The Use of Lean Principles in IT Service Innovation: Insights from an Explorative Case Study

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Abstract. IT service innovation is often dependent upon the relationship with outsourcing vendors. In such situations innovation is a result of knowledge accessing and utilization between outsourcing provider and user. As a management thinking, the application of Lean principles can facilitate knowledge accessing and utilization to enable IT service innovation for the customer. Based on the knowledge-based view of the firm, we developed a conceptual framework to describe how Lean can drive IT service innovation within IT outsourcing relationships. This framework is used to analyze the use of Lean principles in an explorative case study of a service organization and its two IT outsourcing providers. The framework and the case study show that IT service innovation is an ongoing process. A clear strategic direction and learning environment are critical to achieve it. Applying Lean principles facilitates the learning behaviors and allows smooth communication on innovative ideas and in this way drive innovation.

Keywords: Service Innovation, Lean, IT Service, IT Outsourcing, Knowledge-based View.

1 Introduction

Along with the growth of the services sector, there is a need for methods to enhance innovation in services within a short time frame. While traditional product innovation emphasizes the design of tangible and relatively static products, services are often intangible and customers are involved in the service delivery process [1, 2]. Grönroos [3] identified three basic characteristics of services: 1) services are processed using a series of activities (a business process) rather than things, 2) services are to some extent produced and consumed simultaneously, and 3) the customer participates in the service delivery process. Consequently, an approach that can be used to enhance innovativeness in production and manufacturing environments might need to be adapted to the idiosyncratic nature of the services domain [4]. We adopt a multi-dimensional definition of service innovation from [5] (p. 494) "A service innovation is a new

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H. Li et al. (Eds.): I3E 2014, IFIP AICT 445, pp. 58–69, 2014.

service experience or service solution that consists of one or several of the following dimensions: new service concept, new customer interaction, new value system/business partners, new revenue model, new organizational or technological service delivery system."

In recent years, Lean has become popular and sometimes even a strategic imperative for organizations to improve their performance. Lean can be used by organizations to turn passive and defensive organizational cultures into proactive and open cultures that promotes organizational learning and innovation [6-8]. Although Lean has been around for decades, practitioners and scholars primarily applied and studied Lean primarily in manufacturing environments. Because of its apparent success, Lean has gradually expanded itself to other domains such as healthcare [9], government [10] and the service industries [11-13], including IT services [14, 15]. Despite its broad acceptance it is hardly been applied for innovation.

Innovation in IT services is becoming an increasingly complex issue. On the one hand, IT enables innovation and the adoption of new IT technologies often need to be complemented by organizational change activities [16]. On the other hand, IT outsourcing is a common practice in the execution and operation of IT services. A key issue in service innovation is therefore the management of the outsourcing relationships and knowledge sharing between organizations [17]. Prior innovation approaches (e.g. service blueprinting [1]) was used to help organizations improve their service offerings process in the design or implementation stages of services [18]. A service innovation approach that can address the management of IT outsourcing relationships and knowledge sharing between organizations for its use in IT service context has not yet been reported.

In this paper, we propose a Lean IT service innovation framework based on the knowledge-based view (KBV) of the firm. The framework is then used to analyze an insurance company and the relationships with its two IT outsourcing suppliers. The analyses provide insights of the use of Lean for IT service innovation.

2 Lean Driven Innovation

Innovation concerns the generation of a new idea and the way to implement it into new product, process or service [19]. The earlier literature interprets innovation mainly from a product or process perspective [e.g. 20, 21]. While *product innovation* is about the introduction of new product aiming at satisfying new customer needs, *process innovation* is concerned with introducing new elements into an organization's operations such as input materials, task specifications, work and information flow mechanisms, and equipment used to provide a product or service [22]. More recent literature also discusses innovations from administration or management perspectives. *Administrative innovation* is the innovation that relates to strategies, structure, systems, or people in the organization [23]. *Management innovation* is defined as the invention and implementation of a management practice, process, structure, or technique that is new to the state of the art and is intended to further organizational goals [24].

According to the nature of change, innovation can be classified as incremental or radical [19]. *Incremental innovations* improve existing products or processes within

the existing structures and strategies, while *radical innovations* give rise to revolutionary changes in strategies and structures and even culture [23]. A radical innovation is likely to happen in a long time frame and many radical innovations take more than five years before starting to pay back [25].

