Achieving Innovation from Business Process Management

Jing Tang
10D55149

Supervisor:
Professor Junichi Iijima

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ABSTRACT

Since 20th century, business process management has become a hot concept in the academic research and real practice. However it still leaves many points for the further study, especially when the success of business calls for innovation and flexibility as well as efficiency and effectiveness. The goal of this dissertation attempts to address how to achieve innovation through business process management with an emphasis on Business Process Orientation (BPO).

Following the holistic view, BPO supports business process management by reorienting employees’ focus from one that centralized on functional performance to one that emphasizes customer value adding. While it is generally believed that BPO improves various aspects of innovation performance, there has been little empirical evidence especially in eastern contexts. From the organization perspective, the first main part in this dissertation tries to fulfill this gap. Based on a survey of organization in Japan, it shows that BPO significantly influences organizational innovation performance and identifies the underlying mechanism for the effect. Interestingly, it is found that process view, referring to process mapping and defining, is not sufficient to enhance organizational innovation performance. While BPO promotes cross-functional integration, the integration may also need to be carefully managed for it to have a significant impact on innovation. In addition, customer integration and employees’ innovation behavior are keys for innovation, which mediates the positive relationship between BPO and organizational innovation performance. These findings augment current conceptual understanding of BPO, strengthen the justification for fostering BPO in practice, and offer managerial suggestions for enhancing innovation.

Because innovation is highly knowledge intensive, employees’ innovation behavior plays a central role in knowledge creation and distribution in organizations. It is important to encourage employees’ innovation behavior, which involves developing, promoting, judging, distributing and implementing new ideas at work, during enhancing BPO for innovation. For the employee perspective, the second main part applies the theory of planned behavior to better understand employees’ innovation behavior (EIB), and also extends the theory by considering the effects of two unexamined yet important organizational factors: external information awareness and proactiveness of innovation strategy. Results from a survey indicate that both of these
two factors are positively related with employees’ attitude towards innovation, subjective norm about innovation, and perceived behavioral control to innovation, which is, in turn, significantly influence employees’ innovation behavior. Employees’ attitude, subjective norm, and perceived behavior control mediate partially the effects of external information awareness and completely the influence of proactiveness of innovation strategy on employees’ innovation behavior. These findings strengthen the understanding of employees’ innovation behavior, and pinpoint the importance of external information awareness and proactive innovation strategy to innovation.

In contemporary business environment, innovation often associates with adopting information technologies (IT) in a novel way. Since embedding IT into business routines is important for the success of IT-based innovation, business-IT alignment is an important consideration in BPO practice to achieve innovation. However, there has been a lack of tools, methods, and techniques concerning customer and employee issues for the co-design of business processes and IT. The third main part in this dissertation proposed a method by applying Design and Engineering Methodology for Organizations (DEMO) as the basic tool to support business-IT alignment for innovation in the early stage of analysis and design phase. A case study of redesigning aging care system in Central Finland was used to demonstrate the proposed method. Several business inefficiencies has been identified and potential IT solutions for them has been discussed. This study deepens the understanding about IT capabilities, enriches the evidence of DEMO benefits, and offers a method to consider IT-based innovation.

Overall, through empirically declaring the importance of BPO for innovation, extending the theory of planned behavior to interpret employees’ innovation behavior, and offering a DEMO based method to consider IT for innovation, this dissertation gives a contour and direction for organizations to go from business process management to innovation.
ACKNOWLEDGEMENT

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CHAPTER 1 Introduction

1.1 Background and Overview of the Dissertation

Since the end of the 20th century, innovation, which helps a company to differentiate its products or services from other competitors, has gradually been vital for a high performance and sustainable growth in the long run (Gaynor, 2002, Fagerberg, Mowery, & Nelson, 2005). According to BCG innovation survey (2007), 66 percent of executives put innovation in their top three priorities, yet a majority amount of respondents are still unsatisfied with their innovation paybacks. In other words, generating, adopting and sustaining innovation remains a prime challenge for business (Montalvo, 2006). Innovation requires “new ideas” to be “successfully” “implemented” in the business, generating revenues for a company (Gaynor, 2002). The newness or novelty implies to do something that has not been done in the industry or by an organization itself. It requests to disrupt established routines and patterns within an organization. The implementation implies that innovation has to appear in aspects of business as introducing a new product or service, launching a new process, opening a new market, adopting a new supply, and developing a new organization (Schumpeter, 1934); and the successfulness indicates that innovation has to be finally accepted by innovation users and the market. Therefore, innovation is not just an intelligent issue (Gaynor, 2002). It also depends on organization’s vision, risk-taking, willingness to change, learning, and collaboration, and so on. For example, Apple Inc. is one of leaders of innovation because of the good vision of Steven Paul Jobs and a good capability to pack design and advance technology into an innovative product, while Google Inc. as a new generation of innovation leader invests “20 percent time” of engineers into bringing a broad number of new offerings every year.

While processes are considered as a source of innovation, innovation is an important goal of Business Process Management (BPM) to adapt to today’s fast changing business environment. Organizations should often strive to do their business in new ways, either via or not via technologies (Marjanovic, Skaf-Molli, Molli, & Godart, 2007). Contemporary BPM has “emerged as a comprehensive consolidation of
disciplines” with the belief that a process-oriented approach leads to superior performance (Brocke & Rosemann, 2010). In BPM practices, process innovation and business process reengineering look for radical improvements of processes in terms of effectiveness and efficiency through redesign and reengineering efforts (Davenport, 1993; Hammer & Champy, 1993). Yet, even people believe that BPM has the power to innovate and transform businesses (Brocke & Rosemann, 2010), there is a lack of empirical evidence about positive impacts of BPM on innovation, because many business process reengineering efforts and projects have been failed (Abdolvand, Albadvi, & Ferdowsi, 2008; Trkman, 2010). Next, BPM researches also argue that IT is one major force that drives the change of business (Davenport, 1993; McCormack, 2007). However, in practice, many IT maintenance issues come because of less consideration of the link between IT specifications and business and organizational requirements in the design phase (Gustas & Gustiené, 2004). One potential reason is that BPM tools, methods, and techniques often only concern automation issues and ignore customer and employee issues (Harmon, 2010). They are too limited to facilitate innovation in practice (BCG, 2007; Harmon, 2010). This dissertation tries to address these two issues.

Recently, academic studies address an essential role of applying a holistic approach in BPM (Rosemann & Brocke, 2010). Six core elements - strategic alignment, governance, methods, information technology (IT), people, and culture - have to be aligned into the process-oriented managerial approach. It provides a framework to understand the potential impacts of BPM on innovation. Following the holistic view of BPM, Business Process Orientation (BPO) is a well-defined and structured managerial approach of BPM, which emphasizes a multi-dimensional change in the organization (McCormack, 2007). “Soft” issues as governance, people, and culture, which is associated with three key BPO dimensions (process view, process jobs, and process measurement and management), are highlighted in BPO as important as “technical” issues as strategic alignment, IT, and methods. This dissertation tries to address a positive impacts of BPO on innovation from the “soft” perspective, through cultivating collaboration and employees’ behavior. It is because that BPO emphasizes a process way of thinking beyond functional boundaries, and focuses on continuous improvement of the “end-to-end” customer value-adding processes, which will
promote integration and affect the way of employees to work and think (McCormack, 2007).

Further, with a specific focus on the “people” element of BPO to achieve innovation, it is important to address that how to motivate and encourage employees to innovate is important. A comprehensively study employees’ innovation behavior for better management is necessary. In this dissertation, the Theory of Planned Behavior (TPB) was applied to understand employees’ innovation behavior, because it fully considers antecedents of behavior from three critical perspectives: personal attitude, social norm, and behavior controls. TPB was also extended by considering the impacts of two important but unstudied variables – external information awareness and proactiveness of innovation strategy – on employees’ innovation behavior. These may give more directions for managers about how to motivate employees to innovate to enlarge the positive impacts of BPO on innovation. A survey of Japanese companies was conducted in late 2010 to early 2011 to assess the impacts of BPO on innovation and evaluate employees’ innovation behavior based on TPB.

“IT” is another element that is critical for BPO to achieve the innovation goal. As a technical element, IT often supports business processes to perform in a way (Davenport, 1993; Hammer & Champy, 1993; McCormack, 2007). As stated before, a problem that obstacle the success of IT-based innovation is a lack of effective methods, tools, and techniques to facilitate innovation, with concerns on both automation issues and customer and employee issues. DEMO (Design and Engineering Methodology for Organizations) is a business process modeling methodology that highlights enterprise ontology as an essence of organization with a focus on communication (Dietz, 2006). This dissertation suggests applying DEMO as a tool to align IT potentials and human needs in business, because DEMO maps communication that is strongly associated with IT and provides a concise and essential demonstration of end-to-end business processes. This dissertation then proposes a method by using DEMO to consider IT-based innovation in the early stage of analysis and design phase. A case study of Aging care system in Central Finland was used to demonstrate the proposed method for IT-based innovation, because there is lack of academic studies about aging care system and a need for more efficient inter-organizational cooperation across organizational boundaries. Main efforts in this
case study are to create reference models, identify inefficient transactions, and suggest potential improvements facilitated by IT.

In general, this dissertation elaborates to declare a potential of launching BPO to achieve innovation through soft and IT elements that have been highlighted in the holistic view of BPM. It contributes to research and practice as follows. For research, first, this dissertation provides empirical evidence for positive impacts of BPO on innovation, and reveals an underlying mechanism through which BPO affects organizational innovation performance. Second, it demonstrates a pattern by extending TPB that organizational attributes influence employees’ innovation behavior through attitude, social norm, and perceived behavior control. It provides a framework for future research. Third, it focuses on the BPO and innovation in Japan that is an important but unstudied context. Fourth, this study extends theoretical understanding of IT capabilities and proposes a DEMO-based method to align business and IT for IT-based innovation. For practice, this dissertation provides some beneficial managerial directions (launching BPO, promoting employees’ innovation behavior and enhancing associated innovation supports, freedom, and recognition, as well as adopting proactive innovation strategy) and method (applying DEMO for IT-based innovation) for managers and team leaders to achieve their innovation goals through more effective business process management.

1.2 Research Questions

In order to accomplish the objectives, the main research questions are mentioned as follows:

- Does and how does BPO affect organizational innovation performance?
- How to motivate employees to innovate in their process-oriented work?
- How to achieve IT-based innovation through business process modeling and analysis based on DEMO interactional model?

I will explain why I focus on these questions later.

1.3 Structure of the Dissertation

This dissertation is structured as follow:
Chapter 2 reviews literature about several managerial concepts: business process management, innovation, business process orientation, employees’ innovation behavior, and IT.

Chapter 3 focuses on the direct and indirect link between BPO and organizational innovation performance. A questionnaire survey of Japanese companies was conducted in Japan to test hypotheses.

Chapter 4 pays attention to understand and motivate employees’ Innovation behavior, and also highlights proactiveness of innovation strategy and external information awareness on it. The proposed model based on Theory of Planned Behavior was validated by a questionnaire survey.

Chapter 5 elaborates to introduce a method to consider IT-based innovation for business based on DEMO. This method was applied in a case study of aging care system in Central Finland to suggest IT solutions for more efficient cooperation.

Chapter 6 concludes the whole research with discussions about major findings, implications, limitations, and contributions.

Chapter 3, 4, and 5 are the core of this dissertation. Figure 1-1 describes the structure of this dissertation. Chapter 3 and Chapter 4 deal with the “soft” elements of BPM, while Chapter 5 focuses on alignment of IT and business for innovation. An overview of this dissertation is shown in Figure 1-2.
Chapter 1: Introduction

Chapter 2: Literature Review

Chapter 3: Impacts of BPO on innovation

Chapter 4: How to motivate employees for the perspective of the theory of planned behavior

Chapter 5: A DEMO based method for IT-based innovation

Chapter 6: Conclusions

Achieving innovation through “soft” elements of BPO (culture, people, governance)

Achieving innovation through “IT” element of BPO

Figure 1-1 Structure of the Dissertation
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Figure 1-2 Overview of the Dissertation
CHAPTER 2  Literature Review

This chapter provides an overview of managerial concepts that are related to the areas of this dissertation: innovation, business process management, business management orientation, employees’ innovation behavior, and the role of IT in innovation. These concepts set ground for the research questions of the study.

2.1  Innovation

2.1.1  Overview of Innovation

The competitive and changing environment necessitate that organizations create hard-to-imitate core competencies to create and sustain advantage (Teece, 2001). A common belief is that innovation, focusing on developing new customer value, leads to establish a competitive advantage that drives superior organizational performance. Nowadays, many senior managers consider innovation as one of top priorities in business (BCG, 2007). Yet, an undeniable fact is that most of them do not satisfy their innovation paybacks. In really business, innovation still challenges managers and researchers.

There are three key elements of innovation as newness, value creation and process (Voeten, de Haan, & de Groot, 2011). Newness is extremely essential in the innovation definition, because the main idea of innovation is to introduce something is different from the past and the competitors (Johannessen, Olsen, & Lumpkin, 2001). Without the newness, innovation cannot break out the routine. Newness also highlight the creation and adoption difficulty of innovation. So innovation is not a one time effort, and needs many attempts to develop, test and try. The final goal of organizations is to create benefits, so innovation comprises both invention and application or commercialization, which implies a successful innovation need to be finally accepted by the users (McAdam & McClelland, 2002). Through continously providing new values to customers and organizations, organizations can differentiate themselves from competitors, which in turn creates competitive advantages. A customer view is critical for innovation. From the process perspective, innovation is
an unstructured interactive process among producers, suppliers and consumers from idea generation, development, to implementation (Scott & Bruce, 1994; Voeten, et al., 2011). So collaboration inside and cross organizational boundaries is important for innovation. Besides, the introduction of newness is also a typical “learning-by-doing” process of organizations (Voeten, et al., 2011). Thus, it is important for all employees to understand, to support and to manage the innovation process, for the sustainability of innovation (Zairi & Al-Mashari, 2005).

2.1.2 Three-Phase Innovation Process

Nowadays, innovation is often an outcome of organizational intelligence, capability, and effort through organization-level interactive innovation processes, rather than the attempt of a single innovator. Innovation process has been located in the central of innovation studies and practices. Generally, a successful innovation process has three distinct phases (Fagerberg, Mowery, & Nelson, 2005). The first third is to generate creative ideas and solutions for supporting organizational strategies and objectives and addressing emerging opportunities. The second third is to implement and commercialize these creative ideas and solutions into business. The last third is to diffuse innovative products, services, and processes through certain channel over time among potential users.

2.1.2.1 Innovation Idea Generation: Inspiration and Creation

The “newness” of innovation majorly depends on the creative effort and its efficiency for idea generation. Areas as organizational strategies, process inefficiencies, new technologies, and emerging customer needs are inspirations for organizations to innovation. In this era of information and knowledge, many successful companies proactively invest in identifying inefficiencies and weaknesses in their business and then seeking innovative IT solutions for these problems in a continuous pattern. The buy-in from customers enrich opportunities to explore their preferences and needs and identify how new products, services and IT solutions might change customer experience. An innovative organization is often one that “is intelligent and creative, capable of learning effectively, and creating new knowledge (Fagerberg et al., 2005, pp.123)”. A prior sharing, learning, and creating of knowledge among potential
innovation stakeholders may strongly affects innovation outputs (Cohen & Levinthal, 1990).

An organization is a social group in which individuals work and collaborate for a collective goal. Organizational innovation is a flow of collective interaction between individuals. Idea generation of innovation depends on the mechanisms that integrate and translate individual efforts into organizational efforts. Both individuals and organizations are innovating entities for organizations. In the individual level, employee’s capability, willingness, and engagement to innovate are a key internal source of innovation (de Jong & den Hartog, 2007; Scott & Bruce, 1994). In the organizational level, knowledge sharing, learning, and collaboration for innovation support mobilizing organizations to innovate. Moreover, Chesbrough (2003) has highlighted the importance of harvesting external ideas as well as internal ideas for the successful innovation in the term of “open innovation”. Customers, suppliers, rival companies, and research institutions are external sources of innovative ideas. In summary, in order to generate better innovation ideas, innovation managers should motivate to both individual and organizational efforts, and pursue knowledge and intellectual properties both internally and externally.

2.1.2.2 Innovation Implementation and Commercialization

Innovation usually perceived as viable products, services, and processes (Fagerberg et al., 2005). Implementation and commercialization converts innovation ideas, research, or prototypes into reality. Commercialization of new products and services involves designing innovations to be readily manufacturable and feasible, formulating the manufacturing and supply chain strategies, devising implementation plans, and implementing such plans. Innovation implementation within an organization refers to the appropriate and committed use of the innovation (Klein & Sorra, 1996). It is the gateway between the decision to adopt the innovation made by managers and the routine use of the innovation by employees.

A fundamental tension between efficiency and innovation always challenge innovation adoption, implementation, and commercialization (Baldwin & Curley, 2007). Implementation and commercialization of innovation usually requires investments, carries risks, and takes time to have paybacks. Sometimes, these
confuse managers, especially the business and finance managers, during investment decision making. So, it needs a sense of balance between efficiency and innovation in business.

2.1.2.3 Innovation Diffusion

Innovation pursues new values for business. Without the acceptance and use of an innovation by users, innovation have little social and economic impact (Fagerberg et al., 2005). Therefore, innovation diffusion, which refers to a process by which an innovation spreads in the community of its target users, is essential for the success of innovation. If a innovation is implemented within organization, the target community is employees. And if a innovation is to introduce new products or services, the target community is customers. The diffusion process of innovation encompasses the adoption process of individuals over time, depending on the interaction between users and potential users.

In practice, innovation diffusion is also challenging. It often takes times and efforts for individuals to learn and move from old routines into new practices. In the book, Diffusions of Innovations, Rogers (1995) argues that the relative advantage, compatibility (with the potential users’ current way of doing things), complexity, trialability (the extent that the innovation can be tested and tried by users), and observability (the extent that innovation can be evaluated after trial) of an innovation differ the diffusion of innovation throughout a target population.

In this dissertation, innovation stretches from short-term incremental ones to long-term revolutionary ones. While Chapter 3 and 4 focus on the impacts of BPO on innovation and employees’ innovation behavior in the overall innovation process, Chapter 5 puts an emphasis on the first phase of innovation process- idea generation.

2.2 Business Process Management

Since Taylor introduced “scientific management”, more and more interest of researchers and practitioners have been attracted by the importance of business processes. Business Process Management (BPM) becomes a popular concept into our eyes, but it still requests for further theoretical research about the solved and new coming points (Trkman, 2010). As the final purpose of BPM is to improve
organizational performance, innovation is a goal of BPM (Davenport, 1993; Lee & Dale, 1998). However, there has been a lack of studies addressing the issue: how to achieve innovation through BPM.

2.2.1 Overview of Business Process Management

Previous BPM researches can be divided into two categories according to two different definitions of process: narrow view and end-to-end view (Hammer, 2010). Recently, many researches argue that BPM is an organizational capability for superior organizational performance and not just the execution of activities that design, model, analyze, improve, enact, control, monitor, and change (Rosemann & Brocke, 2010). A holistic view of BPM, which changes BPM from a process discipline toward a systematic discipline, has been developed based on the end-to-end view of BPM.

2.2.1.1 Narrow View of Process and Business Process Management

In the early phase, a narrow view of process considers process as a sequence of activities or tasks. With this view, BPM mainly focuses on statistic process control and process execution for better process performance. A belief is that inefficiencies often come from execution defects in processes. Numerous BPM programs and approaches as lean management (Womack, Jones, & Roos, 1991), total quality management (Samson & Terziovsk, 1999), Six Sigma programs (Pande, Neuman, Cavanagh, & George, 2002), and workflow management (Georgakopoulos, Hornick, & Sheth, 1995) helps organizations identify and remove these defects, and standardize processes in practices.

However, there may have more than hundreds of processes, as sequences of activities, in an organization. A focus on one or several processes will lead to a segmented management of processes. When managers are likely to deal with many small projects at work, it is difficult to manage them in a consistent pattern for the same goal. Even a process operate efficiently with no execution defects, it may still not contribute to better organizational performance and customer efficiency.

2.2.1.2 End-to-end View of Process and Business Process Management

In order to avoid a segmented management, the process has been redefined as end-to-end work across an enterprise that delivers customer values and achieves strategic
objectives (Davenport, 1993; Rosemann & Brocke, 2010). Therefore, BPM refers to activities that manage and transform end-to-end processes for superior organizational performance (Zairi, 1997). By managing end-to-end processes across functions and organizations, BPM gives priority to overall strategic process targets rather than local function targets. It enables to break the barriers between functional silos and organizations up, and to efficiently transfer and share information and resources among them (Lee, Kosuga, & Nagasaka, 2010). Indeed, BPM has a far greater impact on business. Yet, the design of end-to-end business process “creates an envelope for its performance” (Hammer, 2010). Process could not achieve better performance than its previous design would allow. If an organization searches for an up-grade in current organizational business performance or the environment of business has changed, it calls for a new design and engineering of process. In practice, a set of BPM programs and approaches helps organizations to redesign and reengineer processes. For example, business process reengineering (Abdolvand et al., 2008), process innovation (Davenport, 1993), and supply chain management (Cooper, Lambert, & Pagh, 1997).

Nowadays, more efforts of BPM are devoted in process reengineering, redesign and innovation, often enabled by IT (Abdolvand et al., 2008; Davenport, 1993). Even BPM is theoretically believed to have a positive effect on business success, but in real-world practice many BPM, especially business process reengineering, efforts and projects are fail to match the expectation (Abdolvand et al., 2008; Trkman, 2010). Moreover, there has been not enough evidence in the non-manufacturing industry that shows redesign and reengineering of process bring tangible and measurable benefits to business (Vergidis, Turner, & Tiwari, 2008). One potential reason is that there is not a metrics of BPM in redesign and reengineering.

