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The impact of service R&D on the performance of Korean information communication technology small and medium enterprises

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ABSTRACT

In recent years, research and development (R&D) in the service industry has attracted a great deal of attention from both academia and industrial firms. However, compared to the manufacturing sector, little research exists on the implications of R&D for the financial and/or non-financial performance of firms in the service industry. The purpose of this study is to examine the impact of service R&D on the performance of information communication technology (ICT) firms. We identify five categories of R&D activities and investigate their impact on the financial and non-financial performance of 100 ICT firms, with a focus on small and medium enterprises (SMEs) in South Korea. We postulate positive relationships between R&D efforts and a firm's performance. However, the findings only partially support our hypotheses; unexpected results demonstrate that the presence of R&D management negatively influences a firm's performance. We present detailed statistical results and discuss the implications of the study.

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Introduction

During the last few decades scholars have increasingly stressed the importance of research and development (R&D) in the manufacturing sector. Technology-based companies in this sector put forth large expenditures for R&D in order to maintain their competitive advantage and ensure their future viability. The service industry currently accounts for more than half of the gross domestic product

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within developed countries (OECD, 2005). Because the attention from academia is a recent development, the concept of R&D in the service industry is more obscure than in the manufacturing industry. Moreover, the unique characteristics of services make it more difficult to capture both the characteristics of R&D (and R&D-like efforts) and their impact. Thus far, these challenges have limited the studies on the relationship between service R&D and a firm's business performance.

In this paper we examine the impact of service R&D efforts on the financial and non-financial performance of firms, focusing on small and medium enterprises (SMEs), especially in the information communication technology (ICT) service industry in South Korea. The ICT service industry has experienced rapid international expansion and has made a large investment in R&D in order to gain technology competencies and provide more customized services. However, managers in the industry have often ignored the importance of service R&D. Because the influence of service R&D is not well understood (even academic research on this subject is rare), industry management has little confidence in its ability to improve performance (Gault, 1997; Djellal et al., 2003; Miles, 2007).

The balance of this paper is organized as follows: section "Literature review" includes a review of the literature in related fields of research. In section "Research concept and analysis model", we outline the research concept, our main hypotheses and the model used in the article. In section "Empirical analysis", we present empirical analyses including sampling, variable measurement, and statistical results. The final section contains a summary of our study, discussion and directions for future research.

Literature review

Service R&D

A marketing scientist was the first to suggest that service firms need an R&D system in which feasibility studies, audits of internal service capabilities, and marketability studies can be sequentially executed (Konrad, 1968). She presented these three R&D efforts as solutions for the lack of genuine marketing innovation in the service industry. However, it has been only a decade since public organizations and academics in economically advanced countries began to shed light on the benefits of service R&D.

The Expert Group on Innovation in Services (2007), a research group of the European Union, reported that the presence of R&D capability in a service firm results in service innovation; researchers are increasingly recognizing the benefit of this service innovation for business performance. However, Miles (2007) explained that in service firms, service R&D and R&D-like activities are difficult to identify, and R&D is not always organized as formally as in manufacturing companies. Neither the concept of, nor the concrete activities associated with, R&D are familiar to employees in service firms; therefore, these employees have not prioritized R&D expenditures. In addition, services have unique characteristics such as intangibility and inseparability (Lovelock, 1983; Boström, 1995; Sasser, 1976). Intangibility means that services lack physical existence or form and cannot be seen, smelled, touched, tasted, or stored. Inseparability means services can only be provided by interactions between a consumer and a service provider. These characteristics make defining and evaluating the outcomes of service R&D difficult (Chiesa and Masella, 1996).

Generally, scholars accept the definition of R&D put forth by the Organization for Economic Cooperation and Development (OECD, 1997, 2008): "Research and development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications." This R&D definition covers three activities: basic research, applied research, and experimental development. Some scholars further categorize R&D into two groups: product R&D and process R&D. Product R&D allows firms to produce better products, while process R&D reduces the marginal cost of production (Lin and Saggi, 2002; Egeraat van, 2007).

Djellal et al. (2003) observed that a service is a set of actions (processing operations) carried out by the service provider for the benefit of the customer and often with the latter's participation (co-production), and the provision of a service can be considered a combination of various processing or problem-solving operations or functions. The authors claimed that the current definition of R&D focuses on R&D activities for manufacturing, and proposed to edit some phrases in order to better

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