



Constructs Of Organizational Innovation for Logistics Industry: An Explortory Analysis for the Impact of Act for Knowledge Sharing

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Abstract

Global dynamic economy forces many firms to generate continuous innovation to sustain their competitive advantage. Advancement in information and communication technologies opens new eras and opportunities in global supply chain and enables firms to have better services for customers in logistic sector. The purpose of this study is to understand and to shed organizational innovation facilitators in the logistic service providers. Throughout the analysis on 120 samples, exploration of latent and sub constructs of these facilitators is stated on the theoretical bases of the enablers in organizational innovation. This work presents some sort of potential facilitators of each constructs and their relationships with the knowledge sharing setting of an organization.

Keywords: Organization Innovation, Logistics

Introduction

One of the popular words of today is innovation, mostly known as the new products or process available for new markets. As a result of investing in research and development; it may also be regarded as a primary way of having competitive advantage (Freeman and Soete, 2004). Although literature offers various explanations about innovation, the Oslo Manual published by OECD (1997) considers innovation in such categories which are derived from Joseph Schumpeter, mostly known as the first economist explaining the path of innovation in 1930s. Schumpeter's five different types of innovation can be listed as: (1) product innovation (introduction of a new product or a qualitative change in an existing product), (2) process innovation, (new production methods), (3) marketing innovation (the opening of a new market), (4) managerial innovation (development of new sources of supply for raw materials or other inputs), and finally (5) organizational innovation (changes in industrial organization). In line with these classifications, innovation refers two main aspects. These are technical and non-technical aspects of innovation. The former one refers new or improved products and new or improved production methods while the latter one refers mostly the adaptation of new including new markets, new forms of organization and etc. Even though the existence of widely agreed definitions and measurement techniques by focusing inputs and outputs of technical innovations (Roger, 1998; European Innovation Scoreboard, 2008), there are insufficient conceptual and methodological techniques for measuring nontechnical side especially for organizational innovation.

The critical importance of organizational innovation for having competitive advantage is still ongoing debate in sense of the ways and constructs enabling competitive strategy. However, it is known that the basic links about innovation and competitiveness relies on four factors: innovations are hard to imitate by rivals (Porter, 1995), innovations reflects market realms (Porter, 1995), innovations enable firms to exploit knowledge and technology and it make firms to access new capabilities (Miller, 1992). On the other hand, selecting competitive strategy forces firms to have a successful innovation. Utterback and Abernaty (1975) explain that cost minimizing strategies make firms to work on process

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innovation to decrease total cost of production and to increase productivity. Studies about the impact of organizational innovation on competitiveness mostly suggest organizational innovation as a result of process innovation enabled by efficient use of technologies (Acemoglu et al, 2006; Caroli and Van Reenen, 2001) and optimized organizational structure. Moreover, organizational innovation provides competitive advantage since it has significant impact on productivity, flexibility and quality. In order to keep their competitive advantage, organizations need to adapt increasing complexity and rapid changes in markets. In today's world of business, the age of knowledge economy, logistic service providers try to make themselves to adapt new situations by transforming their organizations from labor-intensiveness into knowledge intensiveness. Within the context of this adaptation processes, they also try to create and use knowledge for not only for having competitive advantage, but also promote their competencies to gain innovative products. Chapman et al. (2003) states knowledge as crucial need for having innovation capability. Moreover, authors mention that effective managing of knowledge within the organization and among the organizations is the key factor to develop new ideas and products. Autry and Griffis (2008) find positive and significant relationship between knowledge and logistics innovation in their recent works on supply chain capital. Besides the positive relationship between logistics and innovation, Flint et al. (2008) also proposed a positive correlation between supply chain learning and logistics innovation. To utilize knowledge within the organization force logistic firms to develop their internal/external knowledge networks, to invest in knowledge sharing infrastructure for better acquisition of knowledge (Wagner, 2008). As a derived implication, one of the fundamental breakthrough of this adaptation processes is to implement information and communication technologies and automation technologies in their business processes. Investing in information and communication technologies (ICT) used for knowledge sharing within organizations provides new abilities, new skills and new organizational and industry structures as a major driver of the change (Brynjolfsson and Hitt, 2014). Together with the complementarities between ICT and organizational change, there are some evidences that the use of ICT has also positive impact on product and process innovation as well as productivity (Leeuwen, 2008). Finding these kinds of positive correlations between ICT and innovation caused by organizational change may not be proof of the positive relationship between all constructs of ICT and the constructs of organizational innovation. Having ICT investment might be insufficient to have positive impact on organizational innovation performance but conceptually, adaptation of these technologies, in other words the use of these technologies bring organization to have success in the process of change.