Most of business process reengineering efforts are positioned as one-time projects or programs rather than ongoing efforts (Hammer, 2010). A lack of continuous dimension has been criticized by many researches (Armistead & Machin, 1997; Trkman, 2010). “A business process still has to be managed after having it reengineered, but reengineering experts virtually do not state how to manage a business process after reengineering” (Kohlbacher, 2010, p. 136). Moreover, to assure sustained benefits from BPM, following a reengineering project, continuous process measurement and improvement efforts are necessary. As the external environment,
the need of customer, even the strategy goals of the organization may change, so one project may be able to optimize the business process at one time, but it does not mean it will get business done successfully for the long term. More importantly, whenever an organization and its employees really learn and explore from continuous improvement efforts and lessons, innovation can be infused by continuous improvement (Cole, 2001). A direction to manage continuous improvement is to appoint the process owner or process team to be responsible for process performance and its continuous improvement (Lee & Dale, 1998; Pritchard & Armistead, 1999; Zairi, 1997). Consequently, the empowerment and organizational support are also crucial for their continuous improvement engagement.

2.2.1.3 Holistic View of Business process Management

As an extension of the end-to-end view of BPM, contemporary BPM researches put an emphasis on creating a “holistic” management manner through an organization-wide perspective (Pritchard & Armistead, 1999; McCormack, 2007). In practice, successful BPM is more comprehensive than just to identify, model, analyze, improve, implement, execute, monitor, and change processes. It should also include a change in the “soft issues” as system, structure, and culture (Zairi, 1997), under the premise of the fit among strategy, structure, process, technology, and environment of an organization is essential for the success (Hung, 2006; Kanellis, Lycett, & Paul, 1999). For example, a lack of readiness to change may obstruct the progressing of business process reengineering projects.

To decomposing the complexity of a holistic approach, Rosemann and Brocke (2010) distinguished six critical success elements for BPM: strategic alignment, governance, methods, information technology (IT), people, and culture (see Figure 2-1). Strategic alignment calls for a tight alignment from the strategic intents, objectives to process design, measurement, and improvement. For example, even a process has been changed and improved, but if it is without a strongly fit with strategic objectives, the change and improvement may lack value for the organization. Governance emphasizes the importance of appropriate and transparent accountability of process roles, responsibilities and efforts. BPM methods are the set of supportive tools and techniques for “activities long the process life cycle and within enterprise-wide BPM initiatives” (Rosemann & Brocke, 2010). For example, business process modeling and
engineering techniques as Business Process Model and Notation (BPMN), Unified Modeling Language (UML), and Petri Net are common BPM methods. Six sigma is an example for a BPM approach that includes a set of integrated BPM methods. IT becomes an important enabler and facilitor of BPM efforts nowadays. Recently, a bunch of BPM projects are related to Business Process Management System (BPMS) development (Lee, et al., 2010). Many researchers addressed that a successful IT solution should fit with business process (Trkman, 2010). So, IT should be used if and only if processes need it (Dishaw & Strong, 1999; Trkman, 2010). People is an essential important component of business process. Individuals and groups within a organization have to effectively engage in processes and contiously apply their process knowledge and skills to improve business process performance. As a organization is made of people, the BPM capabilities are often “reflected in the human capital of an organization and its ecosystem” (Rosemann & Brocke, 2010). Culture, which includes values and beliefs, is about creating a facilitating environment for BPM activities. A key part of BPM supported culture is to change from the “function thinking” to “process thinking”, focusing the overall performance of the process and the satisfaction of the end customer (Zairi, 1997). Because BPM is an ongoing and comprehensive effort, the positive view of leaders and managers is also a necessary condition for implementing BPM with organization. BPM is not the task for managers or specific project teams. The involvement of all employees in BPM has to be promoted (Hung, 2006). Since BPM initiatives involve many changes within the organization, the opposite attitude of employees will also obstacle the assimilating of these changes into business routines. This dissertation considers that effective BPM lies on integrating these six core elements in a process-oriented way.
In summary, BPM should not be managed as a single technical project at a time, but an ongoing process with a “holistic” consideration of technical issues and soft issues. BPM strives for superior organizational performance through changing culture, people, and governance, as well as automation, redesign, and reengineering. It is may interest to study whether BPM related changes in culture, people, and governance, will contribute to BPM goals. “People” is important for BPM, so it calls for an effective management of employees. A comprehensive understanding of employees’ behavior towards BPM goals is necessary. Besides, IT is another essential element of BPM, so the alignment of IT and business routines is important to achieve BPM goals.

2.2.2 Innovation from Business Process Management

With the belief that a process-oriented approach leads to performance improvement, BPM has “emerged as a comprehensive consolidation of disciplines” (Brocke & Rosemann, 2010). It is widely accepted that “apart from productivity gains, BPM has the power to innovate and continuously transform businesses and entire cross-organizational value chains” (Broke & Rosemann, 2010). A question now arises that there has limited empirical evidence demonstrating positive impacts of BPM on innovation.

Many BPM initiatives emphasizes on the change of process, as process improvement, process redesign, business process reengineering and process innovation (Davenport, 1993; Hammer & Champy, 1993). On one hand, previous BPM researches provide methodologies and tools that organizations can use to undertake process change from
initiating changes, evaluating changes, to enabling changes. Examples are business process modeling tools and packed software (e.g., ERP, CRM). One the other hand, the accumulation of tiny incremental process changes may lead to “transformative change”, and the process reengineering and process innovation efforts may completely change the way to do business. For example, as IT is a driving force of BPM, continuously adding automation to processes may initiate new business (i.e., the widespread use of transit IC cards in Japan gives a chance to develop a new payment system that can be also widely used in convenience stores, vending machines, and supermarkets), and new IT enables organizations to entirely rethink and reengineer their business (i.e., launching ERP, clouds computing).

BPM does not only have technical impacts, but also have “soft” social and culture impacts on innovation. With the end-to-end view of process, BPM may cultivate a customer-centered consideration and cross-boundary collaboration culture of organization (Hammer, 2010). With them, organizations are more likely to discover the latent needs of customers to innovate, and to generate an integrated solutions for business through cross-functional teamwork. The continuous improvement of process demands on employees being willingness to change and accept change at work, so in turn it may increase the readiness of employees toward innovation.

2.2.3 Business Process Orientation: A Managerial Approach of Business Process Management

Since Porter introduced a horizontal organization concept and Deming developed the Deming management method, a process oriented management view has been introduced and accepted by more and more people. As the special emphasis of BPM on continuous improvements and a “holistic” change of organization, BPO is a well-defined and structured managerial approach of BPM, which also enable organizations to systematically measure the maturity of BPO for better process management. The concept is described as a way of thinking and working that emphasizes the customer value creation rather than the hierarchical or functional effectiveness (McCormack & Johnson, 2001; Aguilar-Savén, 2004). It highlights that the focus of management, the structure of organization, the behavior of employees, and the culture are extremely important for launching BPO. So BPO is not a single-dimension concept.
A comprehensive definition and measurement of BPO consists of five components (McCormack & Johnson, 2001):

- **Process View** – Identifying, defining, mapping and documenting business processes;
- **Process Jobs** – Giving multi-dimensional jobs to employees through appointing and educating process owners and process teams;
- **Process Management and Measurement** – Managing and measuring process performance instead of function performance;
- **Process Structure** – Changing from hierarchical structure into process based flat/horizontal structure that matches the processes;
- **Process Values and Beliefs** – Cultivating a customer focused, empowered, and continuous-improvement process culture.

McCormack and Johnson (2001) also developed a list of questions to measure BPO from these five dimensions. But their experimental survey showed that process view, process jobs, and process management and measurement are most effective components of BPO to differentiate organizations and to affect organizational performances. So these three dimensions become a concise version of BPO definition and measurement that widely adopted by many studies (Gemmel, Vandaile, & Tambeau, 2008; Škrinjar, Bosilj-Vuksic, & Indihar-Stemberger, 2008; Škrinjar, Hernaus, & Indihar-Stemberger, 2006).

Following the research of McCormack and Johnson (2001), Lockamy III and McCormack (2004) have proposed the BPO maturity model, which support to understand BPO as a continuum. BPO maturity model demonstrates an integrated view of BPO components, and provides a guideline for BPO management practice. The BPO maturity of a organization can be captured by its score of the BPO questions provided by McCormack and Johnson (2001). The higher score implies higher BPO maturity, which consequentially predicts better process capabilities as efficiency, effectiveness, and control, and better organizational performance. Theoretically, Lockamy III and McCormack (2004) defined five levels of BPO maturity from low to high, as follow:
Ad Hoc – The processes and related activities are not well defined and structured. Process jobs, process structure, and process measures are not horizontal based. Process performance is unpredictable.

Defined – Basic strategic processes are defined and documented. Process performance is more predictable than Ad Hoc level. But process jobs, process structure, and process measures are not horizontal based. Functional staffs concern functional boundaries and compete functional goals.

Linked – In this level, BPO began to break the functional structure. Process jobs and process measures appeared, but coexisted with functional jobs and measures. Cooperation appears in internal and external of the organization. Process performance become more predictable than Defined level. Continuous improvement starts. Staffs begin to feel esprit de corps. Customer satisfaction begins to increase.

Integrated – Internal BPO is well established. All internal and external stakeholders take part in to the process cooperation. Jobs and structure are process based, and functional units begin to disappear. Process measures and management systems are well launched. Process performance is very predictable. Process teams starts to set up the continuous improvement goals by themselves, and take full responsibility of processes. Customer satisfaction and esprit de corps are significantly increased.

Expanded – BPO expands to overall supply chains. Cross-organizational cooperation is effective and efficient. Multiple organizational along supply chains are well integrated. Multiple organizational teams appear. Esprit de corps shapes within supply chains. The customer focused, empowered, continuous-improvement culture strongly supports supply chain. Process performance of the supply chains is measured.

Previous studies have provided some empirical evidences about the positive impacts of BPO on organizational dynamics and organizational performance, especially non-financial performance (Škrinjar et al., 2008). But there is a lack of empirical study of BPO in the eastern countries, as Japan. Besides, as metioned before, innovation is not just an intelligent challenge. Effective innovation highly depends on some “soft” issues, as collaboration, willingness to change, and customer value-adding. This dissertation considers BPO, as a beneficial BPM principal, will contribute to
innovation through enabling a “soft” change associated with process view, process jobs, and process measurement and management. Accordingly, Chapter 3 will address this point through an empirical study of Japanese companies about direct and indirect impacts of BPO on organizational innovation performance.

2.3 Employees’ Innovation Behavior and Organization Innovativeness

As mentioned before, “people” is one important element in BPM. In order to achieve the innovation goal of BPM, to understand employees’ innovation behavior is important. Innovation behavior is the behavior “directed towards the initiation and intentional introduction of new and useful ideas, processes, products, or procedures” at work (de Jong & den Hartog, 2007). Innovation behavior is important for organizational innovativeness. In this study, employees’ innovation behavior is conceptualized as an aggregated, organizational level characteristic rather than individual innovation behavior. So there is a need to separate employees’ innovation behavior and organizational innovativeness.

Based on the definition, organizational innovativeness is an enduring trait or capability of organization to innovate – to create, adapt, and commercialize innovations as new products, processes and services successfully (Tuominen, Rajala, & Möller, 2004). Employees’ innovation behavior is just one element of it. Tuominen et al. (2004) addresses that organizational innovativeness is also related to other technological (as technology developing and searching), market (as customer linking and market sensing), and organizational (as governance and collaboration) factors. Besides, Li, Chen, and Huang (2006) argues that organizational innovativeness consists of five distinct dimensions: product innovativeness, process innovativeness, service innovativeness, personnel innovativeness, and technology innovativeness.

Previous research has provided some directions for employees’ innovation behavior. For example, a research of Huhtala and Parzefall (2007) demonstrates that innovation behavior requires both ability (e.g., task- and context-specific knowledge, cognitive capabilities, technical skills) and willingness (e.g., intrinsic and extrinsic motivation) to be creative. de Jong and den Hartog (2007) highlights the importance of leadership. But there is a lack of systematic analysis of antecedents of employees’ innovation
behavior. In this study, Chapter 4 focuses on analyzing employees’ perceptions of innovation based on the theory of planned behavior.

2.4 IT and Innovation

With the development of information and communication technology, many innovations appear as adopting emerging IT into products, processes, and services, in a novel way (Swanson, 1994). Some information systems, as ERP (enterprise resource planning), CRM (customer relationship management) and SRM (supplier relationship management), provide integrated solutions for business, which lead to a dramatically change of business routines within and cross organizations. IT has become an enabler of innovation nowadays. For example, Davenport (1993) states that process innovation depends on the capability of organizations to reengineer processes and routine works trough IT. In the context of process change, innovation often occurs in the intersection of IT and BPM. IT also provides organizations with opportunities for product innovation (Bakos & Treacy, 1986), especially driving innovations about virtual products and services.

This study focuses on innovation with a considerable investment in IT, named IT-based innovation. IT-based innovation is not simple automation, or a technological issue. As IT has to embed into business to create values, the success of IT-based innovation is related on the capability of organizations to align IT with business in a novel way to radical change existing business. But this is a lack of tools, methods, and techniques helping to consider the IT potentials in business for IT-based innovation, especially what do need and will be changed in employees’ work (Gustas & Gustiené, 2004; Hammer, 2010). Chapter 5 proposes DEMO interactional model as a tool to support organizations to innovate in the early analysis and design phase.
CHAPTER 3  Investigating the Effect of Business Process Orientation on Organizational Innovation Performance

Business Process Orientation (BPO), as a beneficial management principal of business process management, aims to cultivate a process thinking and working of organizations. It lies on a change in process view, process jobs, and process measurement and management. With an emphasis on “soft” issues (culture, people, and governance) (see Chapter 2), these three BPO dimensions cultivate a process-oriented organizational culture, affect the way of employees to think and work, and enhance the measurement and management of business processes. In the organizational level, this Chapter attempts to empirically address that BPO potentially improve organizational innovation performance through strengthening cross-functional integration, customer integration, and employees’ innovation behavior.

3.1  Introduction

Business process management has been widely recognized as a useful approach for supporting innovation, transformation, organizational development, change management, enterprise architecture, and audit/compliance (Zairi, 1997). It advocates a shift from a “vertical” or functional focus to a “horizontal” or process orientation in managing activities in an organization. Critical to the success of business process management is changing employees’ existing attitudes and assumptions based on hierarchies and functions to build a new frame of reference and perspective based on delivering value to customers (Childe, Maull, & Bennett, 1994; Gartner, 2012). Therefore, there has been increasing focus on the concept of business process orientation. The concept is developed based on the Deming Management Method (Davenport & Short, 1990; Walton, 1986) and proposes that organizations can enhance their performance by adopting a process-oriented view. BPO is a way of thinking and working that emphasizes the integration of inputs into valuable outputs rather than focusing on hierarchical or functional effectiveness (McCormack & Johnson, 2001; Aguilar-Savén, 2004). Without the mindset, employees cannot visualize the overall impact of their work and are likely to stay within their functional
silos (Reijers, 2006). Some researchers believe that BPO is a beneficial managerial approach that is essential in innovation efforts such as business reengineering and redesign (Davenport & Short, 1990) and some organizations have invested significant resources and effort in developing their BPO (Zairi, 1997). Yet, there is still a lack of empirical evidence for the effect of BPO on organizational innovation performance. This chapter aims to fill this gap by examining whether BPO influences organizational innovation performance.

BPO has been conceptualized in terms of process view, process jobs, process management and measurement, process structure, and process values and beliefs (McCormack & Johnson, 2001). Process view refers to the extent to which an organization documents and understands a business process from the beginning to the end. Process jobs focus on the extent to which employees’ work is organized around the business processes leading to final products or services. Process management and measurement looks at the extent to which the efficiency and effectiveness (e.g., output quality, cycle time, process cost, and variability) of business processes are assessed. Process structure refers to the extent to which different elements, activities, and workflows are organized effectively. Process values and beliefs focus on whether a culture that encourages employees to focus on customer value creation and continuous improvement exists. Prior studies have shown that process view, process jobs, and process management and measurement are the most significant aspects of BPO (Gemmel et al., 2008; McCormack & Johnson, 2001; Škrinjar et al., 2006; Škrinjar et al., 2008). Accordingly, this research conceptualizes BPO in terms of these three aspects.

More importantly, this chapter seeks to explain how BPO influences organizational innovation performance. As mentioned earlier, BPO is believed to be critical to the success of business process management. The essence of business process management lies in looking beyond functional boundaries to deliver value to customers. In other words, the two fundamental aspects of successful business process management are: 1) effective business processes cross organizational boundaries and are generally independent of the formal organizational structure, and 2) business processes should create value for customers (Davenport & Short, 1990). Accordingly, this study focuses on cross-functional integration and customer integration as two key
effects of BPO. Also, since BPO is a way of thinking and working, this study expects it to influence the attitudes and behaviors of employees (Willaert, Van den Bergh, Willems, & Deschoolmeester, 2007). Given that innovation is an important goal of business process management (Davenport, 1993; Lee & Dale, 1998), this study examines employees’ innovation behavior as another important effect of BPO. Cross-functional integration, customer integration, and employees’ innovation behavior have been shown to be significant antecedents of organizational innovation performance (Lau, Tang, & Yam, 2010; Sherman, Berkowitz, & Souder, 2005; Gumusluoglu & Ilsev, 2009). These suggest that they are likely to play an important role in converting the managerial approach of BPO to tangible organizational innovation performance. In sum, in this chapter, the aim is to address the research question of “how does BPO influence organizational innovation performance?”

Based on survey data collected from 127 organizations in Japan, this study found that process jobs and process management and measurement influence organizational innovation performance through customer integration and employees’ innovation behavior. Interestingly, process view did not have a significant effect. Cross-functional integration also did not have a significant effect on organizational innovation performance.

This study contributes to research and practice in several ways. This is one of the first studies to identify the underlying mechanism through which BPO influences organizational innovation performance. Providing a conceptual exposition for the effect of BPO advances our understanding of its nature and can serve as a foundation for future theoretical development. Through studying Japanese organizations, this study provides initial empirical evidence for the effect of BPO and sheds light into an understudied context in information and management research. For practice, the findings of this study provide suggestions for improving organizational innovation performance and strengthen managers’ value propositions in garnering senior managerial support for developing BPO.

3.2 Conceptual Background

The concept of BPO will first be described. This is followed by a discussion on the three expected effects of BPO: cross-functional integration, customer integration, and
employees’ innovation behavior. Studies examining the effects of BPO will also be reviewed. Last part of this section focuses on the conceptualization of organizational innovation performance.

3.2.1 Business Process Orientation

As a process-oriented way of thinking and working, BPO places a special emphasis on the “process, outcomes and customers” rather than hierarchical or functional effectiveness (McCormack & Johnson, 2001; Reijers, 2006). It fosters the shift from an input-focused, budget-driven managerial approach to an output-focused, market-driven approach. In organizations with strong BPO, work is seen as a sequence of activities and tasks linked across functions and hierarchies to deliver a product or service that is of value to customers (McCormack & Johnson, 2001). Employees are encouraged to “improve key business processes, even at the expense of their department’s performance” (Lee & Dale, 1998). In contrast, organizations that lack BPO are often organized in narrow-focused departments with disparate work procedures and approaches plagued by turf protection, competition, and poor communication (Lee & Dale, 1998).

BPO is initially conceptualized in terms of process view, process jobs, and process management and measurement, process structure, and process values and beliefs (McCormack & Johnson, 2001). Among them, process view, process jobs, and process management and measurement have been shown to be the most significant aspects of BPO (McCormack & Johnson, 2001; McCormack, 2007). Accordingly, this study focuses on the three aspects. Most prior studies on BPO also adopt a similar three-dimensional conceptualization of BPO (e.g., Gemmel et al., 2008; Škrinjar et al., 2006; Škrinjar et al., 2008).

Process view refers to the extent to which an organization documents and understands a business process across the organization, from the beginning to the end (McCormack & Johnson, 2001). It involves defining and modeling business processes in process terms (e.g., input, output, process and process owner) to facilitate communication among employees within an organization as well as in exchanges with customers. The goal is to improve the performance of overall process rather than the performance of a person (Škrinjar et al., 2006), which can serve as a start point of
business process improvement and reengineering (Willaert et al, 2007). Having a clear process view has been shown to increase the success of innovation activities such as business process redesign (Zaheer, Rehman, & Khan, 2010).

Process jobs focus on the extent to which employees’ work is organized around the business processes leading to final products or services (McCormack & Johnson, 2001). Employees working in organizations with high BPO often work as process owners or in process teams (McCormack, 2007). They are expected to take full responsibility for a customer and the business processes related to delivering products or services to the customer. Process jobs often require them to apply a variety of skills and talents to solve complex problems (McCormack, 2007). As customer needs change, employees also need to learn new skills and knowledge to keep up.

Process management and measurement looks at the extent to which the efficiency and effectiveness (e.g., output quality, cycle time, process cost, and variability) of business processes are assessed (McCormack & Johnson, 2001). It involves the identification of process performance goals (e.g., reduce process cost, increase value to customers), definition of process measures (e.g., process cost, time-to-market speed), and assessment of process performance and outcomes (McCormack, 2007). “Signaling what is important” and “fixing accountability for behaviors and results” are two vital benefits of process measurement for strategy execution (Willaert et al., 2007). Results of process assessment are used in decisions regarding the allocation of resources such as human capital and in rewarding employees. Overall, the goal of process management and measurement is to encourage employees to focus on creating value for customers and continuously improving products and services as well as business processes.

Prior studies have shown that BPO improves aspects of business process management such as business process efficiency and business process innovation (Zaheer et al., 2010). It has also been suggested that BPO can improve both non-financial and financial performance, including better integration across the organization and flexibility, improved customer focus and customer satisfaction, as well as cost savings, and reduced cycle times (Kohlbacher, 2010; Škrinjar et al., 2008). Interestingly, it has been found that BPO does not have a direct effect on financial performance. Rather, it influences financial performance through non-financial performance (Škrinjar et al.,
Similarly, other studies found that BPO improves organizational dynamics, decreases interdepartmental conflicts, and promotes “esprit de corps” among employees (McCormack & Johnson, 2001). Although innovation is an important goal of business process management (Davenport, 1993), there has been a paucity of conceptual understanding and empirical evidence for the effects of BPO on organizational innovation performance. This study is an attempt to fill this gap.

