

# The effect of environmental uncertainty and strategic applications of IS on a firm's performance

Jong-min Choe\*

*Department of Accounting, College of Business Administration, Kyungpook National University,  
Buk-ku, Sankyuk-dong 1370, Taegu 702-701, South Korea*

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## Abstract

In our study, we empirically examined the relationships among perceived environmental uncertainty (PEUN), the level of the strategic applications and the facilitators of IS strategic alignment. Using a systems approach, we also showed some ways that these relationships impact the performance of a firm. Apparently, PEUN has an indirect effect on IS strategic applications through the facilitators of alignment. An uncertain environment, a high level of strategic applications and well-arranged facilitators of alignment can contribute more to the improvement of performance than in a less uncertain or stable environment. Therefore, the benefits of a high level of strategic applications can still be realized in a competitive and uncertain environment. However, when the environment is stable (low PEUN), an excessively low level of strategic applications may decrease a firm's performance.

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*Keywords:* Strategic applications level of IS; Alignment of IS with business strategy; Facilitators of alignment; Fitness; Perceived environmental uncertainty

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## 1. Introduction

The value of strategic information systems (IS) has been an important topic in both academia and industry. The use of IS for strategic purposes can provide a variety of competitive advantages. Wiseman and MacMillan [63] suggested five different forms of competitive advantage that may result from strategic applications of IS: differentiation, cost, innovation, growth and alliance advantage. Many studies have tried to investigate the benefits (e.g. [7,8,17,61]).

However, in some research efforts (e.g. [9,17]) the results were inconclusive, and the relationship between the strategic applications and the financial performance of a firm was very weak.

Investment in IS does not directly lead to superior financial performance. The impact of IS investment on performance depends on contextual variables, such as external environment, organizational context and IS maturity. Kivijarvi and Saarinen [31], Ragowsky et al. [47] and Li and Ye [34] have empirically shown the moderating effect of environmental uncertainty and the mediating effect of IS maturity on the relationship between IS investment and improved financial performance. In the same way, heavy investment in a strategic IS does not always guarantee high profitability. Benefits of strategic IS investment are also

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\* Present address: School of Business, La Trobe University, Bundoora 3086, Vic., Australia. Tel.: +82-53-950-5445.

E-mail addresses: choejjm@hanmail.net, choejj@bh.kyungpook.ac.kr (J.-m. Choe).

naturally dependent upon many uncontrollable contextual factors.

External factors such as competition, uncertainty and needs are driving forces for strategic applications of IS [10,24,27,40]. Challenging business environments can make it imperative for firms to seek out opportunities to use IS for strategic purposes. However, in a stable and simple environment, firms generally pursue defensive strategies based on high efficiency and cost effectiveness, and a strategic IS is a costly luxury. Thus, the strategic application of IS is not really required under a stable and noncompetitive environment.

A strategic IS application is one having a profound effect on the company's success and destiny by: (a) influencing or shaping the company's strategy; or (b) playing a direct role in the implementation or support of the company's strategy [50]. Therefore, in recognizing and seizing opportunities of strategic IS applications, business goals and strategy should be properly incorporated. Aligning IS with business strategy is a means that considers business objectives or strategies in the strategic IS planning. It is a way to scan and search for strategic IS opportunities [33]. To identify and seize these, the alignment of IS with business strategy is critical: strategic IS applications are characterized by the mutual information flows and relationships between business strategy and IS planning [46,64].

In our study, relationships among external environments, IS strategic alignment and strategic applications level of IS were investigated. Using a systems approach, we also empirically investigated the impact of the fit among an external environment, the alignment of IS with business strategy and the strategic applications level of IS on the financial gains of a firm.

## **2. Theoretical basis**

### *2.1. External factors and IS strategic alignment*

A strategic IS may be broadly considered to be a competitive weapon to cope with uncertain environments. It has been argued that companies can deal with uncertainty by increasing their information processing capability and by creating interorganizational links between customers and suppliers. Strategic IS applications are used to obtain competitive advan-

tages over rivals and to prevent rivals from gaining an advantage. Previous studies have shown that the external environment often encourages or requires firms to utilize strategic IS applications in order to survive (e.g. [26,28,29,51,52]).

Neo found that environmental uncertainty, the business role of the IS function and distinctive competencies in IS are major facilitators in an organization's decision to use IS applications for strategic purposes. Johnston and Carrico conducted a field study of 11 industries: it showed that industry environmental factors such as competition, deregulation and changes in technology influence the direction and pace of strategic deployment of IS. King et al. also identified the competitive pressure of the environment as an important facilitator for strategic IS use. Sabherwal and King examined decision processes for developing the strategic IS applications. They found that the external environment affects the adoption of a specific type of decision making process, but that the organizational structure does not influence any decision process attribute. Choe et al. empirically showed a positive relationship between perceived environmental uncertainty (PEUN) and strategic application level of IS.

To resort to strategic use of IS under challenging and uncertain external environments, firms must try to identify and seize opportunities of strategic applications. Aligning IS with business goals and strategy is a way to exploit the IS [30,53,57]. Alignment of IS with strategy is a collaborative process among business strategy, business organization, IS infrastructure and IS planning [3]. The alignment process can increase convergence between IS and line managers on the kinds of systems to be developed and enable a more synergistic integration of IT and business knowledge [5,49]. But this alignment requires many facilitating activities, such as IS manager involvement in business strategic planning, upper management's understanding about IS strategy, IS manager education of business goals and top management commitment to IS, many of which are not considered important by upper management [6,39]. The success of the IS strategic alignment is dependent upon the conditions of these facilitators [15]. If facilitators of alignment are poor, the strategic IS planning process will not be effective.

Both facilitators of alignment and the extent of aligning are influenced by the external factors, since all

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