This study copes with the characteristics of organizational innovation and the impact of ICT on these characteristics. By exploring the constructs of today's online ICT applications and constructs of today's organizational innovation, this research aims to specify the impact of each constructs of ICT on each constructs of organizational innovation. Within these bases, the study focuses on (1) the use of **ICT for knowledge sharing** and (2) constructs of the structural characteristics of organizational innovation. The first section, literature review, focuses on the theoretical basis of the concepts; ICT and organizational innovation. This part covers these concepts in an organizational context of knowledge sharing by presenting basics and ongoing debates about the relationships among ICT and organizational innovation. It represents the elaborated review for accessing the constructs enabling empirical settings used in the study. Then, the study ends with an overview of the study and the empirical research suggestions about the matters.

Literature review

One of the most popular trends in today's business is to shift their innovation capabilities by investing in knowledge based assets and investing in ICT applications as a tool for knowledge sharing activities. Since 1990s, ongoing emphasis on innovation capability has been known as the importance of



knowledge sharing and research networks affecting the organizational performance (Baum and Ingram 1998). Having an ability to share and diffuse knowledge resources helps organizations to create opportunities for having better problem solving mechanisms, having more efficient learning environment and openness for innovation and etc. Nonaka (1994) states that knowledge is created and managed by individuals within the organization. Within this scope, knowledge sharing can be defined as a social interaction culture, involving the exchange of employee knowledge, experiences, and skills through the whole department or organization (Lin, 2007). On the other side, knowledge can be shared not only between individuals but also between organizations. Within this sense, knowledge sharing means that organizations must capture, organize, explore, exploit and diffuse knowledge (especially experience-based knowledge aka tacit knowledge) which resides within organization. For both individual and organizational level of knowledge sharing, ICT applications and network systems motivate its users to share their knowledge (Nonaka 1994) and also to facilitate the codification, integration, and dissemination of organizational knowledge (Song, 2002). This section of the study offers literature review about the constructs of organizational learning the constructs of online ICT application used for knowledge sharing within organizational context.

Organizational Innovation and Organizational Structure

Basically, it can be defined as the creation or adoption of an idea or behavior new to the organization (Damanpour, 1996) by building of valuable assets for having new products or process within the organizational context (Woodman et al, 1993). Despite the fact that wide range of literature suggest organizational innovation as a factor having positive impact on organizations' competitiveness and performance, the terms of organizational innovation is still diverse and scattered (Lam, 2004). Thus, organizational innovation has variety of interpretations but it can be broadly classified into three different streams (Lam, 2004). These streams can be grouped as (1) organizational structures enabling organizational innovation, (2) organizational cognition, enabling organizational innovation and finally, (3) organizational change enabling adaptation. While the first strand of research focus on identification of structural characteristics resulting product or process innovation (Teece, 1998), the second strands focus on cognitive characteristics of organizational learning and knowledge creation processes resulting new products or processes (Nonaka, 1994). The last strand mainly focus on relational characteristics of organization with environmental factors forcing them to change and to develop capabilities for responding this demand (Tushman and Nelson, 1990).

All these strands claim that organizational innovation cause technical innovation by enabling organization to adapt changing conditions such as technology, market and etc. On the other hand, it is difficult to separate these strands because of the overlapping results on innovativeness and competitiveness. However, each dimension of these strands may provide different results in sense of the impact of ICT applications. Beyond these research strands, there are also some fragmented research about the relationship between organizational innovation and competitive performance (Womack et al, 1990; Hammer and Champy, 1993; Goldman et al, 1995).