To understand how BPO influences organizational innovation performance, it is necessary to understand the effects of BPO. BPO is a managerial approach for maximizing the success of business process management (Childe et al., 1994; Gartner, 2012), which focuses on integrating and streamlining different functional expertise in the process of creating and delivering value to customers (Davenport & Short, 1990). Accordingly, I examine cross-functional integration and customer integration as two key effects of BPO. As a managerial approach, enhancing BPO involves changing employees’ understanding of their work (through fostering process view), nature of their work (through fostering process jobs), and goals (through process management and measurement). It is therefore likely to change the attitudes and behaviors of employees. Since innovation is an important goal of business process management (Davenport, 1993; Lee & Dale, 1998) and the outcome variable of interest in this study is organizational innovation performance, this study examines employees’ innovation behavior as an effect of BPO. The three effects of BPO (i.e., cross-functional integration, customer integration, and employees’ innovation behavior) will be discussed in the following sections.

### 3.2.2 Cross-Functional Integration

One of the expected effects of BPO is fostering cross-functional integration. Cross-functional integration refers to the degree of interaction, communication, information sharing, and coordination across business functions (Song & Montoya-Weiss, 2001; Troy, Hirunyawipada, & Paswan, 2008). It is a key aspect of business process management because the delivery of products and services to customers inherently requires the combination of different expertise and coordination of different functions. Cross-functional integration encourages employees to acquire a global overview of business processes and helps to reduce functional sub-optimization that plagues traditional organizations (Turkulainen & Ketokivi, 2012). In organizations with high
level of cross-functional integration, employees’ activities are guided by customer requirements and organization-wide value rather than being driven by narrow departmental objectives or cost minimization. Cross-functional integration goes beyond merging employees from different functions into a team. There is a strong emphasis on team building, shared learning, and common goals to break “silo thinking” and facilitate the cooperation and coordination of employees with different expertise (Sherman et al., 2005).

3.2.3 Customer Integration

BPO is also expected to enhance customer integration. Customer integration is a form of organization-customer interaction, in which organizations maintain frequent communication with their customers, collect customer needs, respond promptly to their needs, and involve customers in organization activities and processes (Wikstrom, 1996). Customer integration is an important aspect of business process management because it helps to identify where and how business processes can create value for customers. Through customer integration, customers become the key information source of their updated needs, new problems to be solved, and future demands. In organizations with high level of customer integration, lead customers may become co-producers of innovative products and services by taking part in internal activities and processes (Desouza, Auazu, Jha, & Dombrowski, 2008) or even co-creators of sustainable value (Gassmann & Enkel, 2004).

3.2.4 Employees’ innovation behavior

Innovation is an important goal of business process management (Davenport, 1993; Lee & Dale, 1998) and organizations rely on their employees for innovation. As mentioned earlier, BPO is expected to create a climate that promotes employees’ innovation behavior, which refers to employees’ propensity to generate, promote, and realize new ideas, processes, products, and services (de Jong & den Hartog, 2007; Huhtala & Parzefall, 2007). Innovation behavior requires both ability (e.g., task- and context-specific knowledge, cognitive capabilities, technical skills) and willingness (e.g., intrinsic and extrinsic motivation) to be creative (Huhtala & Parzefall, 2007). As will be explained later, an organization with strong BPO is likely to be conducive for employees to develop their ability and willingness to innovate. Innovation can be
undertaken at the individual, group, or organization levels. In this study, employees’ innovation behavior is conceptualized as an aggregated, organizational level characteristic rather than individual innovation behavior.

### 3.2.5 Organizational Innovation Performance

The dependent variable of interest in this study is organizational innovation performance. Based on Schumpeter (1934) and Ar and Baki (2011), organizational innovation performance is conceptualized in terms of product innovation performance and process innovation performance. Product innovation involves the introduction of new or improved goods or services to the market and it focuses on identifying new customer needs, managing product quality, and developing effective market expansion strategy (Boer & During, 2001). Process innovation refers to the adoption of new or improved methods to produce goods and services. The primary goals of process innovation include reducing lead-time and operational cost, as well as improving manufacturing flexibility (Boer & During, 2001). It focuses on maximizing the efficiency of activities for producing goods and services.

In a competitive business environment, both product innovation and process innovation are important to the growth of an organization. While product innovation tends to have a clearer and more direct effect on an organization’s bottom line, the effect of process innovation tends to be less visible to the external market (Fagerberg, et al., 2005). Nevertheless, whenever new products require a manufacturing and delivery process to reach the customer, process innovation can affect the idea-to-launch process of production innovation, and also inspire “new” product (Dooley & O'Sullivan, 2008). Therefore, it is important to explicitly measure both product and process innovation performance, as done in this study.

### 3.3 Research Model and Hypotheses

The objective of this study is to examine whether and how BPO influences organizational innovation performance. To this end, BPO is conceptualized in terms of process view, process jobs, and process management and measurement. Based on the key objectives of business process management, this study has identified cross-functional integration, customer integration, and employees’ innovation behavior to be three important effects of BPO that, in turn, are expected to influence
organizational innovation performance. The proposed research model depicting these relationships is shown in Figure 3-1. Each hypothesis will be explained next.

![Figure 3-1 Proposed Model of the Impacts of BPO on Innovation](image)

### 3.3.1 Effects of Business Process Orientation

Process view provides a “cross-functional, horizontal picture of a business involving elements of structure, focus, measurement, ownership and customers” (Lockamy III & McCormack, 2004). It provides a common language and basis for employees with different expertise to interact with one another. Having a process view is likely to promote cross-functional integration because it clarifies the role of different functions in a business process and shows how they come together in producing the final product or service. Understanding the interdependencies among different functions provides the impetus for employees to resolve differences and cooperate (Ellinger, 2000; Kahn & Mentzer, 2008). It also encourages employees to work with the final product or service in mind rather than focusing solely on departmental goals (Kahn & Mentzer, 2008).

Process view is also likely to facilitate customer integration. Visibility of customer is an essential achievement of BPO (Willaert et al., 2007). Having a process view makes it easy to identify where and how customer input is necessary, especially for the development/innovation process (Plé, 2010). It also helps to pinpoint activities where customer involvement will be fruitful. Process view allows organizations to explain
their processes to customers more clearly and helps customers reduce initial cognitive effort in understanding the organization. This enables customers to channel their energy to the more value-adding activities of process improvement or product and service enhancement. Improvements can be represented in the form of modified process view and such visible output can serve to motivate customers to participate in future customer integration endeavors (Plé, 2010; Rodie & Kleine, 2000).

This study also expects that a process view will improve employees’ innovation behavior. Having a process view allows employees to understand the business reality and identify areas that need improvement (McCormack, 2007; Lewis, Young, Mathiassen, Rai, & Welke, 2007). It enables and encourages them to look beyond their own tasks and responsibilities to consider bottlenecks in the entire business process. Without a process view, employees are likely to have very limited opportunities to develop and use their creativity as their vision would be bounded by their department, function, or hierarchy. Moreover, having a process view can also help involve employees into the innovation process by defining how and where they were drawn on together to contribute (McCormack, 2007; Bernstein & Singh, 2006). In sum, this study hypothesizes that:

\textit{H1a: Process view is positively associated with cross-functional integration.}

\textit{H1b: Process view is positively associated with customer integration.}

\textit{H1c: Process view is positively associated with employees’ innovation behavior.}

Process jobs emphasize process ownership and process teamwork (McCormack, 2007; Lockamy III & McCormack, 2004). In an organization where employees work on process jobs, the level of cross-functional integration is likely to be high because the very nature of process jobs requires the combination of different functional expertise and coordination of different departments (McCormack, 2007). Working on process jobs motivates employees to engage in interaction, information sharing, and coordination within a cross-functional process team because they would not be able to complete their jobs successfully otherwise (McCormack & Johnson, 2001).

The goal of process-oriented work is pleasing customers rather than pleasing managers. In process jobs, employees are often fully accountable for a customer and
the business processes related to delivering products or services to the customer (McCormack, 2007). Employees are therefore likely to work with customers closely throughout the delivery of a product or service to identify their needs and satisfy their requirements. Customers are also likely to be more willing to share their ideas and contribute insights because having one point of contact allows them to develop shared goal and stronger relationship with the organization (Gibbert et al., 2002).

This study also expects employees’ innovation behavior to be higher in organizations where employees work in process jobs. As mentioned earlier, process jobs often require employees to apply a variety of skills and talents to solve complex problems. Employees also need to acquire new skills and knowledge to attend to new customer needs. As a result, employees working in process jobs are likely to have richer knowledge and skill set which translates to better ability to innovate (Boden, 2001). Further, the need to keep up with changing customer needs serves to motivate employees to continuously innovate (Jong & De Ruyter, 2004). Therefore, this study hypothesizes that:

\[ H2a: \text{Process jobs are positively associated with cross-functional integration.} \]

\[ H2b: \text{Process jobs are positively associated with customer integration.} \]

\[ H2c: \text{Process jobs are positively associated with employees’ innovation behavior.} \]

Process management and measurement focuses on assessing the extent to which business processes are efficiently and effectively carried out and rewarding employees based on business process outcomes (McCormack, 2007; Willaert et al., 2007). Emphasizing process performance rather than departmental or functional performance prompts employees to focus on maximizing the overall performance of a business process rather than that of their department or function (Beretta, 2002). This entices them to work cooperatively across functions rather than competing with one another to maximize their returns. Therefore, this study expects process management and measurement to promote cross-functional integration. In support, McCormack and Johnson (2001) found that process management and measurement decreases cross-functional conflict caused by incompatible goals and increases coordination.
Process management and measurement is also likely to drive customer integration. Since an important measure of business process performance is value added to customer (McCormack, 2007; Payne, Holt, & Frow, 2000; Škrinjar et al., 2008), employees are likely to be motivated to work closely with customers to understand their needs and maximize the value delivered. Employees also have the impetus to involve customers in important business processes to garner their support and buy-in for the final product or service (Vargo, 2008; Kellogg, Youngdahl, & Bowen, 1997).

This study also expects process management and measurement to promote employees’ innovation behavior. When the performance of employees is tied to business process outcomes, they are likely to seek ways to enhance business process outcomes. As mentioned earlier, value added to customer is a key measure of business process performance (McCormack, 2007; Payne et al., 2000; Škrinjar et al., 2008). To create substantial value to customer, innovation is essential (Slater, 1997). Therefore, process management and measurement are likely to encourage employees to become skilled at renewing or creating products and services around customers’ fast-changing needs to generate superior value to customers. In support, Coelho and Augusto (2010) found that the extent to which organizations recognize employees’ efforts through performance measurement increases their feeling of meaningfulness and in turn fosters creativity. Moreover, results of process measurement are also important information sources for employees to improve processes and services (Willaert et al., 2007). In sum, this study assume that:

\[ H3a: \text{Process management and measurement is positively associated with cross-functional integration.} \]

\[ H3b: \text{Process management and measurement is positively associated with customer integration.} \]

\[ H3c: \text{Process management and measurement is positively associated with employees’ innovation behavior.} \]

### 3.3.2 Mediators of the Effects of Business Process Orientation

This study proposes that cross-functional integration, customer integration, and employees’ innovation behavior mediate the effect of BPO on organizational
innovation performance. In this section, the effects of the three mediators on organizational innovation performance will be explained.

Cross-functional integration is expected to improve organizational innovation performance because it provides a platform for combining diverse expertise and skills. Heterogeneity enhances innovation performance because it allows employees to be more fully equipped to discover interesting opportunities and innovations (Rodan & Galunic, 2004). Cross-functional integration can also facilitate creative leaps, which refer to the connection of disparate ideas or concepts within the mind of an individual to create new ideas (Amabile, 1996). In support, there has been strong evidence that the variety of knowledge, know-how, and expertise is important for innovation performance (e.g., de Luca & Atuahene-Gima, 2007; Rodan & Galunic, 2004). This suggests that:

*H4: Cross-functional integration is positively associated with organizational innovation performance.*

Customer integration allows organizations to identify problems with existing products and services, new customer needs, and future demands. This provides the necessary ingredients for organizations to develop improved or new products and services. It also helps to introduce new perspectives and contributes to “collective creativity” (Maltz, Souder, & Kumar, 2001). In support, prior studies have shown that innovation is enhanced when customers articulate their unmet needs and engage in the design of new products to satisfy the needs (Lau et al., 2010). Customer integration can also benefit innovation by reducing potential errors in comprehending customer needs as well as market risks (Enkel, Kausch, & Gassmann, 2005). This study postulate that:

*H5: Customer integration is positively associated with organizational innovation performance.*

Clearly, employees’ innovation behavior is likely to have a significant effect on organizational innovation performance since employees are the main drivers of innovation in organizations (Scott & Bruce, 1994; Gumusluoglu & Ilsev, 2009). When employees’ innovation behavior is high, they are likely to be more active in generating and implementing new ideas for products, services, and processes. Compared to an organization where employees’ innovation behavior is low, such
organizations are likely to have more opportunities to develop innovations that strike a chord with customers. In line with this, some studies have shown that employees’ innovation positively influence the number of new products (e.g., Verhees & Meulenberg, 2004). Hence, this study hypothesizes that:

**H6: Employees’ innovation behavior is positively associated with organizational innovation performance.**

### 3.4 Research Method

Data for assessing the proposed model were collected through a survey of organizations in Japan. Construct operationalization and data collection will be described next.

#### 3.4.1 Construct Operationalization

All constructs were operationalized using scales validated in prior studies. Some items were slightly reworded to fit the context of this study. Each construct was measured with at least three items. All items and their sources are listed in Table 3-1.

To measure the three aspects of business process orientation (i.e., process view, process jobs, process management and measurement), this study adopted the scales developed by McCormack (2001; 2007). For process view, the items assess whether business processes are defined and documented and are used in communications. Process jobs are measured by the extent to which jobs are multidimensional, involve problem solving, and require learning. Items measuring process management and measurement assess the extent to which process goals are identified, process measures are defined, and process performance are measured and used in decision making about resource allocation.
<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Source</th>
</tr>
</thead>
</table>
| **Process View**          | PV1: The average employee views the business as a series of linked processes.  
PV2: Process terms (input, output, process and process owners) are used in the conversation.  
PV3: Processes are defined and documented by using inputs and outputs, to and from our customers.  
PV4: The business processes are sufficiently defined, so that most people know how they work. | All items adapted from McCormack (2001; 2007)                          |
| **Process jobs**          | PJ1: Jobs are usually multidimensional and not just simple tasks.  
PJ2: Jobs include frequent problem solving.  
PJ3: People are constantly learning new things on the job. | All items adapted from McCormack (2001; 2007)                          |
| **Process Management and Measurement** | PM1: Process performance (e.g., customer satisfaction) is measured.  
PM2: Process measurements (e.g., output quality, cycle time, process cost and variability) are defined.  
PM3: Resources (e.g., people, expenses, and other capital) are allocated based on process.  
PM4: Specific process performance goals (e.g., target output quality, target cycle time, target process cost and target variability) are in place.  
PM5: Process outcomes (e.g., real output quality, real cycle time, real process cost and real variability) are measured. | All items adapted from McCormack (2001; 2007)                          |
| **Cross-Functional Integration** | CFI1: Our business functions are integrated in human resource development.  
CFI2: Our projects/business units are jointly managed strategically.  
CFI3: Our business functions are integrated in new products/services development. | CFI1 developed based on Kusunoki and Numagami (1998);  
CFI2 developed based on Closs and Mollenkopf (2004);  
CFI3 developed based on Song and Parry (1997) |
| **Customer Integration**  | CI1: My company maintains close contacts with customers.  
CI2: My company tracks and analyzes customer behavior by information system.  
CI3: My company collects and shares information about customer needs.  
CI4: My company rapidly and proficiently captures customer reactions towards new products/services. | CI1 adapted from Swink et al. (2007);  
CI2 developed based on Enkel et al. (2005);  
CI3-4 developed based on Sherman et al. (2000) |
| **Employees’ innovation behavior** | EIB1: In general, employees in my company innovate actively.  
EIB2: In general, employees in my company innovate frequently.  
EIB3: In general, employees in my company support Innovation behavior at work.  
EIB4: In general, employees in my company spend significant time innovating at work. | All items developed based on Dorenbosch et al. (2005) and Scott and Bruce (1994) |
| **Organizational Innovation Performance** [1] | OIP1: My company has better function of new products/services than others.  
OIP2: My company has better quality of new products/services than others.  
OIP3: My company has better cost of new products/services than others.  
OIP4: My company has better reliability/security of new products/services than others.  
OIP5: My company has better quality of process innovation performance than others.  
OIP6: My company has better effectiveness of process innovation performance than others.  
OIP7: My company has better speed of process innovation performance than others. | All items developed based on Boer and During (2001) and Tracey and Tan (2001) |

Note: [1] Please answer according to the innovation performance of the core business.
Cross-functional integration is measured with items developed based on Kusunoki and Numagami (1998), Closs and Mollenkopf (2004), and Song and Parry (1997). They assess the extent to which an organization engages in cross-functional collaborations, develops employees who have cross-functional skills, and integrates cross-functional units/projects management. Items measuring customer integration were adapted from Swink, Narasimhan, and Wang (2007), Enkel et al. (2005), and Sherman, Souder, and Jenssen (2000). They measure the extent to which an organization communicates with customers to collect information about customer needs and feedback. Employees’ innovation behavior is measured with items developed based on Dorenbosch, Engen, and Verhagen (2005) and Scott and Bruce (1994). The items assess the extent to which employees engage in innovative activities. Based on Boer and During (2001) and Tracey and Tan (2001), organizational innovation performance is assessed in terms of product innovation (e.g., quality of new products or services) and process innovation (e.g., quality of new business process). All items were measured on five-point Likert scales with the two extremes anchored by “strongly disagree” and “strongly agree”.

Since data were collected in Japan, the survey was then translated from English to Japanese. The Japanese questionnaire was reviewed by several researchers and senior managers to ensure translation adequacy before the final survey.

3.4.2 Data Collection

Sample for the survey consists of 1,819 Japanese organizations listed in the First and Second Sections of Tokyo Stock Exchange. The survey was conducted in late 2010 to early 2011 and was administered by the Innovation Management College, which is a Japanese research institute focusing on innovation-related research. Senior managers served as the key information for each organization. A total of 127 completed responses have been received.

The demographic profile of the responding organizations is shown in Table 3-2. Most of the organizations operated in the manufacturing industry (55.1 percent) and had more than 1,000 employees (64.6 percent). Most senior managers who responded to the survey worked in departments focusing on business planning in headquarter (74.8 percent).
Table 3-2 Demographic Profile

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Percent</th>
<th>Characteristic</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Industry</td>
<td></td>
<td>Number of</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>55.1</td>
<td>More than 1000</td>
<td>64.6</td>
</tr>
<tr>
<td>Distribution</td>
<td>11.8</td>
<td>501 – 1000</td>
<td>15.7</td>
</tr>
<tr>
<td>Construction</td>
<td>9.4</td>
<td>101 – 500</td>
<td>15.7</td>
</tr>
<tr>
<td>Service</td>
<td>6.3</td>
<td>Less than 100</td>
<td>3.9</td>
</tr>
<tr>
<td>Other</td>
<td>17.3</td>
<td>Business planning in headquarters</td>
<td>74.8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT in headquarters</td>
<td>7.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other</td>
<td>17.3</td>
</tr>
</tbody>
</table>

Note: Total Number of respondents is 127.

3.5 Data Analysis

The proposed model was assessed using Partial Least Squares (PLS) analysis, a structural equation modeling technique that concurrently tests the psychometric properties of each measurement scale (measurement model) and analyzes the strength and direction of relationships among constructs (structural model) (Chin, Marcolin, & Newsted, 2003). In the data analysis, the effects of organization size and industry were controlled, as larger organizations and organizations in high-tech industries have been shown to be more innovative (Rogers, 2004). Organization size was measured by the number of employees.

3.5.1 Test of Measurement Model

All constructs in this study are reflective. Assessment of measurement model includes the evaluation of reliability, convergent validity, discriminant validity and multicollinearity. Reliability was assessed with Cronbach’s alpha coefficient, composite reliability, and significance of item loading (see Table 3-3). All constructs in this study achieved scores above the recommended value of 0.70 for Cronbach’s alpha (Hair, Babin, & Anderson, 2009) and composite reliability (Chin et al., 2003). All item loadings were also significant at 0.001 level (Chin et al., 2003).

Convergent validity was assessed using average variance extracted (AVE) and factor analysis. All AVEs were above the required value of 0.50 (Chin et al., 2003). In the exploratory factor analysis with Equamax rotation (see Table 3-4), seven factors corresponding to the proposed constructs in the model were extracted. All item loadings on stipulated constructs were greater than 0.50 and all eigenvalues were greater than one as required.
Table 3-3 Psychometric Properties and Construct Correlation in the Impacts of BPO on Innovation Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
<th>AVE</th>
<th>CR</th>
<th>Construct Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV</td>
<td>0.82</td>
<td>0.64</td>
<td>0.88</td>
<td>0.80</td>
</tr>
<tr>
<td>PJ</td>
<td>0.86</td>
<td>0.78</td>
<td>0.91</td>
<td>0.36 0.88</td>
</tr>
<tr>
<td>PM</td>
<td>0.94</td>
<td>0.80</td>
<td>0.95</td>
<td>0.67 0.36 0.89</td>
</tr>
<tr>
<td>CFI</td>
<td>0.75</td>
<td>0.67</td>
<td>0.86</td>
<td>0.37 0.31 0.42 0.82</td>
</tr>
<tr>
<td>CI</td>
<td>0.80</td>
<td>0.63</td>
<td>0.87</td>
<td>0.36 0.30 0.50 0.67 0.79</td>
</tr>
<tr>
<td>EIB</td>
<td>0.89</td>
<td>0.75</td>
<td>0.92</td>
<td>0.43 0.38 0.50 0.54 0.55 0.87</td>
</tr>
<tr>
<td>OIP</td>
<td>0.91</td>
<td>0.64</td>
<td>0.92</td>
<td>0.08 0.16 0.15 0.27 0.33 0.80</td>
</tr>
</tbody>
</table>

Industry N/A N/A N/A -0.04 -0.15 -0.30 0.01 0.11 0.04 -0.07 N/A

Org. Size N/A N/A N/A 0.10 0.03 0.06 0.16 0.21 0.07 -0.04 0.06 N/A

Note: Bold italic diagonal rows are square root of AVE; N/A: Cronbach’s Alpha, AVE, and CR are not calculated for single-item construct; PV: Process View; PJ: Process Jobs; PM: Process Management and Measurement; CFI: Cross-Functional Integration; CI: Customer Integration; EIB: Employees’ Innovation Behavior; OIP: Organizational Innovation Performance; IN: Industry; OS: Organization Size.

