2) externalization: converting tacit knowledge into explicit knowledge; (3) recombination: converting explicit knowledge into explicit knowledge; (4) internalization: converting explicit knowledge to tacit knowledge. When the experience is obtained by the above transformation, it soon becomes a valuable knowledge asset. Holtshouse (1998) proposed that knowledge is a kind of flow that can transfer knowledge between the knowledge supplier and knowledge demander. Nonaka et al. (2000) proposed that despite knowledge creation and knowledge innovation, knowledge sharing among people or groups forms the starting point for the next surge in the knowledge screw. Because the main objective of knowledge management is knowledge innovation, each organization member can increase his knowledge through the spiral course of socialization, externalization, recombination and internalization. The competitiveness of an organization is thereby achieved and the knowledge sharing and integration process can generate new knowledge.

Hendrike (1999) proposed that knowledge sharing must be present if knowledge exchanges between the knowledge owner and knowledge demander persists. Each individual may possess both knowledge owner and knowledge demander characteristics. Hansen et al. (1999) pointed out that knowledge management is not new. For example, several hundred years ago family business owners transferred their trade intelligence to their offspring. The technical masters always taught their apprentices their skills and workers exchanged ideas and skills. Not until the 1990s did top management in firms begin to talk about knowledge management. Davenport et al. (1996) concluded from a case study of knowledge management that a successful knowledge management system for an enterprise must contain a skill resource knowledge bank and on-line inquiry system. Ler (1999) pointed out that knowledge management involves collecting information and transferring information to demanders. Such activities, including knowledge obtaining, knowledge refining, knowledge storing and knowledge sharing, can effectively increase the value of the knowledge asset in an organization. This is called knowledge management. Liu et al. (in press) proposed that knowledge has currently become the main manufacturing resource and a prerequisite for success in the production environment. Competitiveness and the resulting rewards can be obtained by taking advantage of knowledge management and intensive learning. This study will adopt the above concepts from our literature survey, and redefine the knowledge management method including knowledge obtaining, knowledge refining, knowledge storing and

knowledge sharing, to form a knowledge management system.

2.2. New product development strategy

Cooper (1984a, b) thought that there were four variables concerning a new product development strategy.

- (1) *Orientating the enterprise to a new product*: This includes creating a new product, developing a better product for meeting the customer's demand than that of competitors, and product concentration and differentiation.
- (2) *Market characteristic adopted by the new product*: This includes the characteristics for a new market, customers, competitors and new sales channels.
- (3) *The enterprise's technological orientation and commitment*: This includes the percentage of R&D expense to sales amount, company's R&D orientation, etc.
- (4) *Technological characteristic adopted by the new product*: This includes more advanced and complicated technologies, closely matched with the company's R&D resources, technical maturity and concentration.

Firth and Narayanan (1996) defined a new product development strategy as having three aspects: (1) new embodied technology; (2) new market applications; (3) innovation in the market. Based on these three aspects, his research lead to a new product development strategy definition, i.e. (1) innovators; (2) investors in technology; (3) searching for new markets; (4) business as usual; (5) middle-of-the-road. Barczak (1995) divided new product development strategy into three categories based on Ansoff and Stewart's classification: first to market, fast follower and delayed entrant. Song and Montoya-Weiss (1998) utilized Ansoff's product market matrix model considering the growing in our current market and technology strategy. The results lead to incremental new product development. A development strategy that pursues a new market with a new product and technology will create a "real new product". A strategy involving a current market and new product or new market and current product is classified as a moderate innovation. Veryzer (1998) used new models with two important aspects: technological capability and product capability. Technological capability means that a product must be made using a technology beyond the current company technology level. Product capability represents the benefit of a product recognized or experienced by customers. Cooper (1983a, b) proposed a new product development procedure. This procedure covers various activities such as creation, creation dissemination, preliminary product development, economic analysis, product prototype test, pilot run, product mass production and entry to market. Clark et al. (1987) viewed the new product development process as information processing. Four steps

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