Guest editorial

Supply chain management in health services: an overview

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Abstract

Purpose – This paper seeks to concentrate on the question whether any parallels can be found between the industrial sector and health care services with respect to the developments that have taken place in the area of Supply Chain Management. Starting from an analysis of existing literature, it is intended that different modes of Supply Chain integration will be discussed. Also, in doing so, it is intended that the lessons learned from the studies presented in this special issue will be summarized and placed into the perspective of future research that can be considered as necessary.

Design/methodology/approach – This paper adopted an exploratory, qualitative approach based on an analysis of existing literature in the area of Supply Chain Management in Health Services. Additionally, material from the case studies presented in this special issue is used to assess the current body of knowledge regarding Supply Chain Management in Health Services.

Findings – Starting from a classification of existing research, five main research areas with respect to Supply Chain Management in a health care setting are defined. Additionally, it is concluded that next to studies with a mono-disciplinary focus, an interdisciplinary focus on Supply Chain Management issues in health services seems to be necessary.

Originality/value – This paper contributes to both the supply chain management literature and literature in the area of healthcare management by identifying some important research areas which are linked to both fields. This paper helps both academics and managers to gain a better understanding of the complexity of supply chain management in health services.

Keywords Health services, Research, Supply chain management, Literature, Health care

Paper type Research paper

1. Introduction

During the last decade, the health care sector has changed rapidly. Due to increased competition, the growing influence of patient-associations and a necessity to deliver health services in a more efficient and effective way, many health care organisations have started projects in the area of patient logistics, clinical pathways, data interchange and vertical integration (Aptel and Pourjalali, 2001). Moreover, the redesign of hospital services and the implementation of integrated care programmes are frequently addressed as being critical strategies to decrease resource utilization and improve health care quality. Clearly, not only in practice but also from a theoretical point of view the area of health service operations has changed significantly. During the last ten years an impressive number of studies originated in different disciplines like economics, organisational behaviour and logistics have drastically enlarged our knowledge regarding the health care sector (Beier, 1995; Jarett, 1998; Jennett *et al.*, 1999; Bazzoli *et al.*, 2004; Zinhan and Balazs, 2004). From a supply chain management perspective however, our body of knowledge regarding the health care sector still seems to be rather fragmented. Although many health care organisations have recognized the importance of adopting supply chain management practices, the application of techniques, methods and best practices originally developed in an industrial setting clearly is often problematic. Without doubt, the complexity of the technologies being used, the existence of multiple stakeholders, a dynamic internal and external environment and distinctive characteristics of health service operations often impede a straight forward application of industrial oriented supply chain management practices. The many problematic projects aiming at implementing integrated planning systems regarding patient flows and establishing partnership relationships between different health service organisations are a clear indication of the difficulties health care organisations are facing when adopting a supply chain management philosophy. The initiative for this special issue and the included papers, which have been selected after a careful review and revision process, are originated in these backgrounds and take the emerging field of supply chain management in a health service context as a starting point.

In the next section, first an overview is presented of developments, which have taken place in the area of supply

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chain management. In doing so, we concentrate on the question if any parallels can be found between the industrial sector and health care services with respect to the developments that have taken place. Starting from this comparative analysis, different modes of supply chain integration will be discussed. In doing so, the lessons learned from the studies presented in this special issue will be summarized in section four and placed into the perspective of future research that can be considered as necessary.

2. Health care operations from a supply chain management perspective

From a historical perspective, during the last four decades the focus within industrial companies has gradually shifted from a strong orientation on individual processes towards a chain orientation. In the sixties and seventies of the previous century, manufacturing companies considered the management and control of individual processes as a necessity in order to be competitive. During this era, main stream research in the area of operations management resulted in many mathematical models and tools which strongly contributed to our insight and understanding of the planning and control of operating processes in a manufacturing environment.

Without doubt, the increased possibilities of information and communication technologies have enhanced the shifting focus of companies in the late nineties of the previous century. Especially the usage of enterprise resource planning (ERP) software has been the driving force behind the strong focus of manufacturing companies to control goods flows in a more integrated way. ERP systems are software packages designed to integrate, standardise and automate processes within organisations and throughout their value chains. This is achieved by a collection of modules linked through one central database from which all modules draw, manipulate and update data. The promises of ERP systems are clear and convincing: managers can make better-informed decisions, communication costs are reduced and firms become more integrated and coherent (Davenport, 1998; Boonstra, 2006; Dezdar and Sulaiman, 2009). Numerous studies have been performed on integrated planning systems (Akkermans and Helden, 2002) Mirrored by developments in practice, mainstream research in the field of Operations Management in the eighties and nineties concentrated on the question how sub optimisation with respect to the control of goods flows within companies can be avoided. Co-ordination between different planning levels, the use of master production schedule and the introduction of planning and control frameworks are some illustrative examples of research items, which are studied extensively during this period (Bertrand *et al.*, 1990).