Table 3-4 Reflective Factor Analysis of the Impacts of BPO on Innovation Model

<table>
<thead>
<tr>
<th>Mean</th>
<th>Standard Deviation</th>
<th>PV</th>
<th>PJ</th>
<th>PM</th>
<th>CFI</th>
<th>CI</th>
<th>EIB</th>
<th>OIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV1</td>
<td>2.94</td>
<td>0.79</td>
<td>0.80</td>
<td>0.36</td>
<td>0.51</td>
<td>0.36</td>
<td>0.31</td>
<td>0.47</td>
</tr>
<tr>
<td>PV2</td>
<td>2.05</td>
<td>1.00</td>
<td>0.65</td>
<td>0.09</td>
<td>0.38</td>
<td>0.12</td>
<td>0.07</td>
<td>0.14</td>
</tr>
<tr>
<td>PV3</td>
<td>2.48</td>
<td>1.18</td>
<td>0.86</td>
<td>0.26</td>
<td>0.57</td>
<td>0.24</td>
<td>0.29</td>
<td>0.30</td>
</tr>
<tr>
<td>PV4</td>
<td>2.92</td>
<td>0.95</td>
<td>0.88</td>
<td>0.37</td>
<td>0.65</td>
<td>0.40</td>
<td>0.40</td>
<td>0.40</td>
</tr>
<tr>
<td>PJ1</td>
<td>3.34</td>
<td>0.93</td>
<td>0.29</td>
<td>0.87</td>
<td>0.24</td>
<td>0.14</td>
<td>0.22</td>
<td>0.30</td>
</tr>
<tr>
<td>PJ2</td>
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<td>0.86</td>
<td>0.33</td>
<td>0.89</td>
<td>0.34</td>
<td>0.25</td>
<td>0.21</td>
<td>0.33</td>
</tr>
<tr>
<td>PJ3</td>
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<td>0.34</td>
<td>0.88</td>
<td>0.37</td>
<td>0.39</td>
<td>0.36</td>
<td>0.37</td>
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<tr>
<td>PM1</td>
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<td>1.06</td>
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<td>0.38</td>
<td>0.91</td>
<td>0.29</td>
<td>0.41</td>
<td>0.40</td>
</tr>
<tr>
<td>PM2</td>
<td>2.53</td>
<td>1.09</td>
<td>0.63</td>
<td>0.30</td>
<td>0.92</td>
<td>0.37</td>
<td>0.44</td>
<td>0.41</td>
</tr>
<tr>
<td>PM3</td>
<td>2.37</td>
<td>0.94</td>
<td>0.54</td>
<td>0.28</td>
<td>0.82</td>
<td>0.44</td>
<td>0.50</td>
<td>0.48</td>
</tr>
<tr>
<td>PM4</td>
<td>2.70</td>
<td>1.03</td>
<td>0.64</td>
<td>0.36</td>
<td>0.91</td>
<td>0.36</td>
<td>0.43</td>
<td>0.50</td>
</tr>
<tr>
<td>PM5</td>
<td>2.70</td>
<td>1.06</td>
<td>0.61</td>
<td>0.31</td>
<td>0.92</td>
<td>0.40</td>
<td>0.42</td>
<td>0.48</td>
</tr>
<tr>
<td>CFI1</td>
<td>2.35</td>
<td>1.30</td>
<td>0.28</td>
<td>0.29</td>
<td>0.35</td>
<td>0.81</td>
<td>0.56</td>
<td>0.42</td>
</tr>
<tr>
<td>CFI2</td>
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<td>0.25</td>
<td>0.35</td>
<td>0.86</td>
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<td>0.45</td>
</tr>
<tr>
<td>CFI3</td>
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<td>0.33</td>
<td>0.23</td>
<td>0.33</td>
<td>0.78</td>
<td>0.51</td>
<td>0.46</td>
</tr>
<tr>
<td>CI1</td>
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<td>1.20</td>
<td>0.33</td>
<td>0.26</td>
<td>0.37</td>
<td>0.36</td>
<td>0.74</td>
<td>0.44</td>
</tr>
<tr>
<td>CI2</td>
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<td>0.35</td>
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<td>0.45</td>
<td>0.60</td>
<td>0.80</td>
<td>0.45</td>
</tr>
<tr>
<td>CI3</td>
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<td>1.11</td>
<td>0.22</td>
<td>0.24</td>
<td>0.33</td>
<td>0.42</td>
<td>0.80</td>
<td>0.40</td>
</tr>
<tr>
<td>CI4</td>
<td>1.93</td>
<td>1.07</td>
<td>0.24</td>
<td>0.17</td>
<td>0.40</td>
<td>0.53</td>
<td>0.83</td>
<td>0.44</td>
</tr>
<tr>
<td>EIB1</td>
<td>2.56</td>
<td>0.86</td>
<td>0.38</td>
<td>0.33</td>
<td>0.48</td>
<td>0.53</td>
<td>0.50</td>
<td>0.90</td>
</tr>
<tr>
<td>EIB2</td>
<td>2.63</td>
<td>0.86</td>
<td>0.39</td>
<td>0.38</td>
<td>0.45</td>
<td>0.48</td>
<td>0.45</td>
<td>0.86</td>
</tr>
<tr>
<td>EIB3</td>
<td>2.56</td>
<td>0.86</td>
<td>0.34</td>
<td>0.35</td>
<td>0.43</td>
<td>0.49</td>
<td>0.46</td>
<td>0.88</td>
</tr>
<tr>
<td>EIB4</td>
<td>2.21</td>
<td>0.82</td>
<td>0.39</td>
<td>0.27</td>
<td>0.39</td>
<td>0.37</td>
<td>0.48</td>
<td>0.82</td>
</tr>
<tr>
<td>OIP1</td>
<td>3.28</td>
<td>0.90</td>
<td>-0.02</td>
<td>0.14</td>
<td>0.11</td>
<td>0.22</td>
<td>0.22</td>
<td>0.20</td>
</tr>
<tr>
<td>OIP2</td>
<td>3.39</td>
<td>0.89</td>
<td>-0.04</td>
<td>0.16</td>
<td>0.15</td>
<td>0.21</td>
<td>0.29</td>
<td>0.30</td>
</tr>
<tr>
<td>OIP3</td>
<td>3.35</td>
<td>0.83</td>
<td>0.05</td>
<td>0.15</td>
<td>0.14</td>
<td>0.13</td>
<td>0.18</td>
<td>0.32</td>
</tr>
<tr>
<td>OIP4</td>
<td>3.08</td>
<td>0.75</td>
<td>0.15</td>
<td>0.09</td>
<td>0.14</td>
<td>0.11</td>
<td>0.23</td>
<td>0.26</td>
</tr>
<tr>
<td>OIP5</td>
<td>2.98</td>
<td>0.83</td>
<td>0.14</td>
<td>0.12</td>
<td>0.06</td>
<td>0.13</td>
<td>0.18</td>
<td>0.23</td>
</tr>
<tr>
<td>OIP6</td>
<td>2.92</td>
<td>0.86</td>
<td>0.15</td>
<td>0.08</td>
<td>0.15</td>
<td>0.11</td>
<td>0.25</td>
<td>0.31</td>
</tr>
<tr>
<td>OIP7</td>
<td>3.11</td>
<td>0.84</td>
<td>0.00</td>
<td>0.20</td>
<td>-0.02</td>
<td>0.07</td>
<td>0.16</td>
<td>0.16</td>
</tr>
</tbody>
</table>


Discriminant validity was assessed by comparing AVEs and construct correlations as suggested by Gefen and Straub (2005). Results indicated that none of the construct...
correlations (non-diagonal entries in Table 3-3) exceeds the corresponding square root of AVE (diagonal entries), suggesting that the measures of each construct correlated more highly with their own items than with items measuring other constructs.

A test of multicollinearity was also conducted. The highest variance inflation factors (VIF) was 2.10, which is well below the threshold value of 3.3, suggesting that multicollinearity is unlikely to be a problem for the data (Diamantopoulos & Winklhofer, 2001). Overall, tests for reliability, convergent validity, discriminant validity, and multicollinearity show good quality of the measurement.

Common method bias was also assessed in this study, since all constructs are measured with self-reports. First, Harman’s one-factor test, which involved entering all constructs into an unrotated principal components factor analysis and examining the resultant variance, was conducted (Harman, 1960). The threat of common method bias is high if a single factor accounts for more than 50 percent of the variance (Harman, 1960; Mattila & Enz, 2002). The results indicated that none of the factors significantly dominated the variance (variance of the largest factor was 26.4 percent). Second, common method bias was also checked by using the approach outlined in Podsakoff, MacKenzie, Lee, and Podsakoff, (2003), which involved adding a common method factor in the PLS model. The model was compared to the original model without the common method factor, and its results showed that all path coefficients and their signs were similar. Overall, these tests indicated that common method bias is unlikely to be a significant threat in this study.

### 3.5.2 Test of Structural Model

To test the hypotheses, statistical significance of corresponding path coefficients was assessed. All hypotheses except for those related to process view and the effect of cross-functional integration on organizational innovation performance were supported at 0.05 level (see Table 3-5 and Figure 3-2). None of the control variables (i.e., organization size and industry) were significant. The model explained 15 percent of the variance in organizational innovation performance. BPO accounted for 22 percent of the variance in cross-functional integration, 27 percent of the variance in customer integration, and 32 percent of the variance in employees’ innovation behavior.
Table 3-5 Test of Hypotheses of the Impacts of BPO on Innovation Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Path Coefficient</th>
<th>T-value</th>
<th>Result</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: PV → CFI</td>
<td>0.15</td>
<td>1.04</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>H2a: PJ → CFI</td>
<td>0.17*</td>
<td>1.72</td>
<td>Significant</td>
<td>0.22</td>
</tr>
<tr>
<td>H3a: PM → CFI</td>
<td>0.26*</td>
<td>1.94</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H1b: PV → CI</td>
<td>0.05</td>
<td>0.42</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>H2b: PJ → CI</td>
<td>0.15*</td>
<td>1.66</td>
<td>Significant</td>
<td>0.27</td>
</tr>
<tr>
<td>H3b: PM → CI</td>
<td>0.41**</td>
<td>3.94</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H1c: PV → EIB</td>
<td>0.14</td>
<td>1.19</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>H2c: PJ → EIB</td>
<td>0.21**</td>
<td>2.69</td>
<td>Significant</td>
<td>0.32</td>
</tr>
<tr>
<td>H3c: PM → EIB</td>
<td>0.34**</td>
<td>4.00</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H4: CFI → OIP</td>
<td>-0.10</td>
<td>0.58</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>H5: CI → OIP</td>
<td>0.25*</td>
<td>1.86</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H6: EIB → OIP</td>
<td>0.31**</td>
<td>2.66</td>
<td>Significant</td>
<td>0.15</td>
</tr>
<tr>
<td>PV → OIP</td>
<td>-0.09</td>
<td>0.54</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>PJ → OIP</td>
<td>0.04</td>
<td>0.29</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>PM → OIP</td>
<td>-0.05</td>
<td>0.33</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>Industry → OIP</td>
<td>-0.10</td>
<td>1.10</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>Organization Size → OIP</td>
<td>-0.08</td>
<td>1.32</td>
<td>Not Significant</td>
<td></td>
</tr>
</tbody>
</table>

Note: *Significant at p<0.05 (one-tailed T-value: 1.65); ** p<0.01 (one-tailed T-value: 2.35); PV: Process View; PJ: Process Jobs; PM: Process Management and Measurement; CFI: Cross-Functional Integration; CI: Customer Integration; EIB: Employees’ Innovation Behavior; OIP: Organizational Innovation Performance.

Figure 3-2 Test of Structural Model of the Impacts of BPO on Innovation Model

3.5.3 Test of Mediating Effects

To test the mediating role of cross-functional integration, customer integration, and employees’ innovation behavior, the direct effects of BPO on organizational innovation performance were assessed. Process view was excluded from the test since it did not have a significant effect. There were no significant direct impacts from
process jobs and process management and measurement on organizational innovation performance (see Table 3-5). In addition, the Sobel mediation test statistic and its variants (Aroian test statistic and Goodman test) were mostly significant at 0.05 level (see Table 3-6). These indicate that the effect of process jobs is fully mediated by employees’ innovation behavior, and the effect of process management and measurement is fully mediated by customer integration and employees’ innovation behavior.

Table 3-6 Test of Mediating Effects of Cross-functional Integration, Customer Integration, and Employees’ innovation behavior

<table>
<thead>
<tr>
<th>Path</th>
<th>Sobel Statistic</th>
<th>Aroian Statistic</th>
<th>Goodman Statistic</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>PJ  \rightarrow  CFI  \rightarrow  OIP</td>
<td>0.55</td>
<td>0.48</td>
<td>0.66</td>
<td>Not Significant</td>
</tr>
<tr>
<td>PM  \rightarrow  CFI  \rightarrow  OIP</td>
<td>0.56</td>
<td>0.50</td>
<td>0.64</td>
<td>Not Significant</td>
</tr>
<tr>
<td>PJ  \rightarrow  CI  \rightarrow  OIP</td>
<td>1.24</td>
<td>1.15</td>
<td>1.35</td>
<td>Not Significant</td>
</tr>
<tr>
<td>PM  \rightarrow  CI  \rightarrow  OIP</td>
<td>1.68*</td>
<td>1.64</td>
<td>1.73*</td>
<td>Significant</td>
</tr>
<tr>
<td>PJ  \rightarrow  EIB  \rightarrow  OIP</td>
<td>1.89*</td>
<td>1.83*</td>
<td>1.96*</td>
<td>Significant</td>
</tr>
<tr>
<td>PM  \rightarrow  EIB \rightarrow  OIP</td>
<td>2.21*</td>
<td>2.17*</td>
<td>2.26*</td>
<td>Significant</td>
</tr>
</tbody>
</table>

Note: *Significant at p<0.05 (one-tailed T-value: 1.65); PJ: Process Jobs; PM: Process Management and Measurement; CFI: Cross-Functional Integration; CI: Customer Integration; EIB: Employees’ Innovation Behavior; OIP: Organizational Innovation Performance.

3.6 Discussion

This study hypothesized that BPO (conceptualized in terms of process view, process jobs, and process management and measurement) influences organizational innovation performance through promoting cross-functional integration, customer integration, and employees’ innovation behavior. Results of a survey of organizations in Japan indicated that process jobs and process management and measurement influences organizational innovation performance through customer integration and employees’ innovation behavior. Contrary to our expectations, process view did not have a significant effect. Cross-functional integration also did not have a significant effect on organizational innovation performance.

The lack of effect of process view suggests that defining and modeling business processes do not necessarily mean that they will be utilized to facilitate cross-functional integration and customer integration or promote employees’ innovation behavior. This indicates that having a process view may be a necessary but not sufficient condition for successful business process management. This is in line with the notion that effective business process management must consider the human element and the social context in which business processes are embedded (Melão &
Pidd, 2001). To promote cross-functional integration, customer integration, and employees’ innovation behavior, organizations must look beyond technical business process modeling (i.e., process view) and change employees’ attitude and behavior through redesigning jobs as well as management and measurement systems.

This study also found that cross-functional integration did not have a significant effect on organizational innovation performance and it therefore did not mediate the effect of BPO on organizational innovation performance. This may reflect the double-edged-sword quality of cross-functional integration: while expertise and skill heterogeneity facilitates creative leap, it also calls for effective management of background differences and potential conflicts that arise due to the lack of shared understanding among different functional experts (Lovelace, Shapiro, & Weingart, 2001). For cross-functional integration to effectively improve organizational innovation performance, it may be necessary to incorporate mechanisms for managing the differences and resolving conflicts. In line with this, Lovelace et al. (2001) showed that cross-functional collaboration influences product innovation performance through knowledge integration mechanisms (defined as formal processes and structures that ensure the capture, analysis, interpretation, and integration of market and other types of knowledge among different functional units within the firm). This indicates that it may be necessary to account for the effect of such mechanisms in examining the relationship between cross-functional integration and innovation performance.

While BPO has no direct significant impact on organizational innovation performance (see Table 3-6), interestingly, it is found that their relationship is fully due to the mediating effects of customer integration and employees’ innovation behavior, which is the underlying mechanism of how BPO affects organizational innovation performance. It implies that BPO supports organizational innovation indirectly rather than directly. In other words, BPO affects organizational innovation performance through motivating employees and integrating customers into the innovation process. In high BPO organizations, organizational innovation becomes rich because of effective customer information and proactive innovation attitude of employees. On the contrary, in low BPO organizations, innovation will be highly depend on innovation capability of administrators or R&D teams. At the same time, employees’
resistance to change and limited understanding of customer requests may also impede organizational innovation (Willaert et al., 2007).

### 3.6.1 Implications for Research

This study contributes to research and theoretical development in several ways. First, this is one of the initial organization-level studies to provide empirical evidence for the effect of BPO on organizational innovation performance. The findings indicate that, as commonly held, BPO can significantly improve innovation performance. This suggests that it is fruitful for future research to examine how BPO improves innovation performance.

Second, this study have taken the first step to address the “how” question by identifying customer integration and employees’ innovation behavior as the underlying mechanisms through which BPO influences organizational innovation performance. This study found that the process jobs and process management and measurement aspects of BPO promote customer integration and employees’ innovation behavior, which in turn enhances organizational innovation performance. In contrast, process view does not have a significant effect. These findings shed light into the black box of BPO and its effects and they can serve as a basis for refining the theoretical conceptualization of BPO.

Third, this is one of the few studies that collected data from Japan, which is an understudied context in information and management research. While this study did not collect data from other countries and therefore could not conduct comparisons to highlight the specificities of Japan, the findings of this study may be compared to other similar studies in other countries in future to examine whether interesting differences exist across countries or cultures.

### 3.6.2 Implications for Practice

The findings of this study offer some suggestions for how organizational innovation performance, which is an important factor of differentiation in a competitive business environment, can be enhanced. First, fostering BPO by designing process jobs can improve organizational innovation performance through promoting customer integration and employees’ innovation behavior. Such design can take the form of
aligning employees’ job with core business processes, empowering employees, and providing opportunities for learning about the entire business process (McCormack & Johnson, 2001; Willaert et al., 2007).

Second, it is also useful to implement process management and measurement systems. This involves identifying critical success factors for business processes, defining performance measures, setting targets for each measure, assigning responsibilities and developing plans for achieving the targets, measuring actual performance and comparing them against the targets, communicating the results of performance assessment, developing plans for improving performance, and rewarding superior performance (Sinclair & Zairi, 1995).

3.6.3 Limitations and Suggestions for Future Research

The findings in this study should be interpreted in view of its limitations. First, this study limited its focus to the effect of BPO on organizational innovation performance. As mentioned earlier, BPO may influence different aspects of non-financial and financial performance such as customer satisfaction and profit. It may be interesting for future research to empirically examine whether BPO significantly improves these and other aspects of performance. Second, data for assessing the proposed model were collected in Japan based on convenient sampling and thus the findings might not be generalizable to other contexts. Nevertheless, this study provides initial evidence for the performance effects of BPO and indicates that it may be worthwhile to assess the proposed model in other contexts to further establish the validity of the findings. Third, this study relied on a single informant from each organization to provide information about the constructs of interest. While this study did not identify any significant threat related to common method bias, collecting data from multiple informants and triangulating their responses in future studies can help to improve the reliability of findings. Further, collecting objective data about organizational innovation performance from secondary sources such as company reports can enhance the accuracy of data. Fourth, this study is cross-sectional and does not account for the effect of time. It may take time for BPO to show its effects in terms of organizational innovation performance. Examining this time lag and how it differs across industries in longitudinal studies may generate new insights into the effects of BPO.
3.7 Conclusion

As a way of thinking and working, BPO provides fundamental support to business process management by reorienting employees’ attitudes and behaviors from one that centers on departmental or functional performance to one that emphasizes customer value adding. This study shows that this transformation promotes customer integration and employees’ innovation behavior, which sequentially bring about tangible benefit in the form of improved organizational innovation performance. In sum, BPO is a useful strategic starting point for organizations to derive value from business process management.
Innovation relies on people to generate, implement and diffuse novel ideas. The employee is an important stakeholder of organizational innovation. A comprehensive understanding of employees’ innovation behavior may contribute to a more effective management of the “people” element of BPO (see Chapter 2) for better innovation. For the employee perspective, this Chapter applies the Theory of Planned Behavior (TPB) to understand employees’ innovation behavior, and extends TPB by considering the impacts of external information awareness and proactiveness of innovation strategy on employees’ innovation behavior.

4.1 Introduction

In the last decade, the fast emergence and diffusion of information technology led to the customer’s need becoming a trend of diversified, which is, in turn, stressed the importance of innovation to competitive advantage and long-term survival for companies. Recently, innovations have often occurred in the cumulative and diffuse process of knowledge (Fagerberg et al., 2005). But interactivity and complexity of innovation both within and across organizations advance new challenges in exploration and exploitation knowledge, which is one cardinal foundation of “organizational innovative potential” (Swan, Newell, Scharbrough, & Hislop, 1999). Growing emphasis on innovation through knowledge management, innovation behavior of knowledge workers, which involves developing, promoting, judging, distributing, and implementing new ideas, is the primary source for organizational innovation (Jassen, 2004; Scott & Bruce, 1994; Swan et al., 1999). Turgoose (2000) suggests that the acceptance rate of ideas suggested by employees positively
influences organizational performance. The process research of knowledge management and innovation also emphasizes the importance of employees’ innovation behavior. It suggests that innovation in organizations is a “relay race” based on successful connection of individual innovations along continuous stages from new idea and knowledge initiation to implementation and diffusion (de Jong & den Hartog, 2007; King & Anderson, 2002; Swan et al., 1999). Hence, employees’ innovation is indispensable for organization success and it is important to understand individual employees’ innovation behavior.