Besides these approaches, Lin (2006) argues that different types of innovation stress some distinctive determinants of innovation in terms of understanding organizations' adaptation behavior. The author conducts on technical and administrative innovation. While the former one refers to product, services and process innovation, the latter one refers organizational structures and administrative processes. Lin (2006) classifies administrative innovation in three matters as: Supply Chain Management (SCM), Customer Relationship Management (CRM), and knowledge management. The last one, knowledge management, is defined by author as the techniques deal with how knowledge is created or acquired, disseminated, and used within organizations. Thus, it deals with the information infrastructure, tools,



and content. It also involves exploration and exploitation of knowledge. This conceptualization brings the topic to the intersection between resource based view and knowledge based view on competitiveness of organizations in sense of having innovative capability. Knowledge sharing which is addressed in strategic management literature in accordance with resource based theory is the realization of competitive advantage in sense of establishing conditions which enable the sustainability (Grant, 1991). Resource based view characterizes firm's resources as strategic assets and states resource asymmetries between firms as source of organizational rent (Winter, 1987). However, the knowledge based view states the assumption that organizational knowledge is a main strategic resource to sustain competitive advantage by enabling knowledge creation and application in other words exploration and exploitation). General implications derived from literature imply that firms must be effective both in exploration and exploitation in order to innovate. While necessity to survive in long term requires exploration in sense of development of new capabilities, necessity of survive short term requires exploitation in sense of efficient use of current capabilities. Combining both behaviors in a process seems problematic because of that exploitation generally requires preservation of stable organizational structure in firm's assets and capabilities, however, exploration needs changes in structure for new configurations for shifting new standards from existing ones (Noteboom, 2004). In line with methodology followed by Daugherty et al. (2011), it can be framed that the components of organizational structure are linked with organizational capital – formalities or informalities, controlling, coordinating - (Barney, 1991) or organizational resources (Grant, 1991). The more examples can be found in the literature suggesting that organizational structure as a business resource is contributor of having sustainable competitive advantage. Because of the purpose of this study intending to explore the relationship between ICT constructs and constructs of organizational structures, the other fragmented research streams (skill biased change, imitability of resources and etc.) are excluded together with the popular strands of organizational cognition – cognitive characteristics- and organizational change – relational characteristics-.

By following Damanpour (1996) who provides comprehensive analysis of organizational innovation in his work claiming the effects of determinants and moderators of innovation, this study use organizational structuring variables as the dimensions of organizational structure through organizational innovation. Because of the changing complexity through more dynamic structures and advances in ICT applications effects structure related decisions of the organization (Olson et al, 2005). Daugherty et al. (2011) analyzed Grant's (1996) theoretical argument by empirically testing the relationships between organizational structure and organizations innovativeness. They confirmed that organizational structure may contribute to its organizational innovation capability. Grant (1996) explains two critical implications as the role of hierarchy and the location of decision making. Similarly, Damanpour (1996) posits structural complexity as the number of locations at which work is performed, as the number of jobs or services performed, or as the number of hierarchical ranks performing different tasks. Daugherty et al. (2011) follows both directions and they state three dimensions of organizational structures effecting organizational innovation; **decentralization (vs. centralization)**, **formalization** and **specialization**. According to them, the significant and positive relationship between decision-making decentralization and logistics service innovation depends on organizations' efforts on formalization including flexibility and autonomy. However, they found a negative relationship between formalization and logistics service innovation while Damanpour (1996) founds positive. The difference between these two results is resulted by the effect of efficiency (Daugherty et al., 2011) in formal or informal structures. Finally, they found positive (similar with Damanpour) but insignificant relationship between specialization and organizational innovation because of the integrative nature of current supply chain management which requires extensive interaction and collaboration among employees (Daugherty, 2011). Authors gives some definitions for



these three dimensions. According to them centralization refers to the extent that decision authority is closely held by top managers while decentralized and delegated management is held by middle- and lower-level managers (Olson et al., 2005 cited in Daugherty, 2011). Formalization is defined as the extent to which rules, procedures, instructions, and communications are written (Pugh et al., 1968 cited in Daugherty, 2011). Specialization is the degree to which tasks and activities are divided in the organization and the degree to which workers have control in how the tasks are conducted (Olson et al., 2005 cited in Daugherty, 2011). Since this study is designed for explorative research on significant correlations on its previous bases, the constructs of specialization is postponed for future work especially for observing and finding new significant determinants.

