Institutional isomorphism and the adoption of information technology for supply chain management

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Abstract

The adoption of information technology (IT) along a supply chain has increasingly become a necessity for enhancing supply chain performance. Organizations in a supply chain often adopt IT due to the institutional pressure exerted by their supply chain partners. The implications of the different types of institutional isomorphism, namely coercion, mimesis, and norms, are explored from both the perspectives of firms that have taken the initiatives to adopt IT and those that have followed their supply chain partners to adopt IT. The possible impact of the different types of institutional isomorphism discussed here can help managers to better understand the institutional pressure they are putting on and/or of adapting to their supply chain partners, in particular, the possible problems and the injunctions/compliance they may face in the course of adopting IT for the management of their supply chains. The implications of institutional isomorphism on the adoption of IT for supply chain management are discussed.

Keywords: supply chain management, information technology adoption, institutional isomorphism

Supply chain management (SCM) is concerned with managing relationships and operations with suppliers and customers to deliver customer value at a low cost. It has become a strategic focus for many businesses due to its impact on performance [11]. SCM emphasizes effective and efficient flows of both information and physical items to meet customer

requirements profitably, starting from the source of the supply of raw materials to the consumption of the product by end customers [2]. The management of these processes requires close collaboration between different parties in a supply chain (SC), e.g., raw materials suppliers, manufacturers, distributors, and retailers, to attain the ultimate goal of satisfying customer requirements and reducing costs.To ensure that items are delivered on time and to the right place at a low cost, it is most desirable to use information technology (IT) to trace and track the status of the item flows and support the associated information interchange in a supply chain [4, 9]. Before embarking on any IT initiatives for SCM, it is important to consider the diffusion, market acceptance, and legitimacy of IT in SCs to facilitate and support trading and communication among the supply chain partners to ensure its effective implementation.

Notwithstanding the intuitive value of IT to SCM, without its acceptance and diffusion in the SC, it is unlikely that IT adopters will fully realize its operational and economic benefits. Using the adoption of radio-frequency identification (RFID) in the retail industry as an illustrative example, this study employs the institutional isomorphic view to account for how and why IT diffuses in the context of SCM. The case examples presented here were identified and analyzed from a number of periodicals and online resources, e.g., *FORTUNE*, *Harvard Business Review*, *CIO.com*, *Red Herring*, *ComputerWorld*, and so forth. These case examples were chosen from the retail industry for three reasons: (i) they are leading retailers and their adoption of IT for SCM should have had an impact not only on their own operations, but also on the partner firms in their SCs, (ii) both SCM and IT are identified as elements crucial to the success of this industry [16], and (iii) the severe competition in the retail industry has generated pressure on retailers and their SC partners to reduce operations costs by adopting

IT. It is therefore reasonable to use the retail industry as a first step to understanding the influence of institutional isomorphism on the adoption of IT for SCM.

A prior study has attempted to explore the effects of mimetic isomorphism on the adoption of IT within organizations at the individual decision level [10]. Here, we endeavor to advance knowledge on the diffusion of IT by exploring the three institutional isomorphic processes, namely coercion, mimesis, and norms, at the inter-organizational level. Our observations shed light on the diffusion of IT in the realm of SCM, which will help managers and researchers to better understand and address the issues of institutional isomorphic influences that affect the adoption of IT for SCM.

Radio-Frequency Identification

An RFID tag has a micro-transmitter to transmit information to a remote reader. A tag can be active or passive that can send signals or transmit information when queried by a reader. RFID technology enables intra- and inter-organizational communication with respect to identifying products, organizations, locations, and shipments of goods. The operational nature of RFID requires no manual input of data, which helps preserve the integrity of the data and keep operating costs low. RFID technology is adopted for intra-organizational processes, such as inventory management, point-of-sales management, and asset management; and for inter-organizational processes, such as tracking and tracing the status of trade item flows in SCs. The development of RFID technology has not only saved time and labor costs by eliminating the need to manually scan the barcodes of goods, but has also solved the problem of goods going out of stock due to confusion in the SC and the problem of shrinkage caused by theft. Similar to other types of IT, the widespread adoption of RFID technology is

necessary if its full operational and economical benefits are to be realized. This is because the network effects will increase the payoffs to adopters as they can share information and trade with the majority of their peers via RFID technology. This helps to create an efficient and compatible base of trade partners [7]. The diffusion of RFID technology for SCM can be accounted for by reference to institutional isomorphic influences on the adoption of IT in the realm of SCM.