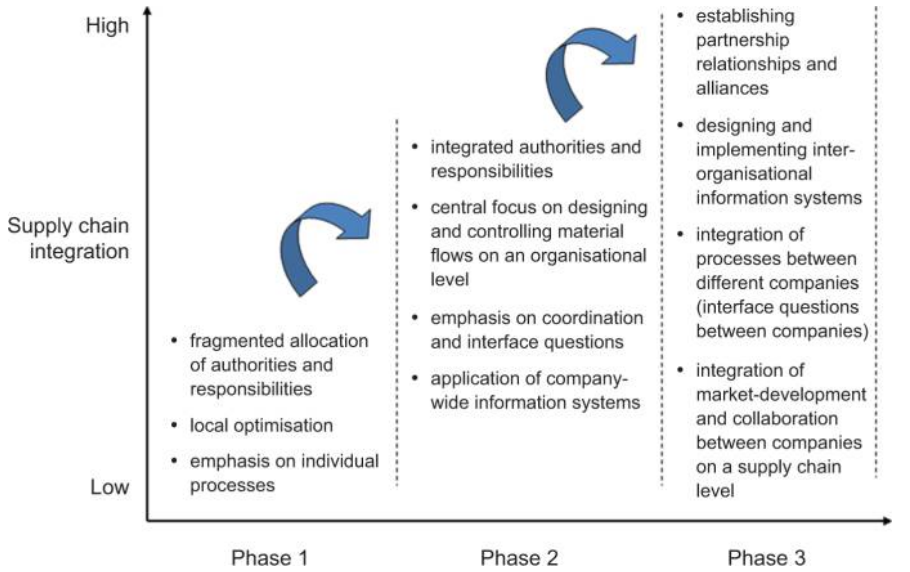
During the last ten years, a considerable amount of studies has emphasized the importance of supply chain management for companies (Croom *et al.*, 2000). Both in theory and in practice it is widely recognized nowadays that by integrating information and materials flows throughout the entire supply chain, both the internal and external performance of supply chain partners can be improved significantly. Many authors have remarked, however, that the supply chain management philosophy not only receives considerable attention from the field of logistics and operations management but also from other areas (Burgress *et al.*, 2006). Clearly, the origin of supply chain management is of a multidisciplinary nature and stems from different areas such as strategic management, marketing, and organizational behaviour (Croom *et al.*, 2000). It is not surprising therefore, that the phenomenon of supply chain management is studied from several different perspectives and, by doing so, several aspects have emerged as being of importance when trying to establish integrated supply chains (Harland, 1996; Lee, 2002; Boone and Ganesham, 2007). Despite the variety of perspectives, the elimination of waste and an emphasis on improving performance by coordinating supply chains are generally considered the core issues of supply chain management relationships. This focus is reflected in the many studies on the exchange of information, materials and products (Jarett, 1998; Chen and Paulraj, 2004; Cooper and Tracey, 2005). The question of how to optimise these exchange processes seems to be well-covered in contemporary literature and is illustrated by numerous studies on supply chain integration, logistics postponement and the role of information technology (Croom *et al.*, 2000). Additionally, several studies have suggested that many potential barriers relating to trust need to be levelled when implementing supply chain partnering (Harland, 1996; Mentzer, 2004). The phenomenon of supply chain management therefore, is also closely linked to issues of collaboration, trust and the atmosphere of the relationship.

Figure 1 presents a schematic overview of the developments, which have taken place with respect to the focus and area, manufacturing companies have concentrated on during the last decades. The phases depicted in Figure 1 should be considered as a development on a macro level. Obviously, many individual companies still are in one of the early phases of supply chain integration.