Although innovation has been a subject of scientific research for over a half century, only the last decade scientific literature started to report the connection between Lean and innovation. However, to date the number of publications is still very small. According to Hoppmann, Rebentisch, Dombrowski and Zahn [26 Exhibit 1], up to 2011 only 27 publications can be found about Lean innovation or product development (PD) and half of these publications fall into the PD domain. Existing literature regards Lean driven innovations as either incremental or radical innovations in different forms. In the manufacturing industry Smeds [27] argued that the reorganization of manufacturing according to Lean principles can trigger a radical techno-organizational change towards a Lean enterprise which includes a new structure, strategy and culture. Byrne, Lubowe and Blitz [28] reported on the effect of using Lean Six Sigma management to derive radical innovations. In the research and development (R&D) domain, Schuh, Lenders and Hieber [29] revealed that the implementation of Lean thinking in innovation management facilitates incremental process and product innovations. Besides the manufacturing industry, applying Lean in supporting innovation was found in healthcare and pharmaceutical industry to achieve incremental process innovation [7, 30].

3 Knowledge-Based View in IT Service Innovation

Lean provides companies a way of working that enables them to introduce and exploit service innovations continuously. Based on KBV, we propose a Lean IT service innovation framework which helps organizations to understand how Lean facilitates service innovation in an IT outsourcing relationship.

The KBV considers knowledge as the most strategically significant resource of a firm and the source of competitive advantage resides in the application of the knowledge rather than in the knowledge itself [31]. It is an outgrowth of the resource-based theory (RBT) of the firm which was initially proposed by Penrose [32]. The KBV postulates that organizations render their services offered by using their knowledge. This knowledge is embedded in and carried through multiple entities including organizational culture and identity, routines, policies, systems, documents, and individual employees [33]. The KBV is also able to analyze the efficiency characteristics of inter-organizational cooperation, including outsourcing [34]. The precondition for using the KBV in analyzing outsourcing relationships is that the major motivation for outsourcing is to gain access to knowledge which can be used to innovate.

While accessing knowledge can be considered as the learning activities of the organizations in an IT outsourcing relationship, knowledge utilization are the organizational activities to transform knowledge assets into goods or services [35]. Knowledge utilization in the service process is the mechanism built within the IT outsourcing relationship that enables IT outsourcing suppliers and clients to share and offer the required expertise which can be used to internalize and facilitate internal innovation.

The KBV suggests that innovating IT outsourcing relationships need specific mechanisms to support efficient knowledge accessing and utilization. The evidence reported by existing literature and the theoretical body of knowledge on Lean indicates that Lean is able to underpin the aforementioned two important components and results in different kinds of innovation outcomes. Figure 1 shows a framework conceptualizing Lean IT service innovation from the perspective of the service organization. The framework describes how IT service innovations can be achieved in cooperation with IT outsourcing suppliers. In this framework, knowledge accessing and utilization are underpinned by four Lean principles (numbered in the figure). Principles are often used to guide decision-making [36]. Lean principles are widely used to guide the implementation of Lean thinking [37, 38]. The four Lean principles presented in Figure 1 are selected as they concern specific areas where IT outsourcing relationships should pay attention to in order to avoid waste and focus on creating value in the knowledge accessing and utilization.