In this chapter, innovation behavior is defined as employees’ behavior “directed towards the initiation and intentional introduction of new and useful ideas, processes, products, or procedures” at work (de Jong & den Hartog, 2007). In order to encourage employees’ innovation behavior, prior research has tried to identify antecedents of employees’ innovation behavior. Examples include leadership, work groups relationship, multifunctionality of jobs, organizational knowledge structure, and external work contacts (de Jong & den Hartog, 2007; Dorenbosch et al., 2005; Scott & Bruce, 1994). These studies provide many advices for managers, but few studies have focused on the psychological analysis of employees’ innovation behavior. Scott and Bruce (1994) suggest that, at individual level, employees’ innovation behavior is a primary response to cognitive meaningful and feasible interpretation of situations, which is more integrative, rather than to the situations per se. So there is a path model of individual innovation from situational and personal characteristics to psychological factors, and to behavior sequentially. Hence, this study considers a structured study of employees’ innovation behavior’s psychological antecedents is important, because it helps to improve management efficiency by focusing on those factors related to the more effective psychological antecedents of employees’ innovation instead of paying attention to everything. In this paper, the theory of planned behavior, which is a well-conceived psychological model, is used to explain employees’ innovation behavior. Attitude towards innovation (ATT), subjective norm about innovation (SN) and perceived behavioral control to innovation (PBC) are expected to influence it.
The organization provides basic conditional environment for individual behaviors, so organizational factors have potential influence on employees’ innovation behavior (de Jong & den Hartog, 2007; Krueger Jr, 2007; Scott & Bruce, 1998). This chapter considers two factors that have been neglected in prior research: external information awareness (EIA) and proactiveness of innovation strategy (PIS). Now, in the knowledge-based economy, accessing knowledge external to organizations offers potential technology and market opportunities to innovate. Meanwhile, tight customer-supplier relationships could also raise employees’ consciousness of the importance of innovation. From the resource-based view (RBV), proactive strategy is positive with firm performance when proactiveness bolsters firms to develop some competitive advantages (Aragón-Correa & Sharma, 2003). As the highly-qualified innovative employee is treated as one important strategic resource for firms in terms of knowledge creation and diffusion to keep long-term competitive advantage (Lieberman & Montgomery, 1998), there is a lack of research considering the relationship between proactiveness of innovation strategy and employees’ innovation. This chapter posits that external information awareness and proactiveness of innovation strategy could prompt employees to engage in innovation behavior and improve the explanatory power of TPB for employees’ innovation behavior.

As previous empirical research on innovation behavior has been mainly conducted in western countries, this study addresses the gap by collecting data in Japan which is among the most innovative but own specific different culture (Fagerberg et al., 2005). In general, Japanese companies view innovation as an overall collaboration rather than a task for limited teams (Forrester, 2000). It is therefore interesting to examine what motivates Japanese employees to engage in innovation behavior.

In sum, the research questions addressed in this chapter are:

*RQ1: What are the psychological factors influencing employees’ innovation behavior?*
RQ2: Does organizational external information awareness and proactiveness of innovation strategy influence employees’ innovation behavior?

Based on a questionnaire survey in Japan, this study found that employees’ attitude, subjective norm, and perceived behavioral control are positively related to their innovation behavior as predicted by TPB. More interestingly, they partially mediate the effects of external information awareness and completely mediate the influence of proactive innovation strategy. This study potentially contributes to research and practice in several ways. First, this is the first study to apply TPB to study employees’ innovation behavior. The findings indicate that TPB is suitable for understanding the behavior. Second, this study examines how the factors in the TPB mediate the influences of organizational factors on employees’ innovation behavior. This provides explanations for how organizational factors influence employees’ innovation behavior. Together, these findings offer insights into how innovation behavior may be promoted in organizations. Third, this is the first study to examine the innovation behavior of employees in Japanese companies, which is a highly relevant but understudied context.

4.2 Conceptual Background

4.2.1 Employees’ Innovation Behavior and Theory of Planned Behavior

As innovation is about both newness and profit, it is not just only related to idea generation, but also the implementation, commercialization and diffusion of new ideas (Scott & Bruce, 1994). According to the research of de Jong and den Hartog (2007), employees’ innovation behavior refers to the behavior “directed towards the initiation and intentional introduction of new and useful ideas, processes, products, or procedures” at work. Prior research on innovation behavior has identified many individual and organizational antecedents or motivators from different perspectives, such as self-confidence, problem-solving style, leadership, work group relationship, job autonomy, organizational knowledge structure, and organizational support (de Jong & den Hartog, 2007; Dorenbosch et al., 2005; Scott & Bruce, 1994).
However, few prior studies have focused on the psychological antecedents of employees’ innovation behavior. As behavior is a result of rational decision of individuals based on the judgment of “perceived” existence of related preconditions, the associated psychological process and psychological factors are important (Ajzen, 1991). So, “perceived” psychological antecedents are more directly related to innovation behavior rather than other organizational and environmental factors. It addresses the importance of psychological analysis of employees’ innovation behavior.

This study use the theory of planned behavior to provide explanations of psychological influences on employees’ innovation behavior, because of its high predictive power in predicting various employees’ behaviors (Jimmieson, Peach, & White, 2008; Morris, Venkatesh, & Ackerman, 2005; Wiethoff, 2004). TPB is a deliberative processing model in which individuals make behavioral decisions based on careful consideration of available information (Ajzen, 1991). It posits that human behavior is preceded by intention formation and that intention is determined by individuals’ attitude, subjective norm, and perceived behavioral control. Since this study is cross-sectional, it focuses on actual behavior rather than intention. Attitude is a personal evaluation or interest about performing the target behavior by an individual. Subjective norm reflects the individual’s perception of social influence and pressure from relevant social constituents such as peers and superiors about the necessity to perform the target behavior. Perceived behavioral control reflects the perceived existence of necessary facilitators (e.g. time, ability) to successfully perform the target behavior. In other words, perceived behavioral control is an assessment of the ability to overcome possible obstacles for performing the target behavior (Ajzen, 1991).

4.2.2 External Information Awareness

External information is an important driver of innovation that provides signals of market and technological trend and extends limited internal innovation capability (Cooper & Kleinschmidt, 1995). In a volatile environment where customer needs and technology changes rapidly, organizations need to maintain strong relationships with
their environmental constituents in their innovation endeavor. It has been emphasized that firms should openly “use external ideas as well as internal ideas”, especially those from key customers, suppliers, competitors, research organizations and market to accelerate innovation. Chesbrough (2003) names it as open innovation. These suggest that it is important for organizations to have strong external information awareness.

External information awareness refers to the extent to which organizations track best performers, main competitors and technologies in the industries, and maintain contact with suppliers, customers, and the government to gather information from the external environment (Mendelson, 2000; von Hippel, 1988). In firms with active network to access both internal and external knowledge and expertise, employees’ awareness and access of external knowledge and knowledge sharing among employees will be strengthened also (Cohen & Levinthal, 1990). Even many scholars certified empirical linkage between external information awareness and innovation performance on the organizational level (Tambe et al., 2009), but few prior studies have considered the potential influence from external information awareness to employees’ innovation behavior for its capability to bolster employees’ external information and knowledge access. This study provides new insights by examining how external information awareness influences innovation behavior through affecting employees’ attitude, subjective norm, and perceived behavioral control.

4.2.3 Proactiveness of Innovation Strategy

Innovation strategy guides organizations’ innovation endeavor (Lumpkin & Dess, 1996; Saleh & Wang, 1993). An important aspect of innovation strategy is proactiveness. Proactiveness “implies taking initiative, aggressively pursuing ventures, and being at the forefront of efforts to shape the environment in ways that benefit the firm,” which is opposite with reactiveness (Knight, 2000). In other words, proactiveness of innovation strategy refers to the organization’s quickness to innovate and to introduce new products or services. According to the resource-based view (RBV), proactiveness is posited to be positively related to firm performance when
firms some develop competitive advantages from proactive strategy, while a reactive strategy of innovation is considered to be not effective to keep long-term success in a dynamic and sophisticated environment (Aragón-Correa & Sharma, 2003).

A proactive innovation firm is likely to be a leader rather than a follower (Lumpkin & Dess, 1996). Slater and Wang (1993) identified four types of innovation strategy: early market innovator, early adopter, mainstream market, and conservationist (late majority and sluggards). Early market innovators are those firms which “appreciate innovation for its own sake” and continuously focus on discovering new needs of customers. Early adopters are those that are sensitive to new market trends and actively “adopt and use innovation to achieve a revolutionary improvement”. Firms in the mainstream market are those that are sensitive to innovation risks and prefer to conduct a “mature” innovation that already confirmed by the market and with low risk. Conservationists are those firms that are highly conservative or averse to innovation. As innovative employees and tacit innovation processes are considered as hard-to-imitate strategic resources to generate competitive advantages (Lieberman & Montgomery, 1998), the potential linkage between proactiveness of innovation strategy and employees’ innovation behavior can deepen our understanding of the positive effect of proactiveness on firm performance. This research considers this potential linkage.

4.3 Proposed Model and Hypotheses

The objective of this study is to systematically analyze employees’ innovation behavior, and identify the impacts of external information awareness and proactiveness of innovation strategy on employees’ innovation behavior. Founded on the theory of planned behavior, this study has considered the antecedents of employees’ innovation behavior in terms of employees’ attitude towards innovation, subjective norm about innovation, and perceived behavior control to innovation. And then, the impacts of external information awareness and proactiveness of innovation strategy on these three antecedents have been also declared. The proposed research
model depicting these relationships is shown in Figure 4-1. Each hypothesis will be explained next.

4.3.1 The Effects of Attitude, Subjective Norm and Perceived Behavioral Control

Attitude is a person’s evaluation or interest about performing the target behavior by an individual, which is strongly related to the perception of behavior-associated outcomes and “the strength of these associates” (Ajzen, 2005). Based on the “principle of compatibility”, employees’ innovation behavior should be anticipated by their attitude towards innovation (Ajzen, 2005). That is to say, as a general rule, employees tend to do innovation when they view it as beneficial or favorable, as it has high possibility of increasing their job efficiency and reputation in the workplace. Lee and Wong (2006) points out the positive relationship between attitude and performance of R&D workers. Williams (2004) also certifies the empirical link between attitude towards divergent thinking, which is “an integral process in creativity”, and employees’ creation. In addition, innovators are often with higher attitude towards innovation than non-innovators (Pizam, 1972). So this study hypothesizes that:
Hypothesis 1a: Employees’ attitude towards innovation is positively associated with their innovation behavior.

Subjective norm reflects an individual’s perception of social encouragement and pressure from relevant social referents such as peers and superiors about the necessity to perform the target behavior (Ajzen, 2005). When key social referents in the workplace seem to all “suggest” employees to conduct innovation behavior, they are likely to feel pressured to engage in innovation. For example, Amabile (1988) considers that leaders’ expectations are important for employees’ creative work, and Amo (2006) indicates that the perceived opinion of “important others” as managers and colleagues influence health-care workers’ innovation behavior. Meanwhile, CEOs’ commitment towards innovation indicates the importance of innovation in firm’s development strategy and customers’ new service or product requirements and expectations and they compel employees to innovate continuously. In addition, from the process view of innovation, the implementation and diffusion of new innovation ideas demands heavily on the engagement of these key social referents. Then this study hypothesizes that:

Hypothesis 1b: Employees’ subjective norm about innovation is positively associated to their innovation behavior.

Perceived behavioral control reflects the perceived existence or absence of necessary non-volitional facilitators (e.g. time, ability) to successfully perform the target behavior (Ajzen, 2005). Facilitators such as opportunities for innovation, freedom to innovate, and resources provided by organization are important, as they provide the basic “physical” preconditions for employees to carry out innovation. Hence, the existence of these facilitators is another independent factor which will be considered when employees make a rational decision of conducting innovation behavior. In support, it has been found that perception of organizational innovation support and resource supply, which is an important part of perceived behavior control, has strong
positive effects on employees’ innovation behavior (Scott & Bruce, 1994). Accordingly this study postulates that:

_Hypothesis 1c: Employees’ perceived behavioral control to innovation is positively associated with their innovation behavior._

### 4.3.2 The Effects of Organizational Context

#### 4.3.2.1 The Effects of External Information Awareness

Nowadays, with increased globalization, innovation requires firms utilize both internal and external innovation sources to advance their R&D capability (Chesbrough, 2003). High external information awareness means organizations tend to be highly open to environment to absorb external knowledge or gain complementary resources. Since these external sources accesses compensate the lack of internal ability, external information awareness enhances the employees’ perception of innovation success and support innovative initiatives, especially for employees in innovation-adopter firms. Meanwhile, external information awareness will improve employees’ perception of innovation necessity. So, in organizations with strong external information awareness employees will develop a positive attitude towards innovation.

_Hypothesis 2a: External information awareness is positively associated with employees’ attitude towards innovation._

As external information awareness could also improve CEO and senior managers’ perceived necessity to innovate, they will tend to persuade and require employees to do innovation through assigning more innovation-related tasks and giving more innovation rewards. At the same time, employees may also feel more innovative pressure from direct contact with external stakeholders such as customers. In addition, closely cooperation among employees is always needed in the innovation project.
corresponding to external customer requirements, so the innovation pressure from colleagues will be enhanced sequentially. Then, this study posits that:

*Hypothesis 2b: External information awareness is positively associated with employees’ subjective norm about innovation.*

External information awareness is associated with a wider knowledge and technology base to innovate. Employees are likely to get more innovation support and freedom in extrovert firms. External information about customers, suppliers and competitors is a trigger of employees’ innovation to provide innovation hints, and external resources may also extend employees’ innovation capability. In addition, tight customer-producer relationships speed up the feedback of innovation. So external information awareness will not only improve employees’ self-efficacy beliefs about their capability to do innovation, but also directly provide technology and market opportunities for employees’ innovation behavior.

*Hypothesis 2c: External information awareness is positively associated with employees’ perceived behavioral control to innovation.*

*Hypothesis 3: External information awareness is positively associated with employees’ innovation behavior.*

### 4.3.2.2 The Effects of Proactiveness of Innovation Strategy

Proactiveness of innovation strategy refers to an organization’s quickness to innovate and the speed to introduce new products or services according to new market opportunities (Lumpkin & Dess, 1996). Proactiveness of innovation strategy reflects the high priority of innovation inside organizations. In proactive organizations, employees’ proactive innovation is more appreciated than in reactive organizations. According to the theory of organizational alignment, rewards system should be aligned with the strategic goals and values, so innovators are expected to receive more
formal or informal organizational rewards (Sender, 2007). Hence, employees will develop more positive attitude towards their innovation behaviors.

**Hypothesis 4a:** Proactiveness of innovation strategy is positively associated with employees’ attitude towards innovation.

Innovation strategy directly reflects administrators’ expectation of employees’ work, and the highlight of innovation management. Managers in organizations with proactive innovation strategy are likely to focus more on continuous generation and implementation of new ideas actively to react to new market trends quickly. Consequently, employees are likely to feel more pressure from social referents to innovate.

**Hypothesis 4b:** Proactiveness of innovation strategy is positively associated with employees’ subjective norm about innovation.

Proactive organizations invest more in R&D and human capital than reactive ones (Aragón-Correa & Sharma, 2003), so they are likely to provide more support (i.e., money, times, and opportunities) for employees’ innovation. With the aim to innovate quickly, proactive organizations are likely to give faster feedback, and implement employees’ idea bravely.

**Hypothesis 4c:** Proactiveness of innovation strategy is positively associated with employees’ perceived behavioral control to innovation.

### 4.4 Survey Instrument Development

The proposed model was assessed with data collected in a survey. All questions and their sources are listed in Table 4-1. The questions related to attitude, subjective norm, perceived behavioral control and employees’ innovation behavior were adapted from prior studies applying TPB (Bock, Zmud, & Kim, 2005; Fishbein & Ajzen, 1981; Lin & Lee, 2004). Attitude was assessed with four questions: “...engaging in innovation...”
behavior is enjoyable”, “...innovation behavior is valuable”, “...innovation behavior is beneficial”, and “...innovation behavior is favorable”. Subjective norm was measured in terms of perceived innovation encouragement and pressure from CEOs, supervisors, colleagues, and customers (e.g., “…receive innovation encouragement and competitive pressure from customers to innovate”). Perceived behavioral control was assessed in terms of perceived existence of resources for innovation (e.g., technology, financial support), opportunities for innovation, freedom to innovate, and feedback, such as “there are many opportunities for employees to innovate in my company” and “employees in my company are given the freedom to innovate at work”. Employees’ innovation behavior was measured with four questions related to frequency of innovation, time spent on innovation, activeness in innovation, and participation in innovation projects. Examples include “…innovate actively” and “…spend significant time innovating at work”. Measures for external information awareness were developed based on prior studies (Kaufmann & Todtling, 2002; Mendelson, 2000; Souitaris, 2001) and focuses on the capture and sharing of information about market trend, government policy, customers, suppliers, competitors, and strategic partners such as research and development institutes and consultants. All items were measured on a five-point Likert scale anchored by “strongly disagree” (1) and “strongly agree” (5).

Proactiveness of innovation strategy was measured by considering the forms of proactive innovation strategy identified by Slater (2006): early market innovator, early adopter, mainstream market, and conservationist (late majority and sluggards), on a continuum. Early market strategy is perceived when firms continuously consider expressed and latent customers needs in conducting innovation to create new market trends (item PIS1). Early adoption strategy is perceived when firms are sensitive to follow new market trends that created by competitors (item PIS2). Mainstream strategy is perceived when firms prefer to capture external market trend, but postpone implementing innovation until it becomes mature inside organization (item PIS3). Conservation strategy is perceived when firms develop non-active attitude towards
innovation (item PIS4). Among these designs, early market strategy is the highest level of proactiveness of innovation strategy (4), while conservation strategy is the lowest one (1).

Table 4-1 Construct Operationalization about Employees' Innovation Behavior

<table>
<thead>
<tr>
<th>Construct</th>
<th>Items</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>External Information Awareness</strong></td>
<td>EIA1: My company actively gathers information about the environment (e.g., market trend and government policy).&lt;br&gt;EIA2: My company actively absorbs new ideas and/or information from our key customers.&lt;br&gt;EIA3: My company actively monitors information about our key competitors.&lt;br&gt;EIA4: My company actively captures information about our key suppliers.&lt;br&gt;EIA5: My company actively absorbs new ideas and/or information from our strategic partners (e.g., strategic alliances, consultants, and R&amp;D institutes).</td>
<td>All items adapted from Kaufmann and Todtling, (2002), Mendelson (2000), and Souitaris (2001)</td>
</tr>
<tr>
<td><strong>Proactiveness of Innovation Strategy</strong></td>
<td>The innovation strategy of my company is…&lt;br&gt;Early market strategy&lt;br&gt;Early adapter strategy&lt;br&gt;Mainstream strategy&lt;br&gt;Conservation strategy</td>
<td>Item developed from Slater and Mohr (2006)</td>
</tr>
<tr>
<td><strong>Attitude towards Innovation</strong></td>
<td>ATT1: In general, employees consider engaging in innovation behavior is enjoyable.&lt;br&gt;ATT2: In general, employees consider innovation behavior is valuable.&lt;br&gt;ATT3: In general, employees consider innovation behavior is beneficial.&lt;br&gt;ATT4: In general, employees consider innovation behavior is favorable.</td>
<td>All items adapted from Bock et al. (2005), Fishbein and Ajzen (1981), and Lin and Lee (2004)</td>
</tr>
<tr>
<td><strong>Subjective Norm about Innovation</strong></td>
<td>SN1: In general, employees receive innovation encouragement and competitive pressure from managers to innovate.&lt;br&gt;SN2: In general, employees receive innovation encouragement and competitive pressure from colleagues to innovate.&lt;br&gt;SN3: In general, employees receive innovation encouragement and competitive pressure from customers to innovate.</td>
<td>All items adapted from Bock et al. (2005), Fishbein and Ajzen (1981), and Lin and Lee (2004)</td>
</tr>
<tr>
<td><strong>Perceived Behavior Control of Innovation</strong></td>
<td>PBC1: In general, there are many opportunities for employees to innovate in my company.&lt;br&gt;PBC2: In general, there is strong support (e.g., technology, financial support) for employees to innovate in my company.&lt;br&gt;PBC3: In general, employees in my company are given the freedom to innovate at work.&lt;br&gt;PBC4: In general, employees in my company are appraised based on the extent to which they innovate at work.</td>
<td>All items adapted from Bock et al. (2005), Fishbein and Ajzen (1981), and Lin and Lee (2004)</td>
</tr>
<tr>
<td><strong>Employees’ Innovation Behavior</strong></td>
<td>EIB1: In general, employees in my company innovate actively.&lt;br&gt;EIB2: In general, employees in my company innovate frequently.&lt;br&gt;EIB3: In general, employees in my company support innovation behavior at work.&lt;br&gt;EIB4: In general, employees in my company spend significant time innovating at work.</td>
<td>All items developed based on Dorenbosch et al. (2005) and Scott and Bruce (1994)</td>
</tr>
</tbody>
</table>
Four control variables: industry and firm size were included in this research. Industry was measured as a categorical variable indicated by respondents as either from manufacturing (1) or non-manufacturing sectors (0). Firm size was measured by the number of employees.

4.5 Data Collection and Analysis

A survey was conducted, together with the survey in Chapter 3, in Japanese companies with the support of the Japanese Innovation Management College in late 2010 to early 2011. The questionnaire was sent to 1,819 Japanese organizations listed in the First and Second Sections of Tokyo Stock Exchange. A total of 127 completed responses had been received, and the response rate was 7 percent. Mainly senior managers who understand the overall situation of an organization and its employees answered the questionnaires, and others are core employees. Most of responses were from large organizations with more than 1000 employees (64.6 percent). The majority of respondents work in manufacturing sector (55.1 percent), but also some in non-manufacturing sector as distribution service, transportation and finance. Among the respondents, 74.8 percent of responses were from business planning department in headquarter.

