



Intellectual capital and new product development performance: The mediating role of organizational learning capability

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ABSTRACT

Previous studies rarely examined the relationship between intellectual capital and organizational learning capability. Moreover, most studies neglect the mediating effect of organizational learning capability in the relationship between intellectual capital and new product development performance. This study uses interviews and the survey method to discuss the relationships governing intellectual capital, organizational learning capability, and new product development performance. Results are based on empirical data from Taiwan's IC design industry, and are generated by the Partial Least Squares (PLS) method. Results show that human capital and relational capital actually improve new product development performance through organizational learning capability. Although structural capital positively affects organizational learning capability, managers should pay attention to possibly negative effects of structural capital on new product development performance. Relational capital is the greatest factor among these three types of intellectual capital in Taiwanese IC design companies, structural capital is second, and human capital is last. Comparing three types of intellectual capital of Taiwan's large enterprises with those of Taiwan's small and medium enterprises (SMEs) reveals that the relational capital of Taiwan's SMEs is marginally less than that of large enterprises.

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1. Introduction

Intellectual capital is becoming a crucial factor for a firm's long-term profit and performance in the knowledge-based economy as more and more firms identify their core competence as invisible assets rather than visible assets [1]. Nonaka and Takeuchi [2] point out that future society is a knowledge-based society in which knowledge storage and application are the basis of economic growth and accumulated capital. Industries in such a society do not rely on traditional production factors for their competitive advantage, but on knowledge management and integration. This trend stresses the importance of organizational learning capability and how to create, manage, and evaluate intellectual capital. Despite the fact that intellectual capital and organizational learning capability are so important to firms' development, few studies focus on how these two factors relate to each other and affect new product development performance.

Griffin's research posits that about 32.4% of company sales is generated by new market products [3]. New product development is necessary for firm survival and competitive advantage [4], especially salient in the high-tech industry. Many studies focus on new product development performance [5–8], yet analysis of factors affecting new product development performance remains incomplete. For example, although Chen et al. [9] discuss the relationship between intellectual capital and new product

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development performance, the study does not address how intellectual capital and organizational learning capability simultaneously affect new product development performance. Studies often neglect organizational learning capability as a firm's mediating role. Therefore, this study fills the research gap by exploring the influence of three types of intellectual capital – i.e. human capital, structural capital, and relational capital – and organizational learning capability upon new product development performance.

This study examines the relationship between intellectual capital – including human capital, structural capital, and relational capital – and organizational learning capability. Then, the mediating role of organizational learning capability in the intellectual capital–new product development relationship is discussed. Third, this study uses the Partial Least Squares (PLS) method to analyze the joint effect of intellectual capital and organizational learning capability on improving new product development performance. Hopefully, these research results can help governments or managers and contribute to relevant studies and future research.

2. Literature review

2.1. Definition of intellectual capital

Intellectual capital, a term first introduced by economist John Kenneth Galbraith in 1969, refers to the difference between an organization's market value and book value. Many researchers have come to regard intellectual capital as a firm's primary means of creating competitive advantage. The abstract and dynamic nature of intellectual capital makes it difficult for scholars to define [10]. Moreover, Guthrie [11] even notes that some consider intellectual capital and intellectual assets or intangible assets as synonyms.

Previous studies indicate that intellectual capital is the product of dynamic business operation processes, and is closely related to knowledge management or organizational learning [12–15]. Some researchers also contend that accumulating intellectual capital is beneficial to creating competitive advantage or business values [16–19,12,14,15,20]. Following the above-mentioned literature, this study thus defines intellectual capital as the total capabilities, knowledge, culture, strategy, process, intellectual property, and relational networks of a company that create value or competitive advantages and help a company achieve its goals.

2.2. Classification of intellectual capital

Previous researchers have their own intellectual capital classification due to research subjects and background, and there seems to be no consistent formulation that comprises all intellectual capital evaluation methods [19]. However, with increasing discussions on intellectual capital, most studies follow the framework proposed by Roos et al. [14], Bontis [21], Johnson [22] and Bozbura [23], adopting *human capital*, *structural capital*, and *relational capital* as the three basic dimensions of intellectual capital, also adopted in this study. Furthermore, this research defines structural capital as including *process capital* and *innovation capital*, following the studies of Johnson [22] and Van Buren [24]. Human capital comprises all business capital embedded in employees and not owned by the organization. This capital may be taken away by employees, and includes employees and managers' competence, experience, knowledge, skills, attitude, commitment, and wisdom. Process capital is defined as workflow, operation processes, specific methods, business development plans, information technology systems, and cooperative culture, etc. Innovation capital is defined as intellectual property within an organization, including patents, copyrights, trademarks, and know-how, etc [24,25]. This term also includes R&D expenses and employees an organization invests in new product development performance. Relational capital includes all value of stakeholders, customers, and supplier relations [22].

2.3. Organizational learning capability

Although previous researchers provide several definitions of organizational learning capability, they often emphasize only part of the concept. This study divides organizational learning capability into *absorptive capability* and *transformative capability* for compatibility, following the works of Cohen and Levinthal [26] and Garud and Nayyar [27]. Concerning absorptive capability, Cohen and Levinthal [26] emphasize the *external* element of capability, noting that the ability to evaluate and utilize outside knowledge is largely a function of prior related knowledge. Prior knowledge confers an ability to recognize the value of new information, assimilate it, and apply it to commercial ends. Regarding transformative capability, Garud and Nayyar [27] emphasize the *internal* element, indicating that transformative capability is the ability to choose technologies, maintain them over time, and reactivate and synthesize them with ongoing technology development efforts. Based on previous studies, this study defines organizational learning capability as an organization's ability to absorb and transform new knowledge and apply it to new product development with competitive advantage and high production speed.

2.4. New product development performance

Experts and scholars propose different definitions for a new product based either on the product [28], the producer [29], the consumers [30], or product life cycles [31]. This study focuses on the firm, adopting the definition of "a new product for a firm, no matter if it is new to the market or not," proposed by Souder [29].

New product development performance is a multidimensional construct [32]. Researchers use various performance evaluation measures based on different research focuses. New product development performance in this study includes market performance, financial performance, customer performance, and product performance.

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