To a certain extent, the developments outlined above also account for the health care sector. From an Operations Management perspective, the focus in the health care sector originally also concentrated on optimising individual processes. Well-known examples are the application of operations research techniques to optimise inventory levels of drugs and methods for optimising the ordering process of care-related products and pharmaceuticals. Comparable to developments in the industrial sector, it is widely acknowledged nowadays that information and communication technologies can play a significant role in improving health supply chains and it will be of no surprise that many health care organisations have started up projects in the field of health supply chains (Schneller *et al.*, 2006). Recent studies show that a significant portion of the costs associated with supply chains in the health care sector can be reduced by implementing effective supply chains (Burns, 2000; Dacosta-Claro, 2002; Oliveira and Pinto, 2005). There are some indications however, that the health care sector is behind the industry sector with respect to implementing supply chain management practices.

The application of supply chain management practices in the health care sector not only relates to physical goods like drugs, pharmaceuticals, medical devices and health aids but also to the flow of patients (Beier, 1995). Nowadays, patient logistics is an emerging field in the area of operations and supply chain management encompassing all planning and control decisions aimed at matching supply and demand throughout the health care supply chain. In practice, patient logistics often concentrates on decisions regarding the variability and complexity of demand within a hospital but

Figure 1 Different stages of supply chain integration



obviously, also important coordination issues exist between health care organisations. Similar to manufacturing companies, many optimisation questions in health care relate to the problem how a high resource utilization can be matched with a high customer service level. Not surprisingly, within the area of patient logistics also a strong emphasis exists nowadays on improving performance by more integrated health care supply chains (Brennan, 1998). The question how this integration can be achieved best still is a relatively uncovered field in the area of supply chain management however, and starting from this question there are only limited academic studies addressing the challenges unique to the health care setting.

3. Integrated health supply chains

Similar to supply chain management in a manufacturing setting, health supply chains can be characterized by different modes of integration:

- Integration and co-ordination of processes.
- Integration and co-ordination of information flows.
- Integration and co-ordination of planning processes.
- Integration of intra- and inter-organisational processes.
- Integration of market-approach.
- Integration of market-development.

Related to health service providers, supply chain management often refers to the information, supplies and finances involved with the acquisition and movement of goods and services from the supplier to the end user in order to enhance clinical outcomes while controlling costs. In doing so supply chain management puts a strong emphasis on the integration of processes. Within the healthcare sector these processes might refer to physical products like pharmaceuticals, medical devices and health aids but also to processes associated with the flow of patients. In both cases the basic rationale of a supply chain management approach is founded in the belief that intensive co-ordination and integration between operational processes might lead to a better health supply chain performance.

Information technology and the deployment of e-business clearly are closely linked to the co-ordination and integration of operational processes. Many studies have advocated the important role information technology plays in supply chain practices (Breen and Crawford, 2005; Harland and Caldwell, 2007) and it will be of no surprise therefore that many studies on health care supply chains focus on the role of e-business technologies across hospital supply chains (Siau *et al.*, 2002). Similar to the co-ordination and integration of operational processes, information technology in the health sector is related to both physical products as well as to the flow of patients within and between health service organisations (Lowell and Celler, 1998). Examples of information technology-oriented applications can be found in the area of procurement, inventory control and materials planning. The application of electronic patient record systems is also a well-known example of integrated information-technology being implemented in health systems across the world. Although many studies have reported important problems when implementing Electronic Patient Record systems (Boonstra and Govers, 2009), it is widely acknowledged that patient-related information systems can significantly contribute to improving the integration and smoothening of processes within and between health service delivery organisations.

Clearly, many different stakeholders are involved in health care chain practices. Therefore, the application of supply chain management practices in a health care setting is almost by definition related to organisational aspects like building relationships, allocating authorities and responsibilities, and organizing interface processes. Different studies have highlighted the importance of organisational processes when applying supply chain management practices. Moreover, recent studies reveal that elements like organisational culture, the absence of strong leadership and mandating authority, as well as power and interest relationships between stakeholders might severely hinder the integration and co-ordination of processes along the health care supply chain (McCutcheon and Stuart, 2000).

Health care supply chain integration not only relates to the integration and co-ordination of planning processes but can

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also be linked to joint "market development" and offering new "care-products". Within the automotive industry it is common practice that supply chain partners collaborate in the process of developing new products. Product co-development is a recognized phenomenon in the field of supply chain management and within industrial supply chains many joint efforts are made to develop new products across suppliers, customers and organisational units. It is interesting to note that the same development is visible in the area of health care supply chains. Although less common, examples can be found of health care service providers communicating jointly to patient groups about the services they provide. In doing so, they emphasize the benefits of the intensive collaboration between the health care organisations for clients in terms of throughput time, quality of care and the services being provided. Additionally, care providers have taken the initiative in different countries to develop new care-products in close collaboration with each other. In The Netherlands for instance, several hospitals started up joint centres for haemodialysis. Other examples can be found in the field of Breast centres.