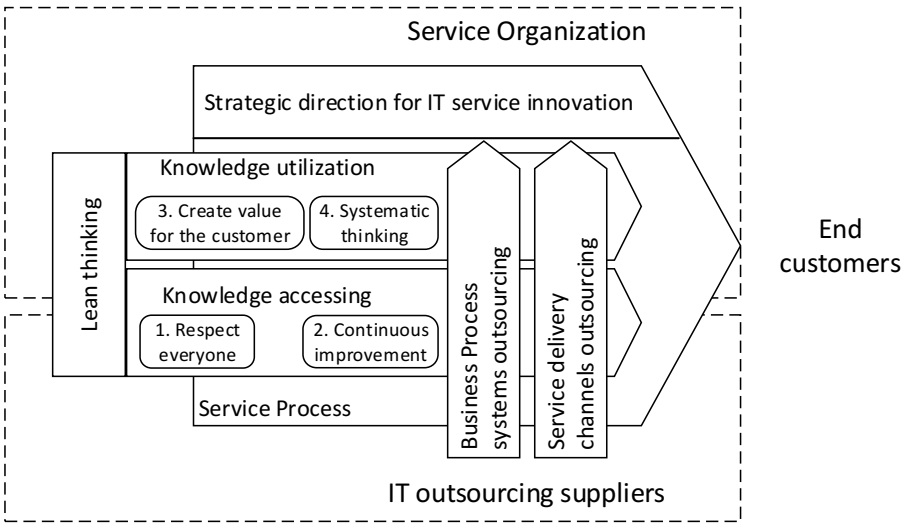

Fig. 1. A conceptual framework of Lean IT service innovation

In the framework, knowledge accessing is facilitated by the Lean principle "respect everyone" and "continuous improvement". *Respect everyone* is about involving all people with different backgrounds, insights, skills and experiences that make a distinct contribution to reach the specified goals of an IT service innovation. Involvement drives people to learn and to improve, unlocks creative potential, ultimately enhancing innovativeness. People are the driving force behind IT outsourcing relationships and have to be respected and nurtured to give them a sense of belonging. People should be provided with plenty of opportunities to hone their skills that are at the heart of both an organization's competitiveness and the success of any IT outsourcing relationship. Similarly, *continuous improvement* concerns the continuous

effort of people to shift from reactive firefighting to proactive problem solving, and having the aim of relentlessly improving the execution and efficiency of processes in an ongoing manner. By focusing on continuous improvement, waste is gradually eliminated causing everyone in the IT outsourcing relationship to focus more on better customer services and innovation.

Knowledge utilization is facilitated by the Lean principles "creating value for the customer" and "systematic thinking". *Creating value for the customer* concerns everyone knowing what the customer desires and demands. This means people begin with the final result in mind and focus on doing the right things in order to reach this desired result. By clearly hearing the voice of the customer without noise, unclarities or ambiguities, the supplier knows what the customer considers to add value and what is considered waste, thereby allowing the IT outsourcing relationship to innovate. *Systematic thinking* focuses on viewing the interconnected processes that make up the entire value stream, while being aware of the cause-and-effect interdependencies that either add value or create waste. All parties involved in an IT outsourcing relationship should have a holistic view of the relationship in order to fully comprehend how specific activities for innovation within an IT outsourcing relationship relate to the greater whole, rather than existing in isolation.

4 Case Study

The case study focuses on a service organization having two relationships with IT-outsourcing vendors. One of them provides a business process system and the other provides web-channel related outsourcing services. Both systems are key to the competitive advantage. All the three companies have experience of applying Lean within their own organizations. Hence they possess knowledge and practical experience of Lean which can potentially be applied in their IT outsourcing relationships. For each outsourcing relationship, we conducted six semi-structured interviews at different organizational levels, ranging from top-level executives to operational employees. For each organizational level, interviews were conducted on site at the service organization and supplier organization. All the interviews were conducted face-to-face to allow for a greater degree of interaction. A typical interview lasted approximately two hours in which one or two interviewees participated. Once all the interviews were conducted the findings were documented a case study report. The report was then provided to the interviewees and asked whether it contained any mistakes. The framework we introduced in the last section is used for describing the case. The rest of this section briefly presents the research finding of this case study.

4.1 Strategic Direction for IT Service Innovation

Company A is an insurance group of operating companies with different labels and brands in several European countries. Company A covers a broad range of insurance services and products, distributed to the market through a broad mixture of distribution channels. The company is a front-runner in experimenting and exploiting digital customer services and distribution channels. In the view of Company A, IT service innovation can be accomplished by adopting new technologies, by enabling new

customer-oriented services, utilizing a mix of service distribution channels and by improving the performance of business processes. Company A selected two IT outsourcing suppliers which have a long history of cooperation with Company A to acquire required technical expertise. Table 1 provides an overview of these IT outsourcing relationships.

Table 1. An overview of the IT outsourcing relationships studied

IT-Outsourcing Supplier	Outsourcing domain	IT outsourcing content and motivation
B	Business process systems	Co-development of an insurance ERP system which can support multiple digital channels for customer interaction
C	Service delivery channels	Development of reusable website components for every operating company of Company A to allow them building up their own website quickly by configuring components

For a long time, Company A had separate IT departments in each operating company. The IT productivity was considered to be too low and the IT departments spent a significant amount of capital to build customized solutions. The strategy of Company A was to centralize IT organization to integrate operations in order to simplify its IT landscape and use module-based and standard solutions to allow quick creation of new business processes and the deployment of new services. In the centralized IT environment, Company A decided to use the standard solution from Supplier B for core insurance and banking systems, next to the reusable, modular frontend components from Supplier C.