4.5.1 Tests of Measurement Model

The proposed model was assessed using Partial Least Squares (PLS) analysis. All constructs show high internal consistency and reliability. The Cronbach’s alpha estimates for attitude, subjective norm, perceived behavioral control, employees’ innovation behavior and external information awareness shown in Table 4-2 were all above the recommend threshold of 0.70. In structural equation modeling (SEM), composite reliability (CR) was also used to value the reliability of constructs, and the suggested threshold of it is 0.70 (Chin et al., 2003). In Table 4-2, all CRs of constructs were above 0.85. In addition, the loadings of each item to constructs were also significant at p<0.001.
Convergent validity was assessed by average variance extracted (AVE) and factor analysis. All AVEs were above the recommended acceptable value of 0.50 (see Table 4-2) (Chin et al., 2003). The exploratory maximum-likelihood factor analysis with Equamax rotation supported the proposed evaluation of constructs (see Table 4-3). Five corresponding factors were extracted. Next, an acceptable individual reliability of item was shown by the item loadings to their related constructs being above 0.70. In this study, the loadings of each item to constructs in the sample were all above the recommended benchmark of 0.70 (Chin et al., 2003).

Table 4-2 Psychometric Properties of Constructs and Construct Correlations in Employees’ Innovation Behavior Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s Alpha</th>
<th>AVE</th>
<th>CR</th>
<th>Construct Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees’ Innovation Behavior (EIB)</td>
<td>0.89</td>
<td>0.75</td>
<td>0.92</td>
<td>0.87</td>
</tr>
<tr>
<td>Attitude towards Innovation (ATT)</td>
<td>0.92</td>
<td>0.81</td>
<td>0.94</td>
<td>0.54 0.90</td>
</tr>
<tr>
<td>Subjective Norm about Innovation (SN)</td>
<td>0.80</td>
<td>0.63</td>
<td>0.87</td>
<td>0.48 0.44 0.79</td>
</tr>
<tr>
<td>Perceived Behavioral Control to Innovation (PBC)</td>
<td>0.83</td>
<td>0.66</td>
<td>0.88</td>
<td>0.54 0.57 0.41 0.81</td>
</tr>
<tr>
<td>External Information Awareness (EIA)</td>
<td>0.84</td>
<td>0.62</td>
<td>0.89</td>
<td>0.36 0.25 0.26 0.24 0.79</td>
</tr>
<tr>
<td>Proactiveness of Innovation Strategy (PIS)</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>0.37 0.38 0.39 0.40 0.19</td>
</tr>
</tbody>
</table>

Note: Bold italic diagonal rows are square root of AVE; Cronbach’s alpha, AVE, and CR of PIS are not computed as it is measured with a Guttman scale.

The discriminant validity demonstrated the difference of construct measures in the research model. Results of comparing square root of AVEs and constructs correlation coefficients supported the adequate discriminant validity of the questionnaire. In construct correlation part of Table 4-2, bold numbers in the diagonal were the square roots of AVE, while off-diagonal numbers were Kendall’s tau correlation coefficients among constructs. Kendall’s tau correlation coefficient was better measure of correlations of ordinal variables, which can be interpreted as same as Pearson correlation coefficient (Lee, Klobas, Tezinde, & Murphy, 2010). In Table 4-2, none of the constructs correlation coefficients was bigger than the corresponding square roots of AVE, which means all constructs are more correlated with their own measuring items than with any other constructs.
A test of multicollinearity was also conducted. The highest variance inflation factors (VIF) was 2.29, which is well below the threshold value of 3.3, suggesting that multicollinearity is unlikely to be a problem for the data (Diamantopoulos & Winklhofer, 2001).

This study also assessed common method bias since all constructs were measured with self-reports. First Harman’s one-factor test, which involved entering all constructs into an unrotated principal components factor analysis and examining the resultant variance, was conducted (Harman, 1960). The threat of common method bias is high if a single factor accounts for more than 50 percent of the variance (Harman, 1960; Mattila & Enz, 2002). The results indicated that none of the factors significantly dominated the variance (variance of the largest factor was 43.78 percent). Second, common method bias was assessed by using the approach outlined in
Podsakoff, MacKenzie, Lee, and Podsakoff, (2003), which involved adding a common method factor in the PLS model. The model is compared to the original model without the common method factor, and its results showed that all path coefficients and their signs were similar. Overall, these tests indicated that common method bias was unlikely to be a significant threat in this study.

4.5.2 Tests of Structural Model

Table 4-4 and Figure 4-2 shows the results of the structural model. All hypotheses were supported at 0.05 level. Among the control variables, only industry had a significantly effects on employees’ innovation behavior. Results showed that employees in manufacturing industry are more innovative than employees in non-manufacturing industry. All related factors explained 71 percent of the variance in employees’ innovation behavior. Among three antecedents, perceived behavioral control had stronger influence on the behavior than the other two factors. Furthermore, external information awareness and proactiveness of innovation strategy explained about 30 percent in employees’ attitude, subjective norm, and perceived behavioral control. The effect of external information awareness on employees’ innovation behavior was significant.

4.5.3 Test of Mediating Effects

To test the mediating role of attitude towards innovation, subjective norm about innovation, and perceived behavior control to innovation, this study assessed the direct effect of proactiveness of innovation strategy on employees’ innovation behavior. But this effect was not significant (see Table 4-4 and Figure 4-2). In addition, the Sobel mediation test statistic and its variants (Aroian test statistic and Goodman test) were all significant at 0.05 level (see Table 4-5). These indicated that three antecedents of employees’ innovation behavior partially mediates the effect of external information awareness, and fully mediates the effect of proactiveness of innovation strategy.
Table 4-4 Test of Hypotheses of Employees' Innovation Behavior Model

<table>
<thead>
<tr>
<th>Construct</th>
<th>Path Coefficient</th>
<th>Result</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>H1a: ATT → EIB</td>
<td>0.21*</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H1b: SN → EIB</td>
<td>0.27***</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H1c: PBC → EIB</td>
<td>0.40****</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H3: EIA → EIB</td>
<td>0.13*</td>
<td>Significant</td>
<td>0.71</td>
</tr>
<tr>
<td>PIS → EIB</td>
<td>0.10</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>Industry → EIB</td>
<td>0.15**</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>Firm Size → EIB</td>
<td>-0.07</td>
<td>Not Significant</td>
<td></td>
</tr>
<tr>
<td>H2a: EIA → ATT</td>
<td>0.26***</td>
<td>Significant</td>
<td>0.28</td>
</tr>
<tr>
<td>H4a: PIS → ATT</td>
<td>0.41***</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H2b: EIA → SN</td>
<td>0.24***</td>
<td>Significant</td>
<td>0.30</td>
</tr>
<tr>
<td>H4b: PIS → SN</td>
<td>0.43***</td>
<td>Significant</td>
<td></td>
</tr>
<tr>
<td>H2c: EIA → PBC</td>
<td>0.25***</td>
<td>Significant</td>
<td>0.30</td>
</tr>
<tr>
<td>H4c: PIS → PBC</td>
<td>0.43***</td>
<td>Significant</td>
<td></td>
</tr>
</tbody>
</table>

Note: *Significant at p<0.05 (one-tailed T-value: 1.65); ** p<0.01 (one-tailed T-value: 2.35); *** p<0.001 (one-tailed T-value: 3.16); EIB: Employees’ Innovation Behavior; ATT: Attitude towards Innovation; SN: Subjective Norm about Innovation; PBC: Perceived Behavioral Control to innovation; EIA: External Information Awareness; PIS: Proactiveness of Innovation Strategy.

Figure 4-2 Results of Structural Model about Employees’ Innovation Behavior
Table 4-5 Test of Mediating Effects of Attitude, Subjective Norm, and Perceived Behavior Control

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Mediation Test Statistic</th>
<th>Mediator</th>
<th>SN</th>
<th>PBC</th>
</tr>
</thead>
<tbody>
<tr>
<td>EIA</td>
<td>Sobel</td>
<td>2.17*</td>
<td>2.44*</td>
<td>2.73*</td>
</tr>
<tr>
<td></td>
<td>Aroian</td>
<td>2.12*</td>
<td>2.40*</td>
<td>2.69*</td>
</tr>
<tr>
<td></td>
<td>Goodman</td>
<td>2.23*</td>
<td>2.48*</td>
<td>2.76*</td>
</tr>
<tr>
<td>PIS</td>
<td>Sobel</td>
<td>2.45*</td>
<td>3.66***</td>
<td>3.53***</td>
</tr>
<tr>
<td></td>
<td>Aroian</td>
<td>2.42*</td>
<td>3.63***</td>
<td>3.50***</td>
</tr>
<tr>
<td></td>
<td>Goodman</td>
<td>2.40*</td>
<td>3.69***</td>
<td>3.57***</td>
</tr>
</tbody>
</table>

Note: *Significant at p<0.05 (one-tailed T-value: 1.65); ** p<0.01 (one-tailed T-value: 2.35); *** p<0.001 (one-tailed T-value: 3.16); ATT: Attitude towards Innovation; SN: Subjective Norm about Innovation; PBC: Perceived Behavioral Control to innovation; EIA: External Information Awareness; PIS: Proactiveness of Innovation Strategy.

4.6 Discussion

4.6.1 Implications for Research

As employees own limited ability to process all kinds of stimuli around them, they use affective and cognitive representations of related information to handle the complexity (Fagerberg et al., 2005). Although previous studies have examined employees’ innovation behavior (de Jong & den Hartog, 2007), there are few empirical studies on the psychological analysis of employees’ innovation. This research applied the theory of planned behavior to empirically understand employees’ innovation behavior. Results of the survey support all hypotheses and help us to answer the two research questions. Attitudes, subjective norms, and perceived behavior control are three primary psychological factors influencing employees’ innovation behavior. External information awareness and proactiveness of innovation strategy, as two important organizational factors is positively related to employees’ innovation behavior through improving three mediating psychological factors.

The first contribution of this study is to examine the power of TPB model in explaining the innovation behavior of employees. While prior research only focuses on the influence of some psychological factors, TPB provides a strong theoretical structure to this study to understand the effects of psychological factors to employees’ innovation behavior. Through comparing path coefficients of the three psychological antecedents, results show that perceived behavioral control to innovation has the
strongest influence on employees’ innovation among the three antecedents. Therefore, future studies may examine ways to improve perceived behavioral control.

The second contribution of this paper is examining the effects of two organizational factors: external information awareness and proactiveness of innovation strategy on employees’ innovation behavior. In empirical studies of TPB, only individual psychological factors are considered and the potential influences of other factors, especially organizational factors, have been neglected. But in practical management, those organizational factors are likely to be more controllable by managers than individual factors. Hence, this study addresses a limitation of prior research. TPB also suggests that organizational factors may influence the way that employees perceive things or actions, and, as a result, affect behavior (Ajzen, 2005). Similarly, this study has shown that the effects of external information awareness and proactiveness of innovation strategy are mediated through attitude, subjective norm and perceived behavioral control. Understanding this mediating relationship is important because it empirically demonstrates of the underlying mechanism through which organizational factors influence employees’ behavior. The results also suggest that external information awareness is also an important trigger for employees’ innovation, when both of them can improve psychological motivation to innovate. This may also help to explain the importance of external information, and the positive relationship between proactive innovation strategies with firm performance, when employees’ innovation behavior becomes an important strategic resource to gain and maintain competitive advantage.

Third, this study is among the first to collect data from Japanese companies. Based on its unique continuous innovation strategy, Japan owns a big market share in some industries like automobiles and electronics (Fagerberg et al., 2005). Recent studies on employees’ innovation behavior focusing on the effect of factors such as job design and leadership have mainly been conducted in the western countries as the United Stated and Netherlands (de Jong & den Hartog, 2007; Pieterse, Knippenberg, ...
Schippers, & Stam, 2010; Scott & Bruce, 1994; Scott & Bruce, 1998). However, Japan is generally considered to be culturally different from these countries in terms of social collectivism, privilege preference, seniority-based social status, tolerance of hierarchy, and risk aversion (Hofstede & Hofstede, 2004). It is therefore interesting to examine whether their findings apply to Japan. This study suggests that the findings of studies in other countries are possible to apply to Japan, but the careful reconsideration based on Japanese culture is also needed.

4.6.2 Implications for Practice

Results show that attitude, subjective norm, and perceived behavioral control are important to predict employees’ innovation behavior. Among them, perceived behavioral control has stronger effect on employees’ innovation behavior than the others. Thus, in order to effectively encourage employees’ innovation behavior, managers may play supporting role rather than deciding and persuading role to increase employees’ perceived controllability and self-efficacy for Innovation behavior. Some ways include providing innovation freedom, innovation opportunities, innovation-related resources, and training to employees.

This research focuses on two important organizational factors: external information awareness and proactiveness of innovation strategy. Results suggest managers to improve external information awareness of their companies, for its positive influence to employees’ attitude, subjective norm, perceived behavioral control and directly to the innovation behavior. So, organizations should establish better relationships with external innovation partners, and share the captured information within organizations. Existing knowledge management technology may be helpful for its capability to capture information from external environment and share them within organizations.

The potential influence of proactiveness of innovation strategy may also be important in practice. Therefore, organizations should firstly emphasize to be an innovation leader rather than an innovation follower, and change to be research-oriented. Then
they also should generate and access a wide range of new ideas and bravely invest in the quick implementation of them to capture new opportunities. Although there is a high risk in proactive innovation strategy, its benefits to increase employees’ innovation behavior also need to be taken into account. As recent research considers human resources and business processes to be unique resources to gain competitive advantages, an innovation leader will be difficult to be copied and surpassed by an innovation follower.

4.6.3 Limitations and Future Research

The findings in this study should be interpreted in view of its limitations. First, most of the respondents are from the manufacturing sector. More studies of other sectors are needed to assess the proposed model. Second, this study focuses on Japanese companies, so there may be some geographical or cultural specificity and the findings may not generalize to other settings. It may be interesting to assess the proposed model in other countries, especially those with different culture compared to Japan, like China, and the United State. Third, only subjective measures have been used in this research, and the measure of employees’ innovation behavior is abstract and brief. As self-reports may contain some presentational biases (Gaes, Kalle, & Tedeschi, 1978), future research may consider using objective measures of employees’ innovation behavior. It is also interested to study employees’ innovation behavior in more detail. Other than addressing the limitation of this study, in order to better understand the phenomenon, future research may further explore other organizational and environmental factors to extend the TPB model. Examples include organizational structure, risk-taking tendency, job and business process orientation, and environmental dynamism.

4.7 Conclusions

The TPB-based psychological analysis of employees’ innovation behavior deepens our understanding of employees’ innovation behavior by considering the effects of
two organizational characteristics: external information awareness and proactive innovation strategy. The finding suggests a more effective way to encourage employees’ innovation is to ensure the availability of innovation sources, as knowledge, time and opportunity. While both external information awareness and proactive innovation strategy own high motivational influence of employees’ innovation, some ideas and technologies from external customers, research institutions or other sectors are likely to directly initiate employees’ innovation. So considering organizational factors will improve the explanatory power of TPB in real world. In addition, it suggests external information awareness as an important characteristic of an innovative organization. Meanwhile, managers should the benefits of proactive innovation strategy on employee’s innovation behavior, as well as its potential risks.
CHAPTER 5  IT-based Innovation based on Business-IT Alignment: A Case Study of Aging Care System in Central Finland

As one of six business process management elements (see Chapter 2), “IT” becomes also a key innovation enabler for organizations to improve or renovate the business due to the high rate of technology change nowadays. Business values of IT come from supporting business strategies and processes, so it is necessary to understand how to align IT and business locating in the center of IT-based innovation. However, there have been few methods and tools to support business-IT alignment for accelerating problem discovery and idea generation in practice. In this chapter, it is proposed to apply DEMO (Design and Engineering Methodology for Organizations) for IT-based innovation, and supplies as a basis for the four-step procedure to consider IT solutions for business.

5.1  Introduction

In this technology intensive era, IT changes the way to do business, and enables innovation, as well as improves productivity and operational efficiency. IT-based innovation is often characterized by applying IT into business in a novel way (Swanson, 1994), helping companies to increase the value proposition for customers. A study of A.T. Kearney in 2012 has shown that high-growth companies lead in the investment in IT-based innovation (A.T. Kearney, 2012). IT-based innovation is an important driver for revenue growth. IT-based innovation is not a technological issue that refers to launching a set of software and hardware. But its important thing is to deeply integrate IT with critical business routines and processes (Thong & Yap, 1995). IT-based innovation then can and does deliver improvements in profitability and
stakeholder value (e.g., customer value). Therefore, a good alignment between business and IT is important (Figure 5-1).

Even though some prior literatures have studied business-IT alignment, most of them focus on providing a conceptual guideline for practice (Chan & Reich, 2007; Ciborra, 1997). And there is a lack of practical tools and techniques for facilitating business-IT alignment. For example, as business-IT alignment relies on teamwork, a central issue in attaining alignment is that business experts are always lack of IT background, while IT engineers are also not always familiar with business strategies and processes (Chan & Reich, 2007). The collaborative engagement of both IT engineers and business experts in IT-based innovation has been widely accepted as a common guideline addressed by many researchers. Yet it also offers the challenge of accelerating communication and discovery in this cross-functional teamwork.

Successful practice highlights the importance of a common language to facilitate understanding and communication in business-IT alignment (Ciborra, 1997). In short, the main objective in this chapter is to propose a method by using DEMO to identify business needs for improvements and discover potential IT solutions for them in early design and decision phase. Based on Ψ theory, DEMO is a well-designed process.
modeling methodology for enterprise redesign and reengineering, with a special emphasis on enterprise ontology rather than implementation (Dietz, 2006). Researches have shown that DEMO enables to create an essential concise view of overall business with an emphasis on the communication between people, accelerates the comparison of business models, and also offers a guideline for business implementation (Bobbert & de Jong, 2009; Dietz, 2006; Geurts & Geelhoed, 2004; Op ‘t Land, Zwitzer, Ensink, & Lebel, 2009). As inter-organization cooperation often challenges business, a comparison of DEMO between different organizations supports to identify overlapping processes that may indicate redundancies and potentials for integration. As one core IT capability is substituting and supporting human at work (Mooney, Gurbaxani, & Kraemer, 1996), DEMO, which highlights the role of actors in business, is highly like to accelerate the match between IT and business.

A case study by applying the proposed method to redesign the aging care system in Central Finland has been conducted to demonstrate the proposed method. This case is chosen by several reasons. First, nowadays, even the healthcare technology, especially medicine, has been progressed dramatically, but many healthcare systems, both in developed and developing countries, still have changed very little. The aging care system in Central Finland is one of these out-of-date healthcare systems, which provides a large room of challenge to redesign. There is a lack of systematic consideration of efficiency, and IT implementation and information sharing are limited. Second, there are multiple stakeholders within the aging care system in Central Finland, but there is limited cooperation between them (Kodner & Spreeuwenberg, 2002). Third, because of a limited number of health workers and beds in facilities, the demand for home care is expected to be increasing. There is a need to pay a special focus on the efficiency of home care. Main efforts in this case study are to create reference models, identify inefficient transactions, and suggest potential improvements facilitated by IT.
5.2 Research Background

5.2.1 IT-based Innovation

Together with the speed development of IT and the increasing coverage of wireless signals, new organizational capabilities are often generated from innovation with IT (Fagerberg et al., 2005). Many innovation projects have appeared as organizational adoption of IT, such as ERP (enterprise resource planning) and CRM (customer relationship management), into products, processes, and services in a novel way (Swanson, 1994). Indeed, some innovations come from emerging IT itself. Commonly, IT holds promise for enabling organizations to function in new ways, improving process controls, and driving new business potentials (Tarafdar & Gordon, 2007). There are many concepts that are strongly associated with IT-enabled innovation: process innovation (Davenport, 1993), business process reengineering (Mooney et al., 1996), technological innovation (Thong & Yap, 1995), and IT adaption (Lai & Guynes, 1997).

Since IT does not address fundamental deficiencies of organizations, IT-based innovation cannot be seldom achieved by IT itself. Innovation can only be perceived when IT adapted and embedded into business practices and routines (Thong & Yap, 1995). In practice, most challenges of IT-based innovation do not come from the availability of IT, but “the ability to adapt to take advantage of its emerging functionalities” (McKenney, Copeland, & Mason, 1995, p. 37). A clear vision about the potential role of IT and how it links to specific business elements is important. IT-based innovation can be considered as exploiting new business values of IT from matching business and IT in a novel way. Therefore, business-IT alignment is a key for IT-based innovation (Tarafdar & Gordon, 2007).

5.2.2 Business-IT alignment

In this decade, business-IT alignment has become one of the top concerns of CEOs and business heads (Silvius, 2007). Business-IT alignment refers to a dynamic
ongoing process, in which a business organization is able to effectively match IT with business objectives and activities, leading to achieve greater IT productivity (Chan & Reich, 2007; Teo & Ang, 1999). In the traditional version, business-IT alignment concerns that business strategies and processes should lead IT (Silvius, 2007). But in this era of innovation, as shown in Figure 5-2, business-IT alignment more emphasizes a two-way street: on one hand, business drives IT implementation; on the other hand, IT also addresses new potentials for business improvement and innovation (Silvius, 2007). In light of this, IT is an enabler of business, rather than only an “expense” of business. Besides, in practice, effective business-IT alignment should be managed like an ongoing process rather than a stage (Chan & Reich, 2007; Silvius, 2007). In the progress of leveraging business and IT, organizations will continuously renew and breakthrough their business and IT framework.

Reich and Benbasat (1996) defined Business-IT alignment in terms of social and intellectual dimensions. The social dimension refers to that both business experts and IT engineers should understand each other’s objectives and plans (“we have a shared view”). A principal reason of IT project failures is the misalignment between business and IT goals, because there have been a lack of mutual understanding about IT and
business between IT and business experts (Chan & Reich, 2007). So, many prior researches have focused on enhancing business-IT alignment from the social perspective. Huang and Hu (2007) summarized four key “social” elements: integrating the process of business and IT planning, maintaining effective communication channels, developing strong relationships between IT and business managers, and institutionalizing the culture of alignment. Luftman (2003) also proposed a five-level maturity model to assess the maturity or ability of business-IT alignment. The intellectual dimension emphasizes that the content of IT and business plans should be consistent (“we drive for the same goal”). It requires “particular methodologies, techniques and tools in the formulation of strategy”. However, limited number of studies have addressed from this dimension (Ciborra, 1997; Chan & Reich, 2007). A framework or tool to consider business-IT alignment for IT-based innovation is missing. This study tries to fulfill this gap.

