

## Chapter 9

# The Impact of ICTs and Business Strategy on Innovation Activities: Empirical Evidence From Japanese SMEs

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### ABSTRACT

*This research explores factors of innovation and clarifies the effects of information and communication technologies (ICTs) on innovation process. Analysis is based on a mail survey conducted in February 2012 to March 2012 on 3,959 Japanese SMEs. The number of valid responses was 647 (16.3%) and is used as a sample for the analysis. Based on the data, logit analysis is employed for product and process innovation to answer the following three research questions: (1) What are factors promoting innovation? (2) How ICTs affect innovation? and (3) Which affect SMEs with higher ICT use to realize innovation? As a result, (1) the factors such as R&D expenditures, leadership of top management, motivation of employees, ICT index, effects of ICTs are extracted. (2) Sharing information and shortening the R&D process are the effects which ICTs perform to innovation. (3) These effects are greater to SMEs with higher ICT index. The new finding of this chapter lies in results such that ICTs affect innovation through sharing information and shortening the R&D period.*

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## INTRODUCTION

Recent digital transformation and the long-term recession termed by “Lost two decades” force Japanese SMEs (small and medium-sized enterprises) to change drastically the business process and develop continuously new products and services. Without achieving these, it is impossible for them to survive. The further empowerment of SMEs to enhance innovation is required. This is difficult and time-consuming task. There are many factors behind the promotion of innovation in an economy, as endogenous economic growth theory emphasizes, i.e. capital, labor and technology. In reality, it is difficult to raise these factors and promote economic development in the entire economy, but it is more difficult for SMEs to improve the innovation which do not necessarily own sufficient resources for innovation.

There are many sources for promoting innovation, including technological ability, managerial organization to enhance the flow of information and ideas related to innovation, orientation of top management toward innovation, human resources such as engineers, and workers at the job shop as well as related to R&D. Moreover, since SMEs do not own sufficient resources for innovation inside the firms, they have to absorb the necessary technology and information from outside such as large firms, universities, regional research institutions, and business organizations. SMEs thus have to obtain and mobilize these factors and resources from outside and assimilate them into innovation. To achieve innovation, current SMEs have larger advantages than those in the past, because of Information and Communication Technologies (ICTs). In the age of the information society, SMEs also can make full use of ICTs to achieve innovation (Lee & Xia, 2006; Idota, et al 2012; Shigeno, Matsuzaki, and Tsuji, 2018; Ueki and Tsuji, 2019). The main theme of this paper is how ICTs enhance innovation. As seen in what follows, various ICTs can contribute to innovation while simply introducing ICTs do not automatically create innovation. But for SMEs, ICT is essential. In this context, this paper focuses on ICT use and the process or transmission mechanism of ICTs contribution to innovation.

ICTs can be categorized in terms of their functionality in the innovation process; the mediation of communications and information flow, and system, devices, and equipment in the manufacturing process. In the former, communication is divided into those inside and outside the firms. The examples of internal use of ICTs for communications are groupware, intra-SNS (Social Networking Service), ERP (Enterprise Resources Planning), whereas external uses for exchanging information are e-commerce such as B2B and B2C, EDI (Electronic Data Interchange), SCM (Supply Chain Management), CRM (Customer Relationship Management), social SNS, and so on. CAD/CAM (Computer-aided Design/Computer-aided Manufacturing) and Industry 4.0 are examples of ICTs used for production.

These explained factors are known as tools of innovation but less analysis were conducted how and why ICTs contribute to innovation. In addition, this paper is interested to whether there is difference in ICT use between SMEs with high and low ICT use or not. Therefore, based on the aim and objective of the paper, the research questions (RQ) are summarized as follows:

**RQ1:** What are the factors inside the firm to promote innovation?

**RQ2:** How do ICTs have effect on innovation?

**RQ3:** Which effect do SMEs with higher ICT use realize for innovation?

The paper consists of the following sections; the next section presents the survey of previous literature. Section 3 clarifies the framework of the analysis while factors promoting innovation are examined in Section 4. Section 5 conducts statistical analysis and identifies significant factors. The contents of the

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