Diffusion of IT

Diffusion is defined as the process by which an innovation is communicated through certain channels over time among the members of a social system [12]. Many prior studies on the adoption of IT, e.g., [17, 18], have embraced this perspective, which assumes that rational adopters make decisions and choices based on the information that is received via communication and social networks [12]. A major pitfall of the concept of diffusion is it assumes that organizations within a group are free and independent to choose to adopt (or not to adopt) an innovation [13]. It fails to address the institutional isomorphic processes, which can affect the decisions of organizations on the adoption of innovations [3, 14]. Supplementing the concept of diffusion, institutional isomorphism, which refers to "the constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions" [3], provides a theoretically sound basis to explain the adoption of IT for SCM.

Institutional Isomorphism

DiMaggio and Powell [3] argued that institutional isomorphism considers "the major factors that organization must take into account are other organizations" [15]. In addition to competing for resources and customers, organizations are competing for political power and institutional legitimacy for social and economic rewards [3]. The implications of this theory are that organizations may base their decisions on one or more of the following mechanisms: (i) they may experience pressure from other organizations upon which they are dependent, (ii) they may mimic other organizations within their sector that they perceive to be successful, and (iii) the professional associations may exert pressure on the organizations by establishing a cognitive base and legitimation for the autonomy of the industry. This theory provides a theoretical lens to explain the institutional isomorphic influences among a group of firms, e.g., firms in an SC, that face the same environmental conditions; and to advance the knowledge of IT adoption for SCM. Firms are instrumental in the institutional isomorphic processes of their SCs through the coordination and collaboration of their business processes with obligations. Institutional isomorphism occurs in the structures, interactions, practices, and dominion of the firms participating in SCs, where the parties join forces to manage their logistical activities.

Institutional isomorphism elucidates the structural changes in organizations when they seek to cope rationally with the uncertainty and constraints that exist within the organizations and their environment [3]. Such structural changes follow the paths taken by firms in a similar environment. The effect of rationalization affects the organizational structures and practices of partner firms in an SC. This, in turn, causes firms to model their organizational structures and practices on those of their partners and operate in a similar fashion. Consequently, the

firms in the SC become increasingly alike in the context of SCM, as they integrate processes and information systems in order to achieve effective communication, quality improvements, and cost reductions. Therefore, due to institutional isomorphism, firms that participate in an SC will perform SCM in a homogeneous manner through cascading "legitimate" SCM and IT practices along the SC.

Institutional isomorphic processes in SCs arise naturally at the intersection of the influence and regulatory powers of institutions [5]. To gain a better understanding of the adoption of IT in SCs, we explore the influence of the different types of institutional isomorphic processes from the views of both the initiators (i.e., IT-adopted firms) and the followers (i.e., IT-adopting firms), where each process has its own objectives, attributes, and injunctions or compliances in the adoption of IT for SCM.

Coercion

The case of coercive institutional isomorphism stems from political influence and legitimacy. The coercive pressures are exerted on a dependent firm by other organizations and by cultural expectations in the society within which the dependent firm operates [3]. Firms that have adopted RFID technology for process integration are likely to ask their trading partners to deploy RFID technology to ensure that the trade items are installed with RFID tags carrying Electronic Product Codes (EPCs) to maintain the efficiency of their SCs. Dependent firms that rely heavily on a dominant firm's business for survival will comply with their dominant partner's direct imposition of the requirement to adopt RFID technology. In this way, the dependent firms are coerced to adopt RFID technology for close collaboration and efficient operations in order to join forces or continue to participate in the SC of the dominant firm. In

other words, the dependent firms are willing to adopt RFID technology in order to demonstrate their commitment to the trading relationship, thus displaying their conformance to legitimacy.

