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Received December 2007

EDITORIAL

Challenges in relating supply chain management and information and communication technology

An introduction

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Abstract

Purpose – The paper's purpose is to provide a motivation for investigating the relationship between supply chain management (SCM) and information and communication technology (ICT), to describe associated theoretical and practical problems and to introduce the papers of the special issue.

Design/methodology/approach – The paper is partly based upon a short literature review, including the papers of the special issue.

Findings – An important finding is that the relationship and integration of SCM and ICT in all papers of this special issue are strongly intertwined with managerial and organizational theory related issues.

Research limitations/implications – The paper suggests three possible avenues for building theory in the joint field of SCM and ICT on the one hand and organizational theory on the other hand.

Practical implications – Implicitly the paper argues for a better use of organizational and managerial insights to increase the usage and implementation of ICT in the context of SCM.

Originality/value – The paper offers a research agenda for incorporating organizational theory to develop the integration of SCM and ICT.

Keywords Supply chain management, Information, Communication technologies, Organizational theory

Paper type Viewpoint

It is more than obvious that the introduction of new technologies in Information and Communication (mostly referred to as ICT) has changed our lives, privately

The author would like to thank the editors of *IJOPM* Margaret Taylor and Andrew Taylor for their support during the long reviewing process. He would also like to thank my colleague Taco van der Vaart who was the co-organizer of the workshop on the theme of this special issue in November 2005 at the University of Groningen, Groningen, The Netherlands. However, he is most grateful for the support and efforts of the reviewers for this special issue: Harry Boer, Michael Braunscheidel, Rafaella Cagliano, Marisa de Brito, Jan de Vries, Steve Disney, Cipriano Forza, Jan Fransoo, Monique French, Paul Gemmel, Mihalis Giannakis, John Griffiths, Herbert Kotzab, Kristian Kreiner, Jack Meredith, Guido Nassimbeni, Steve New, Stefan Seuring, Chetan Soman, Roy Stratton, Jack van der Vorst, Bart Vos, Jacob Wijngaard. Some of them took the effort to review a paper three times and still came up with positive and encouraging comments. Thanks!

International Journal of Operations & Production Management
Vol. 28 No. 4, 2008
pp. 308-312

0144-3577
DOI 10.1108/01443570810861534

and professionally. Also the way business is conducted has changed through the introduction and widespread use of ICT. On the one hand, applications of ICT have resulted in many new business models often put under the umbrella of "new economy" or more sceptically the dotcom boom. Some of these have resulted in stable companies, like Amazon. On the other hand, ICT has resulted in a plethora of new tools that might support operations management and supply chains. Virtually no large business exists without having some type of ERP system or using EDI; email and internet are common for almost every company; while new technologies such as RFID emerge. Although the effect and influence of ICT both as an inspiration for new business and as an enabler of a fast flow of information to support operations and supply chain management is clear, we still know relatively little about the relationship between supply chain management (SCM) and ICT. As an almost superficial example: textbooks in operations management still like to explain the basic principles of MRP in great detail, whereas the above developments are discussed only briefly. In line with that remark, Reynolds (2000) noted that academic research in this area is lagging behind, and Cullen and Webster (2007) stress that specifically the operational aspects have been ignored. Bozarth (2006, p. 1224) signals that the OM literature does "rarely take full advantage of the constructs and models contained in these works [the MIS literature]".

The aim of this special issue is to bring together perspectives from these two fields that seem to be developing in different directions, whereas more interdisciplinary empirical research would be beneficial. Pertinent questions that need to be answered, if we look from an SCM perspective, are: what type of ICT fits to the characteristics of specific supply chains (e.g. type of products, complexity of the chain, organizational types)? What are the limits of information systems? What are new advancements in ICT and what is their relevance for SCM? How do information systems help in achieving supply chain integration? Is ICT one of the fields where technological determinism is paving the way for solutions that will never work? From an ICT perspective most of these questions are relevant as well, but probably have been even less rigorously investigated (if at all) than they have been in the OM literature. Within ICT research, considerable effort is put into the development of new systems and technologies, that should remedy most, if not all, problems of earlier systems and technologies. There also seems to be a disconnect between "theory" and "practice" in the field of SCM and ICT as much money is actually spent in purchasing, implementing, running and updating ICT in all its diversity, whereas at least in the SCM field, all of these aspects are hardly investigated and we do not know that much about effects, proper implementation and relevant factors to consider. Whereas we are frequently told that a seamless flow of goods and information is needed, we only acknowledge that "information distortion in a supply chain" (Lee *et al.*, 1997) is a problem. We rarely investigate what is needed to develop and implement appropriate information systems nor do we study if information systems are capable of providing such seamless information flows. Sometimes it seems that pen-and-paper solutions, along with face-to-face communication, are still the most powerful approaches. Maybe, we should even investigate whether we need the paradigm of seamless flow of information, at all.