Decentralization: The continuous changes in technology and market force organizations to respond this rapid and fast movement by adapting their assets and organizational architectures. When they have improvement in their adaptation process, decentralized workplace organization provide productivity with the more contribution of information technology (Bresnahan, Brynjolfsson and Hitt, 2000). Therefore, most of the organizations try to shift their competencies through the better utilization of decentralized authority, teamwork, and incentives (Hitt and Brynjolfsson, 1997). This shift can be explained as teamwork, incentives, and increased use of skills and training. Hitt and Brynjolfsson (1997) classify these matters in such areas as: (a) decision authority referring teams and individual decision rights, knowledge work and skills, (b) training and supporting practices (incentives for training and education, preemployment screening) and (c) incentives, which includes various aspects of performance-based pay increases and promotions. They also claim that information technology is complementary to decentralized authority because valuable specific knowledge may not able to transfer, or information overload may create potentially binding constraint on central decision makers. At their work, they capture such aspects of decentralization as self-managing teams, employee involvement groups, the allocation of individual decisions and pace or method of work. Similarly, some other critical contributions (Tidd et al., 1997; Lam, 2004) based on Mintzberg's (1983) structural archetypes and their innovative potentials (simple structure, machine bureaucracy, professional bureaucracy, divisionalized form, adhocracy) defines features of innovative organizational structure. Highlights of these features are entrepreneurial behaviors are often highly innovative, low level of standardization or flexibility are beneficial for problem solving, high degree of autonomy may limit innovative capability, capability of learning provide high level of innovative capability (Lam, 2004). In line with Mintzberg's (1999) way and the purpose of this study consider decentralization as dispersion of formal authority. In the light of other contributions in the literature, it can be specified as **the level of delegation of power and the degree of authority**.

Formalization: It refers a work style of an organization regulating its activities by creating and announcing written rules also known as procedures. The intention is to reduce mistakes and risk as long as variability in acts. Even though it has some advantages especially for having standardized products and services, it may impede innovation capability because of that it tend to be more bureaucratic and lower ability to change. In order to highlight the role formalization versus innovativeness, the behavior of individual (it can be called as practitioner here) within the organization (it can be called as community here) must be taken into consideration. Communities of practices have been described as "groups of people informally bound together by shared expertise and passion for a joint enterprise" (Wenger and Snyder 2000). They are different from teams and functional units as they are self-organizing systems whose lifespan is determined by its members, based on the intrinsic value that membership brings. Such communities are not constrained by time and space and therefore can span organizational boundaries (Wenger 1998). Steinmüller (2004) highlights the communities of practitioners as the social networks which are influenced by (and influence) the utilization of



information and communication technologies, economic performance at various levels of aggregation and the localization and globalization of knowledge creation and exchange. These communities are able to retain dynamic and evolving knowledge within a real-time process that adds context to existing static repositories. In line with these explanation, this study consider formalization **the lower level of rigidity** and **the lower level of flexibility** announced by organizations.

Information and Communication Technologies

Especially in the last decades, the skills and capabilities of individuals have been increasingly noticed in terms of their ICT competencies. The skills conducted here are not only technical, but - more importantly - informational: skills that enable individuals to access, to process and to interpret information in useful ways. In this frame, there is a growing attention to the fundamental impact of ICT on the structure (Blanchard and Horan, 2000; Hampton and Wellman, 2003; Quan-Haase and Wellman, 2004; Huysman and Wulf, 2006; Ellison et al., 2007). This attention to the impact of ICT on knowledge creation and skill diffusion makes clear that the ability to create, share and utilize knowledge is continuously upgraded by the advancement of ICT. In parallel with these advancements in organization, ICT introduces some other opportunities for organizations in the sense of having and managing their social assets (Millen and Patterson, 2003). Use of ICT in a virtual environment, including online communities, builds social norms and assets in organizations. Nowadays, instead of only a tool for interaction, ICT should be assumed as an actor of exchanging, codifying, storing, retrieving and delivering (Wang, 2012). This section explores online communities as a place for exchanging knowledge in an organizational context.

Online Tools for Knowledge Sharing

Within the existence of insufficient research attempts, there are some commonly accepted results about the relationship between ICT and knowledge sharing.