The adopting firms may acquire technical assistance from the dominant firm and/or relevant professional associations, especially in the case of integrating their existing systems and processes with the newly adopted IT. In some cases, the initiators will instruct their partners to adopt RFID technology without providing assistance. The followers will be compelled to acquire the necessary information and help from relevant professional associations if they wish to participate in the SC. On the other hand, in some instances, the dominant firm provides technical support and shares its experience with the adopting firms to ensure the quality and conformity of the technology adoption. For example, Tesco, the largest retailer in the United Kingdom, tries to put RFID tags on cases of products delivered to its distribution centers to track them through to its stores. Tesco works with its suppliers to educate and help them to deploy RFID technology. By doing so, Tesco has not only been able to improve the performance of its SC by adopting RFID technology, but can also build close and long-term relationships with its suppliers through the sharing of SCM knowledge. Similarly, in the United States, Wal-Mart has decided to ask its main suppliers to place RFID tags on every box and pallet supplied. To begin with, Wal-Mart takes the approach of discussing the reasons and plans for the adoption of the IT with its partner firms to ensure that the implementation plan and commitment are well communicated throughout its SC.

In the case of the coercive process, initiators face the risk of losing their investment in assisting followers. For instance, followers may not be able to utilize RFID technology in their processes to realize the benefits themselves and may decide to withdraw from the SC

relationship. Also, initiators have to contend with high switching costs (e.g., technical help and training costs) in the SC relationship by offering support and assistance to followers. On the other hand, although the dominant firm provides support and assistance for the technology adoption, the adopting firm bears the risks of revealing its internal processes and trade secrets to the dominant firm. As a result, the adopting firm may end up with higher operating costs if the dominant firm shifts activities and costs (e.g., products storage and handling) to its followers [1].

Mimesis

Another type of institutional isomorphism is the force of uncertainty that encourages the imitation of practices. When a firm has ambiguous goals and operates in a volatile environment, it models itself on other organizations, especially on the organizations that are closely associated with it, in response to the uncertain business environment. The followers may not be aware of their mimetic behavior as the firm being imitated may merely serve as a convenient source of practices [3].

Discovery and learning of RFID technology for SCM may occur indirectly through industry associations, employee transfers, employee turnover, and information interchanges. When firms face a chaotic and uncertain environment, they try to outperform their competitors through low cost or differentiation [8]. In the context of SCM, when seeking strategic SCM tools and practices to outperform competitors, firms consciously or unconsciously mimic the practices of their SC partners because:

- the firms have easy access to the SCM practices of their partner firms through information interchanges and inter-firm process integrations,
- the attributes that seem to account for the successful SCM practices of the partner firms are easily observed by the mimicking firms in the SC, and
- the partner firms are often willing to share SCM experiences and know-how with one another, as the sharing of information and knowledge benefits them as well while they serve the same SC.

The convenient access to the SCM practices of partner firms, the recognition of critical success factors, and the dissemination of SCM know-how and experience all lead to the intentional or unintentional imitation of practices ranging from the diffusion of IT applications and tools to SCM practices, e.g., efficient customer response (ECR). Organizations tend to model themselves on similar organizations in their field that they perceive to be legitimate or successful [6], by imitating and acquiring the attributes, innovations, and practices that have been proven to be attributable to the success of SCM. With Wal-Mart's demand on its top suppliers to implement RFID technology by January 2005, retail analysts at Sanford C. Bernstein estimate that the company can save as much as US$8 billion annually [19]. Other retailers, e.g., Target and Albertson's, are following Wal-Mart's lead and have started pilot testing their RFID programs in the hope of reducing their distribution times and costs.

To encourage the voluntary adoption of RFID technology, firms that have adopted RFID technology create awareness of RFID technology in their SC by demonstrating improvements in their intra- and inter-organizational processes via RFID technology. Also, by sharing their experiences of the processes of the technology adoption, the initiators alleviate the doubts of

their followers about adopting RFID technology and reduce their perceived risks associated with the technology adoption. However, in the case of mimetic institutional isomorphism, the initiators tend to avoid providing technical support to RFID-adopting firms by only creating awareness and sharing knowledge of RFID technology. The initiators may miss the opportunity to build partnerships with their suppliers and customers, who might face difficulty in justifying the associated investment in order to realize the benefits of the technology adoption. Furthermore, the firms that are mimicking the adoption of RFID technology may refrain from conforming to the legitimate practices of the SC and from committing to the SC. The adoption of technology by the followers is mainly for the purpose of improving their SC performance. In other words, business commitment from the initiators is not necessarily generated in the processes of the followers in imitating the adoption of IT for improving their SCM.