5.2.3 Ψ Theory and DEMO

IT can support business processes to improve effectiveness and efficiency, and to achieve innovation. An extent of standardization of processes and routines is a prerequisite for adopting IT. It calls for a clear definition and mapping of business process. Moreover, both BPM and innovation put a special emphasis on teamwork. Creating a common understanding of the process and objectives within the team is crucial. But a general fact is that more of team members are with different backgrounds and experiences, so it requires a standard language — for example, business model — to support communication and exchange of knowledge towards deficiencies and IT potentials. In this study, this study proposes DEMO as a tool for IT-based innovation. Design and Engineering Methodology for Organizations (DEMO) based on Ψ theory is a good tool to provide a concise essential view of business, and to facilitate communication (Dietz, 2006). In this section, Ψ theory with its four axioms, and the four aspects DEMO models will be briefly introduced.
5.2.3.1 Four $\Psi$ Theory Axioms

$\Psi$ theory was emerged around 19th century, which draws the language action perspective and speech act theory (Dietz, 2006; Ribeiro, Borbinha, Trablolet, & Pereira, 2012). $\Psi$ theory underlines the social perspective of organization, and pinpoints that communication and cooperation between people is the string to constitute the organization (Dietz, 2006). Founded on this theory, DEMO specifies an enterprise ontology to describe the construction and process of enterprise. With predefined notion and transaction pattern, DEMO can provide a consistent, concise, comprehensive, and coherent view of essential processes for the organization, which is independent from implementation (Dietz, 2006).

$\Psi$ theory includes four core axioms, which highly reduce the complexity of business model demonstrated by DEMO:

- **Operation axiom** postulates that acts of people formulate the organization. It distinguishes two forms of acts: production acts (P-acts) and coordination acts (C-acts). P-acts are related to perform the function of an organization. In other words, P-acts, as manufacturing, creating, deciding and judging, will bring some material or immaterial outcomes. C-acts allow actors to enter into and comply with commitments of P-acts, which enables actor to negotiate and cooperate for the execution of P-acts. The results of P-acts call P-facts, and the results of C-acts call C-facts. So, Operation axiom enables to describe the essential construction of an organization by actor roles, acts, and facts, without getting into implementation details.

- **Transaction axiom** addresses that P-acts and C-acts always perform in a specific pattern, which paths a well-defined universal transaction pattern. There are eight C-acts (request, promise, state, accept, quit, decline, stop and reject) and one P-act (execute) included. These eight C-acts include both basic proposed and complied situation, and extended rollback situation. So it enables to describe all potential communication intentions.
- **Composition axiom** divides two kinds of links between transactions which facilities to describe the relation between transactions within business processes. For the first kind, the transaction is enclosed in another. Or it can be called as external activation (Dietz, 2006). For the second kind, the transaction is activated by itself. Composition axiom enables to use a causality-based tree structure to describe business processes. It is different from traditional way to describe business processes as a linear flow.

- **Distinction axiom** differs human activities into three categories (performa, informa, and forma). *Performa* includes deciding, judging, manufacturing, and exposing and evoking commitment. *Informa* is mainly processing information. It includes computing and reasoning information, and formulating and interpreting thought. *Forma* is for processing data. So it comprises storing and transmitting data, and uttering and perceiving information. Accordingly, both C-acts and P-acts can be sorted out into these three human activities. Based on it, distinction axiom enables to consider an organization as an integration of three layer: B(usiness)-organization, I(nformation)-organization, and D(ata)-organization, which help us to concentrate our attentions on the essential ontological level (Dietz, 2006). B-organization is composed of business or ontological transactions that depend on the performa ability of actors. And I-organization consists of infological transactions that depend on the informa ability of actors, while D-organization focuses on datalogical transactions that depend on the forma ability of actors. They are interrelated (i.e., D-organization supports I-organization, and I-organization supports B-organization).

### 5.2.3.2 Four-aspect DEMO Models

Founded on Ψ theory, DEMO was developed by Dietz in the late of 1990s. DEMO comprises four-aspect models to depict of the business (see Figure 5-3): construction model (CM), process model (PM), action model (AM), and state model (SM),
together with a step-by-step procedure that guild to develop these four models for sources and materials (Albani, Dietz, & Zaha, 2006; Dietz, 2006).

**Figure 5-3 Four-aspect DEMO Models (adapted from Albani et al. (2006))**

Construction Model contains two models: interaction model and interstriction model. Interaction model (including actor traction diagram and transaction result table) is the most basic, concise and easy-to-understand model among the four aspect models. It mainly depicts transactions, actor roles, result types, as well as the tree logic of transactions. It also clearly demonstrates the responsibility, authority, and competence of actor roles (Dietz, 2006). Interaction model has been widely used in previous case studies and business consulting. Interstriction model (including actor bank diagram and bank contents table), which focuses on the passive influencing bonds between actor roles, mainly specifies the data ownership. It can be considered as a starting point of detailed information system design phase. This study proposes to use interaction model to facilitate business and technical staffs to discuss IT objectives for the business process. Figure 5-4 shows the notation and basic construct in actor traction diagram for interaction model that will be used later.
Process model deals with business processes and business events. Following the interaction model, process model (including process structure diagram and information use table) describes every transaction in a specific universal transaction pattern (as described in transaction axiom part) together with their causal and conditional links (Albani et al., 2006). Process structure diagram is similar with the model provided by transitional enterprise engineering tools (e.g., Petri Net, BPMN) due to the same focus on ordering in process execution. Since logic link is easy to be changed to the ordering, it is easy to change DEMO process model to workflow chart (Dietz, 2006). But DEMO process model focuses on the state of communication between actor roles to fulfill transaction objectives, which links actor roles with organizational functions. Process model can be considered as a starting point for business process optimization or reengineering.

Action model (including action rule specifications) specifies action rules and work instruction for every state of communication showing in the process model (Albani et al., 2006). Basically, it provides a guideline for the work of actor roles. But it does not require following the rules all the time (Dietz, 2006). Sometimes, especially for processes which are more art than science as innovation, actors should be brave to break the rules. One important characteristic is that, in DEMO action model, all action
“rules are grouped according to the actor roles that distinguished” (Albani et al., 2006, p. 337).

State model (including object property diagram and object fact table) deals with business objects, facts, events, and existence laws that extracting from the action model. It is a good starting point for creating data dictionary, and also helps for identifying components for database and information system (Dietz, 2006).

To sum up, these four-aspect DEMO models are interrelated, which enable us to understand a business process from different perspectives.

Traditional activity-flow-based modeling methods (e.g., BPMN, Petri Net) of business processes are too complex to discuss IT solutions. This study mainly focuses on applying DEMO interaction model for business-IT alignment. There are several benefits of DEMO for it. First, DEMO focuses on modeling the communication between peoples, which is strongly associated with potential IT usages. Second, DEMO depicts enterprise ontology, which is dependent from implementation. In other words, DEMO models are consistent even IT implementations change. Third, DEMO demonstrates the essence of business in a concrete format, because four axioms of \( \Psi \) theory help to reduce complexity. Consequently, it is easier for business and IT staffs to create an overall business understanding. Fourth, DEMO also incorporates change dynamics into the model.

5.2.4 Similarity and Difference between Business Process Models

The similarity and difference between business process models may be able to be translated into some cross-model issues (van Dongen, Dijkman, & Mendling, 2008). For example, if the business process model A and B in Figure 5-5 are the “as-is” and “to-be” models of a organizational for one innovation project, then the grey squares indicate which parts of business have to be changed, which in turn supports innovation project management and support related IT system upgrade. If the business
model A and B in Figure 5-5 are models of two organizations, then the black squares demonstrate redundancies of business. It may imply some needs for business improvements that (Dias, 2012): A) there are inefficiencies in cooperation and information sharing; B) there is a lack of definition regarding the responsibilities, authorities and competencies; and C) there are needs for standardization of overlapping transactions.

![Figure 5-5 Similarity and Difference between Business Models](image)

However, traditional business process modeling tools (e.g., BPMN) cannot provide a consistent and complete view of business (Caetano, Assis, & Tribolet, 2011) for comparison due to their excessive details. DEMO, which has a set of consistent notations for business process modeling, is able to serve as a potential tool for comparing organizations.

### 5.3 Proposed Method by using DEMO for IT-based Innovation

According to the benefits of DEMO discussed above, this study proposes a method to facilitate IT-based innovation by using DEMO interaction model (as shown in Figure 5-6). There are four steps: (starting from the top) modeling and understanding business by using DEMO, identifying business needs for improvements, discovering potential IT solutions, and further evaluating and designing IT solutions, respectively. Because all steps require not only business understanding but also IT capability,
collaborative teamwork engaging with business and IT staffs in these four steps is preferred.

Figure 5-6 DEMO based Method for IT-based Innovation

5.3.1 Step 1: Modeling and Understanding Business by using DEMO

Understanding of on-going business process is a prerequisite for any business process improvement and innovation. It is essential to visualize a given business process in order to facilitate a quick understanding of the logic behind a process and a fast overview of tasks. It is also a good starting point for business-IT alignment through building a consensus of overall business process between business and IT staffs. As
DEMO interaction model depicts the essence of business in a consistent, concise and structured way, it enables a reduction in the complexity of the obtained diagrams, comparing to traditional business process modeling tools.

In this step, a textual and diagrammatic description of processes is a crucial input for building DEMO models. This description is often developed based on available documents that are written by someone who has a good understanding of business, observations, and interviews. Transactions with associated initiators, executors, and results have to be identified from the process description following the procedure that introduced by Dietz (2006). Then, the corresponding graphical representation (i.e., actor traction diagram and transaction result table) will be developed.

5.3.2 Step 2: Identifying Business Needs for Improvements

After a mutual understanding being created, it is important to identify business needs for improvements and highlights the associated transactions in the DEMO construction model. In turn, it helps to systematically discuss business needs for improvements, scale down the domain of IT-based innovation, and pinpoint all the persons or departments concerned.

Business strategy change, emerging IT, inefficiency, and overlapping transaction between organizations are potential starting points to identify business needs for improvement. According to the loop of business-IT alignment, business strategies may naturally imply the needs of IT for the future to achieve business goals, while a new and emerging IT may offer opportunities to rethink the strategic direction of business. Inefficiencies in business practice also directly figure out the needs of business improvements, which may require IT to support. As DEMO interaction models enable faster comparison of business processes, the overlapping transaction with or cross organizations may reveals duplicate or unnecessary transactions.
5.3.3 Step 3: Discovering Potential IT Solutions

A pre-assumption of this study is that one core IT capability is substituting and supporting human at work. When transactions that need to be changed and improved have been identified in DEMO construction model, their associated initiators and executors are obviously shown in DEMO construction model. In turn, potential IT solutions can be generated, through further considering the needs of associated initiators and executors. For better matching the IT potentials and human needs, a classification of IT categories regarding to human needs is important. To do it, a typology of IT ability regarding to human ability should be clarified.

5.3.3.1 A Typology of IT Ability

Ψ theory has classified three kinds of human abilities: performa, informa, and forma. Accordingly, this study proposed a typology of IT abilities (see Table 5-1), under a key premise that IT can substitute and support human at work. Although from the people and law perspective, IT cannot substitute human, from the competency perspective, IT as a “performer” can substitute and support performa ability of human in exposing & evoking commit, devising, judging, creating, and manufacturing. IT as an “informer” can substitute informa ability of human in expressing (formulating) & educing (interpreting), remembering, recalling, computing, and analyzing. IT as a “visual channel provider” can substitute forma ability of human in uttering & perceiving, storing, retrying, transmitting, and copy.

<table>
<thead>
<tr>
<th>Organizational Layer</th>
<th>Human Ability</th>
<th>C - Acts</th>
<th>P - Acts</th>
<th>IT Ability</th>
</tr>
</thead>
<tbody>
<tr>
<td>B(usiness)</td>
<td>Performa</td>
<td>Exposing Commit, Evoking Commit</td>
<td>Deciding, Judging, Creating, Manufacturing</td>
<td>Performer</td>
</tr>
<tr>
<td>I(nformational)</td>
<td>Informa</td>
<td>Expressing (formulating), Educating (interpreting)</td>
<td>Remembering, Recalling, Computing, Analyzing</td>
<td>Informer</td>
</tr>
<tr>
<td>D(data)</td>
<td>Forma</td>
<td>Uttering, Perceiving</td>
<td>Storing, Retrying, Transmitting, Copy</td>
<td>Visual Channel Provider</td>
</tr>
</tbody>
</table>
5.3.3.2 Mapping IT Abilities, IT Capabilities, Human Abilities, and Human Needs

At present, IT is widely used in business with various purposes. After IT abilities are defined, mapping IT abilities, IT capabilities, human abilities, and human needs is necessary, in order to demonstrate what IT can do in business.

Many prior researches have been focused on the classification of IT capabilities on business. The most well-known categorization of IT capabilities was provided by Davenport (1993) including nine categories: analytical, automational, disintermediating, geographical, informational, integrative, intellectual, sequential, and tracking. After this, Mooney et al. (1996) simplified all nine categories into three dimensions: automational, informational, and transformational. And Lee and Lim (2005) extended Davenport’s research in the latest scenario, and added three new capabilities: collaboration, communication, and knowledge management (knowledge creation, knowledge storing, and knowledge distribution). Table 5-2 shows the definition of IT capabilities together with some examples (Lee & Lim, 2005). These classifications of IT capabilities do give so direction help companies to innovate with IT in practice. But they focus more on theoretical examination of IT potentials. It is still difficult for theses IT capabilities to be mapped into specific business elements for the detail design of business-IT alignment.

Table 5-2 maps IT abilities, IT capabilities, human abilities, and human needs. For a B-organization, IT, as a “performer”, is likely to substitute and support human actors to perform a specific transaction, to enable new services to customers, or to reduce unnecessary transactions. For an I-organization, IT is considered as “informer” to facilitate a human being to fulfill his/her responsibility and authority. Six of IT capabilities are related to this level: information, analysis, knowledge management, routinizational, tracking, and workflow. The rest five IT capabilities: collaboration, communication, control, disintermediation, and geographical; are about IT framework,
which enable a virtual path to support transactions in B- and I-organization. So, in D-organization, IT is more like a “virtual channel provider” for traditional business to improve the accessibility.

Table 5-2 Categories of IT Capabilities (Lee & Lim, 2005)

<table>
<thead>
<tr>
<th>Capability</th>
<th>Definition</th>
<th>IT Application Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytical</td>
<td>IT enables complex analyze data and process</td>
<td>Decision Support System</td>
</tr>
<tr>
<td>Automational</td>
<td>IT enables to substitute human labor</td>
<td>Inventory Management System, ATM</td>
</tr>
<tr>
<td>Collaboration</td>
<td>IT enables virtual collaboration</td>
<td>Application Sharing System</td>
</tr>
<tr>
<td>Communication</td>
<td>IT enables virtual communication</td>
<td>E-mail, Internet Chatting System</td>
</tr>
<tr>
<td>Control (Security)</td>
<td>IT enables to ensure virtual security of organization's data and information</td>
<td>Firewall, Data Security System</td>
</tr>
<tr>
<td>Disintermediation</td>
<td>IT enables virtual connections between parties that through intermediaries before</td>
<td>Electronic Data Interchange</td>
</tr>
<tr>
<td>Geographical</td>
<td>IT enables virtual links to overcome geographical problems</td>
<td>Networking System</td>
</tr>
<tr>
<td>Informational</td>
<td>IT enables to provide information to process</td>
<td>Database</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>IT enables to create, store and disseminate knowledge</td>
<td>Enterprise Knowledge Repository</td>
</tr>
<tr>
<td>Routinizational</td>
<td>IT enables to change unstructured processes into routine</td>
<td>Production Planning System</td>
</tr>
<tr>
<td>Tracking</td>
<td>IT enables to track status, inputs &amp; outputs</td>
<td>Monitoring System</td>
</tr>
<tr>
<td>Workflow</td>
<td>IT enables to manage the sequence of tasks, and the flow of business</td>
<td>Workflow &amp; Scheduling System</td>
</tr>
</tbody>
</table>

Giving a credit card company as an example, launching an online banking system is an IT solution for D-organization, which enables clients to do virtual banking around
the world with an access to internet (geographical). Providing information about real-
time currency exchange rates and loan rates, which facilitates clients to make
decisions during online banking, is an IT solution for I-organization (information).
And as launching a bonus point program enriches customer experience and renews the
business model of a credit card company, it is a specific IT solution for B-
organization (introduce new transactions).

5.3.4 Step 4: Further Evaluating and Designing IT Solutions

As the potential contributions of new IT solutions have been considered in step 3, in
the next step, it is necessary to go more carefully further on categorizing IT solutions
and integrate them into IT architecture, evaluating IT solutions in terms of feasibility,
prioritizing IT solutions, and redesigning organizations or systems of these IT
solutions. This step is important, but it will not be focused in this study for prior
researches related to IT project management. Those researches may give some usable
guidelines for this. However, it does not mean business-IT alignment will finish after
new IT solution have been launched, because effective alignment should be managed
as an ongoing process (Chan & Reich, 2007; Silvius, 2007). Some problems and
lessons that appeared in step 4 may also address the needs for further reconsideration
about business-IT alignment.

In the following part, a case study about aging care system in Central Finland is used
to further explain this proposed method for IT-based innovation in detail.

5.4 Case Study: Aging Care System in Central Finland

5.4.1 Backgrounds of Aging Care System in Central Finland

The overall population of Central Finland is more than 270 thousands, and 17.8
percent of them are aging people (i.e., >65 years old). But, the ratio of healthcare
staffs to the population is only around 1 percent (the average of Finland is around 2.7
percent). As a rule, the national health insurance, provided by KELA (Social
Insurance Institute of Finland), basically covers all permanent residents of Finland. And it also has “achieved near-universal coverage of health-care costs for a core set of services, which usually include consultations with doctors and specialists, tests and examinations, and surgical and therapeutic procedures” (OECD, 2011, p. 132). The long-term care public expenditure counts for 2.2 percent of GDP, while the total health care expenditure is 9.2 percent of GDP in 2009. Together with the high expenditure for health care, Finnish health care system has been still criticized for being inefficient (Kokko, 2009). Some phenomena are that the high density of administrative units in the system, a large number of beds in hospitals that are in fact used for long-term care rather than cure, the shortage of medical workers, and the long waiting times (Kokko, 2009; OECD, 2011). Hence, the redesign and reengineering of the health care system is desirable.

In Finland, health care is a service managed and financed by local municipal authorities. They decide domestic basic rules and laws for health care. Most of public health care facilities (e.g., hospitals, nursing homes, and home cares) are funded and organized by municipal authorities. They are key providers in current Finnish health care system. But it is undeniable that nowadays private health care gradually becomes more important and behaves as an alternative to the public health care.

In addition, local municipal authorities are main contactors to advice people to access health care services under the coverage of national health insurance. Especially, when aging people wants to use or change public aging care services, a pre-contact with the municipal authority of health care is necessary. Then, according to the health and living situation of a demander, and the local annual budget for health care, the municipal authority will establish a home care policy for him or her, mainly about period, basic services, devices, potential provider list, and fee. After that, a health care provider (public or private) from potential caregiver list, selected by the demander, will execute the home care policy.
Aging care in Central Finland mainly consists of four parts: support services (e.g., meal, leaning, daycare, and aid tool), home care, sheltered houses/nursing homes (with accommodation and daytime supervision), and intensive care facilities (with 24-hour intensive supervision) (see Figure 5-7). All these services are correlated and continuous according to the potential time line of the health situation of aging people. As intensive care facilities are responsible for temporary intensive medical treatment, and national health insurance mainly play the role of payer, this case study mainly focuses on the other four components of the aging care system. The objective of this case study is to propose IT solutions for more efficiency system to support out-of-hospital aging care (the part inside of the gray square in Figure 5-7).

Figure 5-7 Components of Aging Care System in Central Finland
5.4.2 Modeling Method and Process

In first step, this study focused on to create a reference model for aging care system in Central Finland. There are nine organizations that have participated in this research. The pre-modeling information collection was mainly based on interviews and document reviews. In each organization, two to three managers, team leaders and key staffs were interviewed about key business processes and their daily works. The data from the interviews was also matched with the provided documents. The business process flow chart is one of the main references for us. Interviews and documents were mainly in Finnish, and a cooperated Finnish research team facilitated my work. According to these, this study created the interaction model for each organization.

Then, this study deduced the reference models of municipal authority, private home care, public home care, sheltered house, and public physiotherapy. The reference models were final validated by the cooperated Finnish research team and home care professionals.

5.4.3 Reference Models for Aging Care System based on DEMO

Interaction model consists of actor transaction diagram (ATD) and transaction result table (TRT). At here, only ATDs were provided here (see from Figure 5-8 to Figure 5-12). There were seven core transactions in municipal authority of health care, ten core transactions in private home care, twenty-two core transactions in public home care, nineteen core transactions in sheltered houses, and nine core transactions in physiotherapy. The ATDs of private home care and public home care are different, because the difference of their business focus that affected by their capabilities. Private home care mainly concentrate on non-medical care and housework, while outsourcing all of the medical care to other private clinics or medical workers. But in public home care, nurses have to do non-medical and medical care. Currently, for seniors who need long-term care, public home care often tries to invite and support their relatives to take care of them, through providing monetary rewards. In Central
Finland, public physiotherapy is an important part of home care system. It is in charge of managing and providing aid tools, in addition to its regular clinic services.