Recently, a considerable number of papers has addressed one or several issues related to the role of ICT in SCM. However, most of those papers grasp one specific aspect of ICT only: the use of inter-organizational information systems (Da Silveira

and Cagliano, 2006), the use of EDI (Hill and Scudder, 2002), designing CPFR (Danese, 2007), the implementation/use of ERP (Wu and Wang, 2006), or the learning effects in on-line ordering (Kull *et al.*, 2007) and hardly address the trade-offs between different types of ICT and/or the trade-off between ICT and other forms of information exchange. Carr and Kaynak (2007) recently also noticed this gap in the context of supplier development and subsequently develop an integrated model.

Whereas the ambition of this special issue was to answer all the above and preferably more, the reality and an intensive reviewing process resulted in answers to three specific questions. There is a common perspective to these three papers, as each of them stresses the limitations of ICT usage as being influenced by organizational, strategic and/or behavioral aspects. The first paper by Bakker, Zheng, Knight and Harland offers an interesting perspective on the adoption of e-commerce in a healthcare setting. They show that the adoption of e-commerce is not only a matter of fit between characteristics of the supply chain and the type of e-commerce, but that the organizational context can play a decisive role. The second paper, by Mortensen and Lemoine, discusses the usage and importance of ICT in the context of TPL-providers. Here, it seems that the usage of ICT, most commonly in the form of inter-organizational computer systems, has become a qualifier rather than an order winner. The third paper by Ambrose, Marshall, Fynes and Lynch, shows that not only are the content of information and the frequency of information exchange important features, but that the interaction between human decision makers in a supply chain influences the selection of information channels and consequently of ICT, as well.

In line with the earlier paper by Carr and Kaynak (2007), these three papers together indicate that a necessary condition for further understanding how and when integrating SCM and ICT might be effective, is to incorporate, as a third component, organizational theory and organizational context. Suggesting that integrating a third component is useful is, of course, not directly helping in better understanding the relationship between SCM and ICT, nor does it directly say how and where we can constructively apply organizational theory. In fact, it only adds complexity to a subject that is already problematic. Recently, Blackmon and van Donk (2007) suggest three propositions or directions that can be used to import organizational theory into operations management/supply chain management. Below we will briefly describe these three perspectives and explore how this might help in developing a research agenda for investigating the relationship between SCM and ICT, that incorporates an organizational theory perspective.

The first perspective follows the often used argument that supply chains represent a new (unique) organizational form. Although it is hard to prove empirically, this idea is used as a conceptual metaphor. Applying organizational theory, now, is more or less straightforward as organizational theory applies to organizations. For ICT that would imply that we could go back to some early theory building that related organizational structuring and information systems (Galbraith, 1973). Theoretical frameworks such as those, can be helpful in understanding why the use and implementation of ICT in certain supply chains and supply chain forms is less beneficial than in others, or is even undesirable. Other forms of organizational theory in this perspective might be the use of metaphors such as the learning organization or organizations as social networks (as is visible in the results of Ambrose *et al.* in this special issue).

The second perspective of Blackmon and van Donk (2007) suggests that supply chain management can be seen as a specific organizational phenomenon and consequently organizational theory that explains other organizational phenomena can be used to explain and understand this one. Within this perspective we can differentiate between different types of SCM (e.g. a TPL-relationship is different from a buyer-supplier relationship), along with finding appropriate organizational lenses to investigate and understand such different forms. That, in turn, will help to develop theory to understand differences in use of ICT in different supply chain forms. In the context of this special issue, it might help to further understand the use of inter-organizational information systems in the case of TPL (Mortensen and Lemoine, this special issue), as opposed to their use in buyer-supplier relationships as investigated in Da Silveira and Cagliano (2006), along with a deepened understanding of why different forms of SCM are used in these two distinctive situations.

The third perspective taken by Blackmon and van Donk (2007) simply states that SCM is a type of management. Management theories can thus be used to identify and understand effective and ineffective managerial activities in the context of SCM and ICT. Rigorous research into this direction could help to resolve why implementing ERP systems and using them beneficially for managing the supply chain seems so problematic, and to understand why implementation plans seem to be rational and wise but are difficult to realize. It might also address issues touched upon in this special issue, such as: who is responsible for a certain part of the chain and how is that reflected in the design of the ICT, or, what is a proper organizational and informational structure to manage a certain supply chain?

Whereas the intention was to answer questions and increase our understanding of how to use and implement ICT in the context of SCM, this introduction can only end in concluding that more work along the lines above, and in line with the three papers in this special issue, is needed.

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