Norms

Normative processes are the third type of institutional isomorphism. They stem from professionalization, which is concerned with the establishment of legitimation for the autonomy of an SC. Firms in an SC are subject to the norms, standards, and expectations of their SCM in order to attain effective coordination. Generally, firms that have adopted RFID technology are unlikely to establish new partnerships with non RFID-adopters, as this would require the RFID-adopted firms in the SC to set up an additional channel for data interchange. This, in turn, would have a potentially negative impact on the efficiency of the SC. In other words, an SC operates under the normative institutional isomorphic process, whereby firms that are to become eligible participants in the SC are expected to adopt RFID technology. While normative and coercive institutional isomorphic processes are similar in nature, i.e.,

enforcing standard SCM practices and IT applications in an SC, they are indeed different in practice. With normative institutional isomorphic process, the followers adopt RFID technology voluntarily, even though there is no commitment for business; while firms mandated to adopt RFID technology via the coercive institutional isomorphic process are guaranteed to receive business from their SC partners. The wide deployment of RFID technology in the retail industry makes the adoption of RFID technology a norm for suppliers in the industry. The suppliers tag their products with RFID to meet the norms of the industry in order to sell their products via the mega-retailers. However, no commitment of business is guaranteed for the followers due to the adoption of RFID technology.

The initiators that take the normative institutional isomorphism approach standardize their SC by setting the required IT and standards for managing information and product flows. Firms seeking entry to that SC network are expected to adopt the required IT, e.g., RFID, in order to participate in the SC. In the normative institutional isomorphic process of adoption, the initiators are less likely to provide support and share experiences with the potential RFID-adopting firms. This is because the initiators have already formed efficient and effective process of SC coordination by adopting RFID technology, which guarantees the autonomy of the SC. Hence, no business commitment or obligation is created or maintained in the SC, as the participants have the option of deciding whether to adopt RFID technology with the intention of gaining business opportunities. For example, Wal-Mart issues a list of requirements, e.g., a supplier evaluation report and identification of the company's barcode labeling, to suppliers who wish to initiate a business relationship. There is no guarantee of business from Wal-Mart even though suppliers meet the requirements. Table 1 summarizes the dimensions of institutional isomorphism on the adoption of IT for SCM.

[Insert Table 1 here]

Conclusions and Implications

Unlike prior studies on the diffusion of IT, which assume that firms can make independent decisions to explain the adoption of IT in organizations, this article utilizes the institutional isomorphism perspective, which emphasizes the institutional isomorphic processes that exist in groups of firms to account for the adoption of IT for SCM. In particular, this article extends the theory of institutional isomorphism from the individual decision level within a company [10] to the inter-organizational level in context of SCM. The objectives, attributes, possible drawbacks of each of the three institutional isomorphic processes and how they may influence the intra-organizational operations and inter-organizational processes among SC partners on the adoption of IT for SCM are explored.

Academic Implications

This article highlights the view that the adoption of IT for SC activities are subject to the influence of three types of institutional isomorphic process, i.e., coercion, mimesis, and norms. From the illustrative examples, we recognize the different types of institutional isomorphism on the adoption of IT in real-life SC scenarios. It is therefore important to consider these institutional isomorphic processes in future studies on the adoption of IT, especially in the context of SCM.

Knowledge on the adoption of IT for SCM is advanced from the institutional isomorphism perspective. This article has laid a foundation for further studies to empirically evaluate the extent of the different types of institutional isomorphism faced by both initiators and followers in their adoption of IT for managing their SCs. It would also be useful to carry out

a longitudinal study to understand how the influences of the different types of institutional isomorphic processes evolve and are linked to the adoption of IT for SCM.