Huysman and Wulf (2005) expect that distributed communities with a high cognitive ability (i.e. a shared frame of reference) and motivations to share knowledge (e.g. a shared purpose), but with low structural opportunities will be in need for communication tools since, it is expected that the level of density will increase over time (Brown and Duguid, 2001 cited in Huysman and Wulf, 2006). With regard to the dimensional approaches, Pigg and Crank (2004) consider the functions of ICT supporting both communication in various forms as well as information storage, retrieval, analysis and sharing. Bolisani and Scarso (1999) point that ICT facilitates knowledge transfer through the exchange of data. Nonetheless, this requires a double transformation process from knowledge to information and then to data, and back from data to information and finally, to knowledge. They also claim that the transfer of knowledge (especially the tacit form) often requires proximity between the transmitter and the receiver. In line with these explanations, considering ICT in two forms as **information functioning tools** and **communication functioning tools** may become necessary especially because of the fact that it is built upon “instrumental” and “expressive” information forms (Briggs, 2003 cited in Pigg and Crank, 2004). Pigg and Crank, (2004) differentiate between the information and communication functions. **The information function** is complex because Internet-based information transfer can take place using a variety of features of the network (Pigg and Crank, 2004). Information transfer can be “active” in that people share information using various communication features of the online networks including e-mail and video conferencing, or it can be “passive”, based on one person’s searching for resources on the Internet and using, for example, its archiving or knowledge management capabilities. Pigg and Crank, (2004) also offer that **the communication function** is multi-faceted and interactive, including text, audio and video, as well it may be real-time (as in VOIP) or asynchronous or



archival/historical. According to them, the communication function refers to the acts of transmitting information of different types, e.g., ideas and feelings, from one person to another. Based on these challenges for classifying ICT in sense of its format and the role in users' relations, Yuan et al., (2013) considers the role of ICT tools for knowledge sharing. For that reason, they collect ICT in three groups such as **Social media tools** –as a generator of knowledge sharing among community members-, **communication tools** –as a channel for knowledge sharing-, long standing tools³. They state that social media can better address challenges to knowledge sharing because using social media helps users to develop better awareness of both other users' expertise (e.g., from employees' profiles) and their personal lives (e.g., from status updates). On the other hand, communication tools connect users (transmitter and receiver) directly and they are very informative and more importantly, most efficient in providing up-to-date information. Besides, they may help build stronger connections between them and thereby make providers more motivated to share knowledge (Yuan et al., 2013). Based on the given discussion, as a knowledge sharing platform, social media tools and the communication tools may lead to basic changes in users' opportunities, motivations and abilities in sense of building, maintaining.

Communication tools: According to Boase et al. (2006) communication tools are going to emerge mostly as a synchronous messaging which are integrated with other knowledge sharing tools (web-based platforms). The means of online communication are many and varied. The popular communication tools for knowledge sharing on the Internet refer to applications such as e-mail, instant messaging, video-conferencing, voice over internet protocol (VoIP), Internet relay chat and chat rooms (Kreijns et al., 2003; Boneva et al., 2006; Steinfield and Scupola, 2006). These tools (e-mail, instant messaging, telephone, and video-conferencing) are complementary to each other in supporting both synchronous (e.g. instant messaging) and asynchronous (e.g. e-mail), as well as intrusive (e.g. telephone calls) and less intrusive (e.g. using instant messaging to respond to an urgent requests).

Social Media Tools: On the other hand, together with the advance of ICT with the introduction of Web2.0⁴, the recent trends in social networking sites, blogs, wikis and forums become valuable platforms for knowledge sharing. Vossen (2009) defines Web 2.0 in four dimensions. These are the social dimension, infrastructure dimension, functionality dimension and the data dimension. These dimensions technically are related with the Nonaka's (1994) process of knowledge sharing as socialization, externalization, combination and internalization. With regard to Nonaka's (1994) statement about **socialization** - process of creating tacit knowledge through shared experience- social dimension, is described as the software for sharing user-generated content or collaborative use of it (Vossen, 2009). These description of social media tools -**Social Networking Sites (SNS)**- refers to the applications for the interactions among users in which they create, share, and exchange information and ideas in online communities and networks. Another process of knowledge sharing is **externalization** -the conversion of tacit knowledge to explicit knowledge- (Nonaka, 1994), make **Wikis** a conversational technology within the frame of meaningful dialogues (Andreano, 2008) externalizing practitioners experiences for submitting it to the Web 2.0 platforms (McAfee, 2006). According to Andreano (2008), wiki technology allows users to directly interact with the content they encounter. The process of **Combination** -the reconfiguration of existing information for having new knowledge by sorting, adding, re-categorizing, and re-contextualizing- (Nonaka, 1994), appears as **forums** in Web 2.0 technology (McAfee, 2006). The final process defined by Nonaka (1994) is **internalization** -conversion of explicit knowledge into tacit knowledge-. For this process, Web 2.0