Figure 5-8 ATD of Municipal Authority

Figure 5-9 ATD of Private Home Care
Figure 5-10 ATD of Public Home Care
Figure 5-11 ATD of Sheltered House
5.4.4 Overlapping and Suggestions for IT Solutions

In step 2, based on the comparison between DEMO interaction models (form Figure 5-8 to Figure 5-12), this study listed out all overlapping transactions in Table 5-4. And then, by considering the real practice, this study mainly paid attention to five transactions that has been highlighted by gray color in Table 5-4 as follows. They are always questioned by practitioners about the extended waiting times, and duplicated costs and investments. Then, in step 3, this study first classified the potential improvements of these five transactions in B-, I-, or D-organization level as performer, informer, and virtual channel provider, and suggested IT solutions for them (see Table 5-5).
The registration transaction is isolated in each facility with its different database of clients. It is an overloading work for both aging people and medical workers, because a number of aging people who need special care are with problems of seeing, listening, and writing. And medical workers are also forced to spend more time in deskwork such as data inputting. As a premise of overall aging care system, most of utilization of public cares has to be pre-approved by the municipal authority. In the B-organization level, it is possible to automate the registration transaction in other facilities with IT. For instance, it is good to allow other facilities to access the client data from municipal authority database by a pre-provided trial number or bar code for

<table>
<thead>
<tr>
<th>Municipal Authority</th>
<th>Public Home Care</th>
<th>Private Home Care</th>
<th>Sheltered House</th>
<th>Physiotherapy</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>T01 Registration</td>
<td>T01 Registration</td>
<td>T01 Registration</td>
<td>T01 Registration</td>
<td>T01 Registration</td>
<td>B-org</td>
</tr>
<tr>
<td>T02 Home Care Execution</td>
<td>T02 Home Care Execution</td>
<td>T02 Care Execution</td>
<td>T03 Physical Treatment Execution</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T03 Care Planning</td>
<td>T03 Care Planning</td>
<td>T04 Test Participation</td>
<td>T04 Test Participation</td>
<td>B-org</td>
<td></td>
</tr>
<tr>
<td>T07 Supporting Service Payment</td>
<td>T10 Payment</td>
<td>T05 Payment</td>
<td>T07 Aid Tool Provision</td>
<td>T04 Payment</td>
<td></td>
</tr>
<tr>
<td>T08 Meal Service</td>
<td>T09 Cleaning Service</td>
<td>T09 Cleaning Service</td>
<td>T09 Daily Activity Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T11 Daily Activity Management</td>
<td>T06 Personal Care Management</td>
<td>T08 Housework Service Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T12 Catering Service</td>
<td>T12 Personal Care Execution</td>
<td>T13 Catering Service</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T14 Medicine Preparation</td>
<td>T14 Medical Service Preparation</td>
<td>T16 Medicine Preparation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T17 Therapy Execution</td>
<td>T17 Therapy Execution</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T18 Nurse Visiting</td>
<td>T03 Nurse Visiting</td>
<td>T14 Medical Service</td>
<td>I-org</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T19 Medical Advice</td>
<td>T15 Medical Advice</td>
<td></td>
<td>D-org</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T22 First Aid</td>
<td>T19 First Aid</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
a care case of a senior. Then, it simplifies the complicated communication or filling-in process into just code provision.

Test participation is a key transaction for medical workers to understand the real health situation of aging people, because many aging people are lack of capability to describe their situation. Each facility has to give basic test such as blood pressure test, blood sugar test, and memory test, etc. It extends the lead-time of pre-caring stage such as care policy establishment and care planning. Similar to test participation, medical record provision is also important to help medical workers judging the health situation of aging people. In some cases, responsible medical workers are not capable to give some specific tests, then they have to request and wait for the response from the related record taker (e.g., hospital, clinic, or municipal authority) before accepting clients. It makes the pre-caring stage to be even longer. So, in the B-organization, test participation and medical record provision are more cost consuming than value generating. It will be more efficient if these two processes are reduced. A main requirement of this reduction is the existence of a well-established information sharing system within the aging care system that recording key medicine and care information of involved seniors.

The efficiency and effectiveness of nurse visiting strongly effect the performance of aging care system, because nurses are main medical caregivers in regular daily care. However, in line with the report of Hughes, Karsten, Konttila, and Järvi (2002), half of working hours of nurses were spent in desk works such as reviewing client record, reporting daily work, inputting data to information system and so on. Moreover, because each client is not assigned to a fixed nurse, even before home visiting, nurses have to spend around 15 minutes to go over client reports and treatment procedures. Currently, IT does not fundamentally benefit daily work of nurses, but on the contrary, they are bound to additionally data inputting and printing. In the B-organization, nurse visiting is a value adding transaction, and it is also not easy to be automated by technologies. Then, this study considers improving this transaction in the I-
organization level to reduce the time spending on data reporting and report reviewing. At here, mobile devices (e.g., smart phone, tablet) are suitable to be used. They can enable nurses to report a client visiting on the spot. In addition, these mobile devices can reduce the time for nurses to review the record by illustrating data by tables or graphs.

In addition, there is a strong complaint about less collaboration with doctors or hospitals. In Finland, nurses are main providers of primary health care (OECD, 2011). A main phenomenon is that there is almost no channel for nurses to communicate with doctors about the situations of clients (e.g., current medicine or treatment is not effective). Sometimes, nurses will call the doctors for help, but it is hard for the doctors to give correct advice without any references about health of seniors. So, senior often have to go to hospitals requesting for an overall health check when nurses consider there is a need to adjust the treatment. A fact in current Finnish health system is that there is a long average waiting times of reservation for doctors (OECD, 2011). For the importance of medical advice, in the D-organization level, an on-line communication through mobile devices, consisting of email, photo, video and chatting, is likely to provide another way for in-time medical advice. Nurses can talk with doctors immediately at client’s home, and provides references to doctors through email, photo and video. It is highly potential to save transportation cost, health test cost, and queuing time comparing to go to hospital directly by clients themselves.

Table 5-5 Proposed IT Solutions for Aging Care System in Central Finland

<table>
<thead>
<tr>
<th>Transaction</th>
<th>Level</th>
<th>IT Ability</th>
<th>IT Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration</td>
<td>B-org</td>
<td>Performer</td>
<td>Automate registration through pre-provided trial number provided by municipal authority</td>
</tr>
<tr>
<td>Test Participation</td>
<td>B-org</td>
<td>Performer</td>
<td>Reduce test participation through launching aging care record system</td>
</tr>
<tr>
<td>Medical Record Provision</td>
<td>B-org</td>
<td>Performer</td>
<td>Reduce medical record provision through launching aging care record system</td>
</tr>
<tr>
<td>Nurse Visiting</td>
<td>I-org</td>
<td>Informer</td>
<td>Support nurses to report a client visiting and review the client’s record on the spot through mobile devices</td>
</tr>
<tr>
<td>Medical Advice</td>
<td>D-org</td>
<td>Visual channel provider</td>
<td>Provide on-line communication through mobile devices or other for in-time medical advice</td>
</tr>
</tbody>
</table>
After discussing IT for five transactions in B-, I-, and D-organization, then discussion about how to integrate previous idea into current or new IT framework, together with political possibility, is important. A common goal of health system is to optimize the cost of overall treatment process towards patients, rather than a single function within the process. As mentioned earlier, first three suggestions are related to how to utilize centralized IT system, instead of current decentralized IT system, to reduce time-consuming and duplicated transactions in aging care system. It is likely to contribute to a better performance of overall aging care system. In Figure 5-9, it is known that municipal authority is the first player who is responsible for registering seniors and assessing their needs, so it is the most suitable owner of the centralized IT system in the future. The last two suggestions focus on to release visiting nurses from data processing work and to strength their collaboration with doctors by adopting mobile devices. It is related to efficiency of a single organization. So, an integrative consideration about the centralized IT system and mobile devices about data processing is needed. Moreover, for the success, it also calls for a consideration about how to assign and motivate doctor to engage in giving medical advice to visiting nurses for their jobs. Currently, the security of private information of patients attracts many attentions from researchers and practitioners. Thus, in the future, a more clear process planning related to how to assign the access permission to stakeholders is also crucial.

5.5 Discussion

A case study on applying DEMO interaction model to consideration of new IT solutions for aging care system in Central Finland was used to demonstrate the implementation of the proposed DEMO-based method for IT-based innovation at work. It implies that DEMO is applicable to the examination of essential processes in aging care systems, to the comparison of business models between organizations, and to the consideration of IT potentials for innovation. There are several advantages of applying DEMO interaction model as follows:
- DEMO interaction model provides a starting point to build up a shared view of business among IT and business planners.
- DEMO interaction model enables to compare the transactions and processes of different organizations, which provides a basis to reconsider combination and cooperation.
- DEMO interaction model serves as a concise model to consider IT usability for business through substituting and supporting people at work. In the B-organization, the focus lies on how to apply IT as a “performer” to automate transactions that need less human capability to decide, judge and process. In the I-organization, the focus lies on how to apply IT as an “informer” to support transactions by supporting information sharing and decision-making. In the D-organization, the focus lies on how to apply IT to enable a virtual channel of current business.

This study contributes to research and practice in four ways. First, this study classified IT capabilities into three categories according to the distinction of B-, I-, and D-organization, and also associated with the needs of human. It enables a systematical consideration of IT solutions based on DEMO interaction models. Following it, second, this study proposed a method, which aims to guide business-IT alignment discussion for innovation, based on DEMO for the early analysis and design phase (rather than the IT development & implementation and support & maintenance phase). It gives a possible direction and method for practitioners to manage business-IT alignment, business process improvement, and innovation. Third, this study provides more evidence that DEMO is a useful and beneficial approach in management practice. It is may interesting for future study to explore new DEMO implementation for other purpose, which in turn enrich the understanding of DEMO. Forth, it is one of the limited studies focusing upon the transformation of healthcare delivery system, especially aging care system.
5.6 Limitations

There are also some limitations of DEMO usability for IT-based innovation. First, even though DEMO provides a more concise map of an organization comparing with traditional process modeling methods (e.g., BPMN), it still needs specific knowledge and experience about process modeling to understand. Thus, a training course of DEMO given by DEMO professionals is required for business and IT staffs in order to fully understand the meaning of DEMO models. Second, the feasibility evaluation of the suggested IT solutions is not conducted yet in the current phase, which is the goal of the next phase. The main purpose of this study is to propose a DEMO based method to support decision makers, who have different expertise, for a comprehensive consideration of Business-IT alignment towards innovation. In practice, the effectiveness of IT solutions is also highly depend on the opinions, knowledge, and experience of researchers, managers and staffs who participate in the discussion. Third, in this study, only the interaction model has been developed, it is also interesting to further create other DEMO aspect models for aging care system in Central Finland. Because DEMO four aspect models are highly interrelated and interdependent, understanding a system from all these aspects may support to create a comprehensive view of an organization and system. In turn, it may give some additional hints and directions for aging care system improvements in Central Finland.
CHAPTER 6  Conclusions

This chapter summarizes the contributions, findings, and implications of this dissertation. Contributions are described in terms of theoretical and practical aspects. New findings are concluded and possible implications from this dissertation that will be beneficial for the management are explained. The limitations and recommendations for future research are also provided.

6.1 Summary of Main Findings

The motivation of this dissertation is related to the limited theoretical understanding, empirical evidence, and implementation tools and methods about how to achieve innovation through BPM. There is a need for more evidences to demonstrate both direct and indirect impacts of BPM on organizational innovation, and pinpoint related main factors that managers have to focus on and carefully manage. As mentioned in Chapter 2, recent academic studies argue that beyond just managing process, contemporary BPM calls for a “holistic” process-oriented managerial manner (Pritchard & Armistead, 1999; McCormack, 2007). Strategic alignment, governance, methods, IT, people, and culture are needed to fit and support this process-oriented management. Following a holistic view, BPO is well defined and structured managerial approach for effective BPM, which highlights the importance of “soft” issues (culture, people, and culture) as well as “technical” issues (IT, strategic alignment, and methods). This dissertation addresses impacts of launching BPO on innovation with the focuses on four core elements: governance, people, culture, and IT.

Launching BPO often is associated with a process-oriented change in “culture”, “people”, and “governance”, corresponding to three BPO dimensions (process view, process jobs, and process measurement and management). Chapter 3 found out BPO significantly affects organizational innovation performance, through promoting customer integration and employees’ innovation behavior. But the direct link between of BPO and organizational innovation performance is not significant, according to
results of the survey in Japan. So, in current stage, a change from “hierarchical organization” to “horizontal organization” according to BPO criteria/components does not directly lead to innovations of products and processes. In the proposed model, the main benefit of BPO is to mobilize resources for innovation, which changes the way of how employees work to be collaborative and innovative. Unfortunately, not all three BPO components (process view, process jobs, and process management and measurement) showed significant impacts on organizational innovation performance. Having a process view, which relying on defining, mapping, and documenting processes, while important, is not sufficient for successful business process management. One reason is that employees’ attitude and behavior cannot be simply changed by providing technical business process documents and models. One challenge for managers and researchers is that how to embed a process view or process understanding into organizations. Next, cross-functional integration also did not show a significant influence on organizational innovation performance as expected. It may reflect that cooperation of innovation is not simply grouping multiple expertise, skills, and knowledge together. It also calls for an effective management of the heterogeneity of backgrounds and experts, and innovation agendas. One more important point that has to be mentioned again is that employees’ attitude and behavior plays a crucial role for successful business process management and innovation, because results showed that employees’ innovation behavior fully mediates the impact of process jobs and partially mediates the impact of process management and measurement on innovation.

“People” as one core element of BPO demonstrates that efficient management of employees’ innovation behavior is necessary. However, even prior researches have given some directions for managers, but a theoretical and systematic understanding of employees’ innovation behavior is missing. From the employee perspective, Chapter 4 proposed to apply theory of planned behavior to understand basic antecedents of employees’ innovation behavior, and extended it by considering the impacts of external information awareness and proactiveness of innovation strategy on these
antecedents. Results of the survey addressed that all three antecedents adapted from theory of planned behavior - attitudes towards innovation, subjective norm about innovation, and perceived behavior control to innovation – are critical triggers for employees to innovate. The nature of innovation is to breakthrough, so employees have to devote a lot of time of effort to create, champion, evaluate, and learn. It calls for a full-round commitments and supports from organization. Thus, if an organization only focused on one of them, then employees’ innovation behavior may not be effectively motivated. As the expectation, results demonstrated external information awareness and proactiveness of innovation strategy significantly prompts attitudes, subjective norms, and perceived behavior control of employees to innovate. Further these three antecedents partially or fully convert impacts of external information awareness and proactiveness of innovation strategy on employees’ innovation behavior. It unveils an underlying mechanism how organizational characteristics affect employees’ innovation behavior.

Most of BPM and innovation projects and programs are highly related to technologies, especially “IT”. Aligning and embedding emerging IT into business practice in a novel way is crucial for the success of IT-based BPM or innovation. For this, a mutual understanding within project teams about their objectives is an important prerequisite. But there are not enough methods and tools to facilitate the teamwork-based innovation. Chapter 5 proposed a method based on DEMO interaction model to facilitate systematically consider IT solutions for business, under the premise that one capability of IT is to substitute and support people at work. Following this method, a case study about aging care system in Central Finland was conducted, mainly focusing on five kinds of facilities – municipal authority, private home care, public home care, sheltered houses and physiotherapy. Through comparing the overlapping transactions among these five kinds of facilities, this study pinpointed some inefficient transactions, and suggested some IT solutions to improve the efficiency of this aging care system. In this case study, it found that DEMO provides a way to demonstrate the essential of organization in a concise form, which in turn support a
fast comparison between DEMO models. The overlapping transactions are worth to reconsider by organizations, because they duplicate the recourses investment. In addition, a categorization of IT capacities on B-, I-, and D-organization, according to distinction axiom in Ψ theory, can support link IT capabilities with human competences, authorities, and responsibilities in business.

In summary, Figure 6-1 outlines main findings in Chapter 3, 4, and 5, together with the relationship between them.
6.2 Implications for Theory Development

There are several implications for academic research. First, the study in Chapter 3 is one of the limited empirical researches focusing on “how” BPO affect organizational innovation performance. It gives more evidence to support the belief of many researchers that BPO can significantly improve organization performance, including innovation performance as well. Chapter 3 tried to answer the “how” question by identifying customer integration and employees’ innovation behavior as the underlying mechanisms through which BPO influences organizational innovation performance.

Second, in Chapter 3, among three BPO components, it found process view does not significantly influence customer integration and employees’ innovation behavior, which in turn affect organizational innovation performance, as the other two components. Similarly, the empirical study of McCormack (2007) also indicated that process view does not have a significant impact on business performance. These findings suggest a need for future study to focus on the “black box” of BPO, which can further contribute to restructure BPO concept and improve the effectiveness of BPO measures.

Third, based on the theory of planned behavior, Chapter 4 pointed out an underlining mechanism about how organizational factors affect employees’ innovation behavior, by considering the mediation effects of employees’ attitude, subjective norm, and perceived behavioral control. Chapter 4 successfully evaluated the impacts of external information awareness and proactiveness of innovation strategy on employees’ innovation behavior under this mechanism. Therefore, future research may also be able to follow this mechanism to predict the impacts of other organizational attributes—for instance, leadership and knowledge management—on employees’ innovation behavior.
Fourth, empirical studies in Chapter 3 and Chapter 4 collected data from Japan. It is an unstudied context in BPO and innovation research, this dissertation fulfilled this gap. So this dissertation may contribute to enhancing of our understanding about the situation of BPO and innovation management in Japan. On the other hand, because this study only collected data in Japan, then it cannot compare the BPO and innovation between different countries. It may be interesting for future research to focus on comparison of BPO and innovation among different countries, which is fruitful for us to highlight the impacts of country’s specificities.

Fifth, in Chapter 5, it theoretically categorized IT capabilities based on distinction axiom in Ψ theory to facilitate the consideration of new IT solutions for innovation. DEMO interaction model has been suggested as the modeling tool to map IT capabilities and business practices, together with a proposed method for IT-based innovation. Following the proposed method, Chapter 5 conducted a reach about aging care system in Central Finland to consider new IT solutions for business improvement and innovation. This chapter is an attempt to provide a practical framework for IT-based innovation through the route from business practice to business model, and then to new IT solution. Future study may be able to follow this route to discuss more insights about how to examine and recognize the value of IT-based innovation for business in practice. It is also helpful if future study uses more cases and projects in other industries and countries to evaluate over proposed method, and compare the efficiency of traditional innovation or process management methods with this new one. In addition, this chapter strengthens the belief that DEMO can benefit design, engineering, and innovation.

6.3 Implications for Management Practice

This dissertation also provides some directions for managers to manage BPO and innovation in practice. First, according to the findings in Chapter 3, promoting BPO by appointing process jobs and implementing process management and measurement system is fruitful for fostering customer integration and motivating employees’ 
innovation behavior. Therefore, managers should try to align employees’ jobs with core business process, and empower employees’ to manage process jobs and process performance by themselves. Organizations should also launch and improve process measurement system and reward system to support the evaluation and recognition of process performance and employees’ efforts.

Second, employees’ innovation behavior is a critical contributor for organizational innovations. Organizations should motivate employees to innovate from multiple ways. Attitude, subjective norm, and perceived behavior control are significant antecedents of employees’ innovation behavior at the findings in Chapter 4. Focusing one or two aspects may not well produce the expected results. In practice, managers may also use attitude, subjective norm, and perceived behavior control as predictors to manage employees’ innovation behavior, and as criteria to decide policy portfolios for innovation.

Third, the findings in Chapter 4 suggest managers to improve external information awareness of their companies, and to develop a more proactive attitude and strategy for innovation, in order to promote employees to innovate. It is beneficial if organization establishes good relationship and share information with suppliers, customers, competitors, and research institutes. In order to enable employees to reach these information that captured from outside for innovation, a good internal information sharing system and mechanism may help. Moreover, when an organization intends to change from an innovation follower to be an innovation leader, fostering employees’ commitments towards the proactive innovation strategy is important. Indeed, organization should also set up a better system to support the proactive innovation strategy launch. In organizations that have launched BPO, according to the mediating effect of employees’ innovation behavior in the relationship of BPO and innovation performance, managers are able to enlarge the impacts of BPO through promoting external information awareness and adopting proactive innovation strategy.
Fourth, following the procedure proposed in Chapter 5, it might benefit organizations if managers and focused team really utilize DEMO interaction model to facilitate the discussion and design of IT solutions for business. But because most of employees or team members are lack of business modeling experience before, it is not easy for beginners to understand the DEMO interaction models and learn how to develop it. A basic course provided by DEMO professionals is necessary. Moreover, a good understanding of business process, cultivating a process view within organizations, may also helpful for employees to learn DEMO.

6.4 Limitations and Recommendations for Future Research

The findings in this dissertation should be interpreted in a view of its limitations. First, empirical studies in Chapter 3 and Chapter 4 collected all the data in Japan, thus the findings should be further reconsidered with the difference of country specificities, when managers want to apply them in other countries. Future research that compares BPO and its impacts on innovation between multiple countries may be fruitful. Second, only require one informant (mainly senior managers) from one company was requested to fill in the questionnaire survey. The findings still face the problem of common method bias. Even no significant threat related to common method bias was found in the study, but in the future, it is better for researchers to require multiple informants to engage in the survey. Third, it may enhance the accuracy evaluation of organizational innovation performance and employees’ innovation behavior, if the objective data from resources as the annual report of companies was used. As the measure of employees’ innovation behavior in this dissertation is very abstract and brief, it is also interested to study it in more detail. Forth, in this dissertation, it did not take into account the effect of time. It may take times for the transfer from BPO efforts to innovation outcome, and for the change from attitude, subjective norm, perceived behavior control to innovation behavior. A longitude study considering the time lag of innovation may bring interesting findings for us. Fifth, for the case study in Chapter 5, an objective evaluation of the suggested IT solutions in aging care
system case is important stage to ensure the effectiveness of the proposed method for Business-IT alignment. There are some available approaches as simulation and calculating cost effectiveness. Therefore, it is better to conduct a follow-up study for this purpose. Further, more cases and examples in different industries and countries are also necessary. Sixth, BPM addresses the importance of six core elements, yet this dissertation only studied four of them. It may be interesting for future research to focus on other two elements – strategy and method, in order to provide a more comprehensive image about how to achieve innovation through BPM.

6.5 Overall Conclusions

To conclude, according to empirical and case studies that mentioned in previous chapters, this dissertation mainly clarified three directions for innovation management:

- **Launching BPO is a beneficial BPM approach to cultivating collaboration and motivating employees to innovate.**
- **Motivating employees is crucial for innovation, and its related motivations and supports are important.**
- **DEMO interaction model can supply as a basis to consider IT solutions for innovation and BPM, through supporting for mutual business understanding creation, and business-IT alignment design.**

Indeed, there are still a lot of work for future study to illustrate more insights of BPO, BPM, and innovation. In this sense, this dissertation contributes to research and practice by providing some evidences and proposing some potential approaches.