Managerial Implications

This article sheds light on the institutional isomorphic processes that influence the adoption of IT in SCs, which will help managers to understand the pros and cons of the different types of institutional isomorphic processes that occur during the course of adopting IT to improve the management of their SCs. A firm may assume more than one role in the institutional isomorphic process. For instance, a firm is mandated to adopt IT to satisfy the requirements of the dominant firm in its SC. In the meantime, the firm can play the role of an initiator in the mimetic institutional isomorphic process to influence its SC partners that are not participating in the SC of the dominant firm. The challenge is to make their partner firms realize the benefits of the adoption of IT to motivate the further diffusion of IT in their SC. Another challenge is for firms to select an institutional isomorphic process that fits their SCM practices, since the selected institutional isomorphic process should not have a negative impact on the efficiency of existing SCs. For instance, a firm seeking entry to an SC may comply with the norms of the SC by adopting an IT application. The managers should recognize that business opportunities are not guaranteed, as the adoption of the specific IT has become a pre-requisite to participating in the SC. Table 2 summarizes the managerial issues that need to be addressed by firms that have adopted or will be adopting IT when deciding on the adoption of IT to improve their SCM.

[Insert Table 2 here]

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		Coercion	Mimesis	Norms
Initiators (Adopted Firms)	***Objective***	Striving for SC performance improvement.	Seeking SC performance improvement.	Striving for SC autonomy.
	Attributes	May provide technical support, and share knowledge, know-how, and experience to followers. Offering business commitment.	Creating awareness. Sharing know-how and experience. Providing minimal or no support to followers. Do not offer business commitment.	Standardizing practices in SC. Providing minimal or no support to followers. Do not offer business commitment.
	Injunction	Forcing IT adoption with or without assistance and support.	Fostering the voluntary adoption of technology.	Imposing the adoption of technology.
	Possible Drawbacks	Incurring switching costs.	Losing business opportunities.	Losing business opportunities.
Followers (Adopting Firms)	***Objective***	Attaining business commitment.	Seeking SC performance improvement.	Seeking business opportunities.
	Attributes	Acquiring knowledge and experience in new IT. Seeking help for technical support. Conforming to legitimacy.	Responding to uncertainty. Voluntarily seeking information about new IT.	Seeking entry to an SC.
	Compliance	Adopting due to coercion.	Intentional or unintentional imitation.	Adopting due to norms.
	Possible Drawbacks	Revealing internal processes to initiators. Increasing the cost of operations due to shifting activities and costs from initiators.	No business commitment guaranteed by SC partners.	No business commitment guaranteed by SC partners.

Table 1. Dimensions of institutional isomorphism on the adoption of IT for SCM

Issues on	Initiators	Followers
Objective	A "fit" between the institutional isomorphic process and the SC strategy is necessary, as it guarantees that the necessary resources are allocated to implement the selected institutional isomorphic process.	The adopting firm must recognize the nature of the different institutional isomorphic processes when they adopt IT and emphasize the one that fits its SC objective. For example, a firm that is looking for business commitment in the SC should not consider the mimetic or normative institutional isomorphic processes, as they may not lead to any business commitments by their SC partners.
Attributes	The domination of the adopted firm in the SC directly affects the outcome of the institutional isomorphic processes. For instance, when dealing with a submissive follower the mimetic institutional isomorphic process should be considered instead of the coercive institutional isomorphic process.	The followers must consider the compatibility of the IT to their structure and existing IT, as the cost incurred in reengineering and systems integration can be very high.
Injunction/ Compliance	The relevant professional associations are often willing to assist the adopted firm and collaborate with them to promote the adoption of IT. By doing so, the adopted firms can minimize the investment needed to provide technical assistance to the adopting firms.	Since the adoption of a new IT often involves process reengineering and investment, the adopting firms must consider the availability of assistance and resources that can be obtained from the initiator and relevant professional associations in order to minimize the costs and risks of the technology adoption.
Possible Drawbacks	The adopted firms must be aware of the potential consequences of each institutional isomorphic process and evaluate whether the benefits of diffusing the IT in the SC justify the operations needs and investment.	The adopting firms must note the potential drawbacks of each institutional isomorphic process and determine whether the business opportunity justifies the investment.

Table 2. Managerial issues in the adoption of IT for SCM