4.2 Business Process System Innovation

In the co-development project between Company A and Supplier B, both companies were aiming to develop a standard solution for the insurance industry. Such a partnership itself is already viewed as an innovative cooperation by some interviewees. Company A is the first insurance company adopting the insurance solution of Supplier B together with other ERP components from Supplier B across the entire company. In this sense, Company A plays an important role for Supplier B to improve its insurance solution. Looking from the other side, Supplier B can offer Company A not just the latest IT technology, but also knowledge and experience acquired from IT projects implemented at other market players in the insurance industry. In their collaboration, Company A is involved as of requirements engineering up until final validation of the solution that was built by Supplier B.

Knowledge Accessing

Both companies attach a great deal of weight to the professional development of their employees. Supplier B has plenty of internal training resources to allow its people to learn, including the development of soft skills referring to collaboration and cultural

aspects. Building together with Supplier B, Company A also has an internal training program on the products of Supplier B. In addition, consultants from Supplier B are co-located at Company A to facilitate the deployment of the solution and bring back the feedback from Company A to the development center of Supplier B. There is a lot of discussion between the two companies on identifying the opportunities of improvement and innovation. The use of Lean techniques such as Kaizen and A3 thinking for problem solving on an outsourcing relationship level was being discussed. Both companies know that people need to adopt innovation and have to incorporate these in their daily behaviors to ensure continuous improvement. Management at a tactical level carefully balances the efforts on routine work/delivery and innovation. They promote proactive innovation in a modest but sustainable way so that it has fewer interruptions on the current processes and consequently less resistance.

Knowledge Utilization

The chief architect and people at the strategic level of Company A decide whether a business process is designed well enough and which processes are important enough to be placed on the roadmap for the system development. By sharing this roadmap with Supplier B, Company A shares a clear vision on the transformation. In the software development, Company A is closely involved with Supplier B in the development of the insurance solution. Occasionally, Company A's experts and architects are invited to the development center of Supplier B for joint solution design sessions.

People at the tactical level of Company A hold a plan-build-run meeting every two weeks with people from Supplier B. The meeting provides updates on all the issues that they previously decided to monitor. Issues they focus on are related to safeguarding the service delivery or creating innovative ideas. On an operational level, there is a collaborative contract to support operational people of Company A with quick problem-solving and addressing any findings for improvement and innovation.

However, despite that people have learned value stream mapping during trainings, we found that neither of the companies uses this technique in their outsourcing relationship. Some interviewees indicated to believe that both company have optimized procedures, but neither organization wants to change its internal processes for an optimized cross-organizational value stream. This implies that a higher level of openness and a clear business model for value sharing are required to achieve common systematic thinking in IT outsourcing relationships to enable cross-organizational optimization.

4.3 Service Delivery Channels Innovation

In the outsourcing relationship for the development of website components, Supplier C provided software development outsourcing services to Company A through onshore and offshore teams. A parallel 'software development factory' structure was introduced to provide Company A with flexible and sufficient software development capacity. Two factories similar in size are working in parallel: one factory belongs to Supplier C, whereas the other factory belongs to Company A. In addition, a small team of software architects from Supplier C are working on-site at Company A. The two parallel factories are treated in an equal manner, meaning that for any

random order, a set of requirements of to-be developed software components will be sent to either one of these factories. A deliverable, being one or more software components developed by either the factory of Company A or the factory of Supplier C, will be sent to a unified quality gate of Company A to be tested.

Knowledge Accessing

The strategic direction is to create a competitive but open and healthy learning environment between the two parallel factories. This learning environment stimulates the people involved to improve their software development skills and to learn from their peers working for the other factory.

The business strategy of Company A demands each operating company to have its own website as a service delivery channel to its customers. The best way to achieve this is to develop reusable components and build websites based on those components rather than to develop each website individually. As a consequence, Company A decided that the reusable components have to be built on the Microsoft .NET framework. A major challenge for Company A was that its software development personnel had to switch to this new development environment, and that people had to learn new technical skills. Within this outsourcing relationship, having a peer factory with strong software development skills at Supplier C results in competition between the factory of Company A and the factory of Supplier C. This results in a competitive culture in which both factories strive to outperform each other. As a consequence, people working in both development factories attempt to earn the respect and recognition of their peers for their craftsmanship, accompanied by a strong willingness to learn and to improve.

Both organizations recognize the benefit of such a competitive environment. Every quarter both factories visit each other to facilitate learning. Each visit typically lasts several days, depending on the subjects and purposes, and provides sufficient time for communication and discussion. Subjects discussed include software engineering and project management. Having sufficient time during a visit allows people to work together on a certain issue in an in-depth manner. Examples of discussions are how the process of developing a software component can be broken down into an action plan in a team meeting, how the most difficult part of the component can be identified, and how to decide upon the most optimal priority of different tasks to be carried out during development. Both organizations also provide or support various software-related technical trainings to employees. Occasionally, Supplier C invites people from Company A to attend its internal trainings on new and related technologies. Those trainings allow both factories to keep up with the latest technologies that are related to their current or future work.

