Creating a firm self-propagating function for advanced innovation-oriented projects: lessons from ERP

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Abstract

Under the new paradigm of an information society, Japan is experiencing a vicious cycle between non-elastic institutions and insufficient utilization of the potential benefits of IT that impedes the structural change efforts of firms. In parallel with this, the advanced innovation-oriented projects of firms are undergoing a structural change.

However, a dramatic deployment of i-mode service (NTT DoCoMo's mobile Internet access service) in the late 1990s provides encouragement that, once the potential is exploited, Japan's institutional systems can effectively stimulate the self-propagating nature of IT through dynamic interaction with it. The advancement of enterprise resource planning (ERP) software in a co-evolutional way between convergence for vendor strength and divergence for satisfying diversified customer base demonstrates a similar expectation. This expectation relates to a business field in which the advanced innovation-oriented projects of firms under a new paradigm can be expected to develop in the process of embodying a self-propagating function.

Prompted by this demonstration, this paper on the basis of a comparative empirical analysis of the interaction between a software vendor (ERP firm) and ERP customers with different business models towards creating a self-propagating structure based on a co-evolutional process between internal motivation of the vendor and external expectations raised by customers, attempts to identify key conditions essential to creating a self-propagating structure for advanced innovation-oriented projects of firms.
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1. Introduction

Under the new paradigm of an information society, while the advanced innovation-oriented projects of firms are undergoing a structural change, Japan's institutions do not function as efficiently as they did in the 1980s. As a result, Japan is experiencing a vicious cycle between non-elastic institutions and insufficient utilization of the potential benefits of IT that impedes the structural change efforts of firms.

While Japan is experiencing such a vicious cycle, a dramatic deployment of i-mode service (NTT DoCoMo's mobile Internet access service) in the late 1990s provides encouragement that potential elasticity of Japan's solid institutions towards unknown systems,

especially with higher IT intensity, can be derived if some familiarity is stimulated, and once the potential is exploited, institutional elasticity effectively stimulates the self-propagating natures of IT through dynamic interaction with it during the course of its diffusion, thereby a co-evolutional structure is expected to construct. A dramatic advancement of enterprise resource planning (ERP) software in a co-evolutional way by satisfying trade-off issues between converging for vendor strength and divergence for satisfying diversified customer base demonstrates a similar expectation also in a business field that the advanced innovation-oriented projects of firms under a new paradigm can be expected to develop in the process of embodying a self-propagating function similar to IT's new functionality development mechanism (Yucean et al., 1999).

Prompted by this demonstration, this paper attempts to identify key factors contributed to creating an elaborate self-propagating structure in ERP software development and essential for creating a similar structure for

advanced innovation-oriented projects of firms.

To date, a number of studies have revealed Japan's less elastic institutions impeding the advanced innovation-oriented projects of firms in the midst of the IT evolution (Dewan and Kraemer, 2000; OECD, 2001; Watanabe and Kondo, in press). In addition, not a few works analyzed development path of ERP software and the impacts of ERP. Based on the recognition of the significant impacts of ERP phenomenon on supply chain strategies, Yucean et al. (1999) sought to understand the impacts of ERP systems on supply chain performance by surveying 60 European firms. They pointed out that while ERP relies on the use of IT for creating radically different working methods to deliver significant improvements, it is a key catalyst for organizational change by adopting a new set of performance metrics by enabling routine data collection on those metrics. They postulated that the ERP industry is now a tightly knit 'ecosystem' of software vendors, middleware vendors, supply chain experts, specialty-software houses, and hardware vendors. Furthermore, they demonstrated that, since this ecosystem is rapidly evolving, it is important to understand the capabilities afforded by the current technology and identify the desirable features of ERP evolution. Sakakibara (1999) conducted a questionnaire survey on the state of the introduction and utilization of ERP software in Japan's leading firms and pointed out that the utilization of ERP software in Japan's leading firms is insufficient primarily due to the absence of a timely decision-making system.

While these studies demonstrate suggestive warning with respect to firms introduction and utilization of ERP software for their business strategy, none have identified the critical success factor in constructing a self-propagating structure essential for the advanced innovation-oriented projects of firms.

This paper attempts to identify key conditions essential to creating a self-propagating structure in ERP software deployment. An empirical analysis is conducted comparing the interaction between software vendors (ERP firms) and ERP customers with different business models. Based on this empirical analysis, secondary impacts of this process on the interaction between ERP customers and their customers (consumers) are explored. Through this analysis, suggestions for the co-evolution between customer satisfactions and sustaining producers' strength by constructing a virtuous cycle between converging their core competence and diverging non-core competence process are developed.

Section 2 provides an analytical framework by demonstrating the overlap between the theory of IT self-propagation and the role of ERP software deployment. Section 3 demonstrates a comparative empirical analysis. Section 4 extracts key conditions essential for creating a self-propagating structure by outlining interpretations of the results of the empirical analysis. Section 5 briefly summarizes the key findings of the analysis and presents policy implications.

2. Contrast of self-propagating structures between IT and ERP software deployment—an analytical framework

IT strongly possesses a self-propagating nature that closely interacts with individuals, organizations, and society during the course of its diffusion and new functionality is formed during the course of this institutional interaction (Watanabe et al., in press). This IT process provides a constructive suggestion in constructing firms' strategy for advanced innovation-oriented project under a new paradigm of an information society. Thus, firm's important strategy for effective utilization of the potential benefits of IT is to construct a co-evolutional interacting system between suppliers and customers.

The dramatic advancement of ERP software in a co-evolutional way between convergence for vendor's strength and divergence for satisfying diversified customers demonstrates a similar expectation also in a business field.

Contrary to traditional business management concept, the ERP concept is a co-evolutional interacting system based on global optimality. Its functional scope has been expanded from the optimization of a single function to the whole core production processes, entire supply chain (supply chain management (SCM) software), and to firms and customers interaction (customer relationship management (CRM) software) as illustrated in Fig. 1 (Watanabe and Hobo, in press). This dynamic system for global optimality has the potential to create a self-propagating trajectory similar to IT's new functionality development as illustrated in Fig. 2.

Through this trajectory, the software vendor and its customers satisfy both internal motivation of the vendor and its external expectation raised by the customers. The success of this process depends on the momentum that is gained when the vendor provides high-quality software that meets specific customer requirements and simultaneously creates global standards assimilating the best practice from leading firms as demonstrated in Fig. 3.

From the vendor perspective, constructing this self-propagating feed-back loop depends on an ability to provide high-quality software and the capacity to assimilate world's best practice through sophisticated filters as summarized in Table 1.

The dramatic advancement of ERP software can be largely attributed to the efforts of the ERP firms in creating this virtuous cycle. At the same time, this success depends on a creation of a self-propagating structure based on a co-evolutional interaction between this internal motivation of the ERP firm and its external expectations raised by customers in their desire for