³ **Long-standing tools** such as databases and digital archives that allow searching or communicating with document contributors; hence, their value for developing awareness of expertise distribution is limited (Yuan et al., 2013).

⁴ The term Web 2.0 was coined in 1999 to describe web sites that use technology beyond the static pages of earlier web sites.



serves as **blogs** allowing users to express themselves through storytelling and narrative (Du and Wagner, 2006). Table 2 presents popular communication tools and their purposes while Table 3 shows social media tools by giving differences among them and relations between knowledge sharing processes.

Table 1: Popular online communication tools

E-mail	Write, store, send, and receive asynchronous messages electronically; can include attachments of word documents, pictures, audio, and other multimedia files.
Instant messaging	Allows the synchronous exchange of private messages with another user; messages primarily are in text but can include attachments of word documents, pictures, audio, and other multimedia files.
Chat rooms	Synchronous conversations with more than one user that primarily involve text; can be either public or private. Internet Relay Chat (IRC) is a protocol for live interactive Internet text messaging (chat) or synchronous conferencing.
Videoconferencing	A set of telecommunication technologies which allow two or more locations to communicate by simultaneous two-way video and audio transmissions.
Voice over Internet	A methodology and group of technologies for the delivery of voice communications and multimedia sessions over Internet Protocol (IP) networks, such as the Internet.

Source: Subrahmanyam (2008)

Table 2: Differences between wiki, forum and blog

SNS	Wiki	Forum	Blog
Socialization	Externalization	Combination	Internalization
Personal and community supply	Community supply	Community supply	Personal supply
Mostly developed by authenticated users and the owner	Mostly developed by authenticated users	Mostly developed by anonymous users	Mostly developed by the owner
Content publishing consisting of text, video or audio	Displays text and graphic content contributions	Content publishing consisting of comments and descriptions of entries	Content publishing consisting of text, video or audio
Pushes content to subscribers	List of edits to entries	Shows others with similar Entries	Pushes content to subscribers
Notification to owner or commenter's when the new comment have been made	Notification when changes have been made	Displays number of people who bookmarked same content	

Source: Treem and Leonardi (2012)



Conclusion

The rapid development in ICT and its extensive use in organizations shaped the structures of organizations in order to adapt new conditions and acquiring, creating and diffusing knowledge within the organization and among organizations. More generally, ICT based working, especially computerization effects organizational change by adding value in two ways; it increases productivity of workers and it increases knowledge acquisition within the organization and between organizations, as well as coordination and monitoring (Brynjolfsson and Hitt, 2003). ICT applications improves central management's ability to monitor agents and results and increase the relative profitability of decentralization. On the other hand, ICT applications decrease communication and information processing costs and increase organizational performance by enabling central decision making. Decentralization associated with some sort of informal communication and more initiatives which make transfer of implicit knowledge easier and effective. On the other hand, centralization associated with some sort of formalization and specialization which make transfer of explicit and procedural knowledge easier and cost effective.

Within the scope of the study, the relationships between information and communication technologies and the workplace organization, it has been assumed that an analysis of the functionalities of tools associated with knowledge sharing activities provides new insights into the conditions of organizational constructs in online communities of practices in sense of managing knowledge. This study expects to find that structures of workplace organization positively and significantly has been influenced by the use of ICT in sense of communication technologies. The constructs of authority might be shaped by the messages transmitted through the communication tools. The results may suggest that the constructs of organizational structure needs to be determined by handling other applications used by individuals in the organizations. The harmony in the use of these technologies make the division difficulty and it reflects this difficulty to reach significant relationships between the constructs of ICT and the constructs of organizational structure.

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