In this case study, we found that board level meetings often involve operational people. During such meetings, people discuss issues of continuous improvement and conduct Kaizen sessions. These Kaizen sessions involve managers from both factories and also the software architects from Supplier C working on-site at Company A. Issues about continuous improvement are also discussed on a lower level. Those issues include, but are not limited to, how capacity forecasting can be improved, how people's skills can be improved, or if their roles and positions should be adjusted.

Both factories also have their own daily start-up meeting. During the bilateral visits, personnel join in the local daily start-up meetings and exchange ideas and experiences. The parallel factories setting allows people to compare different ways of working in designing and analyzing a software component and the way of prioritizing the work in progress. This comparison results in fresh ideas for continuous improvement and experiments and subsequently results in process innovations.

Knowledge Utilization
The knowledge utilization in this IT outsourcing relationship begins with functional requirements engineering. Functional requirements of websites originally come from the operating companies of Company A. The IT department at Company A translates those functional requirements into IT requirements and component-based system design solutions. During this process, software architects from Supplier C are often involved, sometimes leading the design. To evaluate those novel solutions, Microsoft is involved during the review process to ensure the technical feasibility of the solution. Eventually, these design solutions become orders for software components and are sent to one of the two factories.

During the software component development stage, we found that both factories make use of internal value stream mapping. Activities were undertaken to create process maps, but did not cross the border of the factory. In other words, these activities were not performed from an end-to-end perspective, but limited to internal software development processes. Nevertheless, analyzing segments of multiple value streams helped both factories to improve their way of working. The type of innovations achieved mainly improve the efficiency of software development. Those improvements originate from the best practices of the two parallel factories. As the two factories remain independent in their daily operations, knowledge utilization rarely happened in this stage.

5 Discussion and Conclusions

The case study presented in this paper shows that the application of Lean principles facilitate knowledge accessing and utilization in both IT outsourcing relationships to a large extent. Not all the four principles were completely followed in the studied two outsourcing relationships. Systematic knowledge sharing is often found to be difficult to be achieved in IT outsourcing relationships, as the exchange is blocked by the boundary of organizations. This reduces the opportunities of innovations. Higher levels of openness are a requirement for both organizations to facilitate innovation. In addition, the case study shows that service innovations can have various forms. The co-development relationship between Company A and Supplier B can be considered as an innovation in itself where both companies established a strategic alignment to create a new ERP solution. The next step in the innovation process will be to develop this as a standard for the insurance industry. In the outsourcing relationship between Company A and Supplier C, we observed several process innovations resulting in the improvement of software development processes.

IT service innovation is an ongoing process that provide the end-customer with a new service experience or solution. To achieve this, the service organization should

establish a clear strategic direction for IT service innovation. Based on this strategic direction and Lean thinking, the service organization can better involve its IT outsourcing suppliers in the efforts for knowledge accessing and utilization. Different learning environment (e.g. co-development or competition) can be established to facilitate the knowledge accessing and utilization for different domains. Lean principles are widely applicable in different contexts to amplify the effect of the learning environment and the efficiency of knowledge utilization.

Traditionally Lean driven innovation focuses on manufacturing and production environment rather than service industries. IT service innovation often co-evolves with IT outsourcing activities and as such innovation is a result of knowledge accessing and utilization between the service organization and its outsourcing suppliers. With a Lean management system, IT service innovation should be viewed as an ongoing process in which innovations at different domains including business process system and service delivery channels are involved. The key principles of Lean driven IT service innovation are 1) respect everyone 2) continuous improvement 3) create value for the customer and 4) systematic thinking. The explorative case study shows that the application of these Lean principles facilitate knowledge accessing and utilization. Applying these principles facilitate the learning behaviors of the people working in the IT outsourcing relationships. Based on a clear strategic direction of IT service innovation and applying Lean principles allowed smooth communication on innovative ideas and drive innovations at different domains of the IT service process. Future research should focus on examining the applicability of those Lean principles to facilitate IT service innovation in different domains besides the insurance industry.

Acknowledgement. The preliminary work of this research is supported by the Lean Education and Research Network (LEArN) at Nyenrode Business University.

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