Clearly, the above mentioned modes of integration cannot be considered in isolation. Studies in the field of industrial companies indicate that organisations often go through several stages of integration, starting with a transparency stage via a commitment/coordination stage to a full integrated stage encompassing all the different modes of integration addressed above (Ballou *et al.*, 2000; van der Vaart and van Donk, 2008). The ongoing transformation within the health care sector towards greater integration and more process-oriented health care chains requires a shift in strategy, structure and control mechanisms. As such, the supply chain orientation within the health care sector can be regarded as a complex social change process.

In their review article, Croom *et al.* (2000) present a framework for the categorisation of literature on Supply Chain Management. They distinguish two dimensions, which form a matrix to classify research in the area of supply chain management. This taxonomy of Croom *et al.* seems to be relevant for the setting of health care supply chains as well.

Dimension 1: level of analysis

Current research in the field of health care supply chains seems to be conducted on different levels reaching from internal supply chains to a network level. Between these two extremes two party relationships (dyadic level) and a set of dyadic relationships can be distinguished (chain level). The dyadic level considers the single relationship between a supplier and a health care provider in the case of physical products (see pharmaceuticals) or two health care organisations in the case of patient flows. Research on a chain level encompasses issues related to exchange processes taking place in specific parts of the supply chain ranging from the supplier of the supplier to the customer of the customer. A third main stream research area concentrates on the network of service providers and the exchange processes taking place between the stakeholders in this network.

Dimension 2: element of exchange

The second dimension of the taxonomy of Croom *et al.* (2000), which also seems to be applicable to the health care context, can be addressed as the element of exchange. This element relates to the exchanged "product" and to how relationships between actors in the health care supply chain are conducted and managed. A specific issue, which needs to be addressed in this context is the distinction between patient flows and supply chains related to physical goods and products. Without doubt, the health care setting differs from the industrial setting regarding the "assets" that can be exchanged.

The matrix shown in Figure 2 can be used to classify both existing as well as future research in the area of health supply chains. In the next section the matrix will be used to asses the studies this special issue reports on. Additionally, some general conclusions regarding future research on health supply chains will be drawn.

4. Overview of the special issue

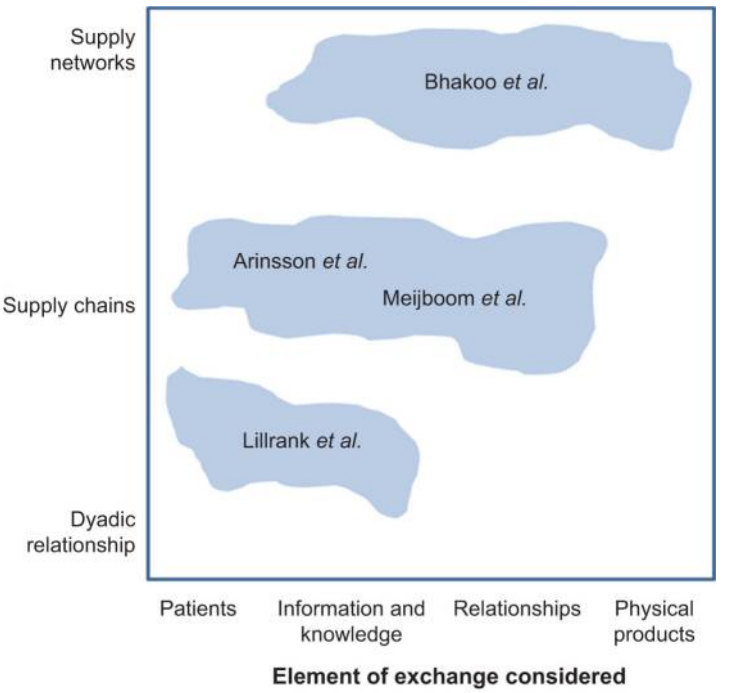
This special issue is based on papers submitted to *Supply Chain Management: An International Journal*, after a call for papers. The special issue attracted 21 papers and after an intensive review of each paper, ultimately four papers were accepted for publication in this special issue.

The first paper by Meijboom, Bakx and Westert discusses how supply chain management practices can be used to solve organisational problems that occur in situations that are complex because the treatment of patients requires input from multiple health care providers. It is argued by Meijboom *et al.* that interface problems between health care providers can be solved by applying supply chain practices. Rather than on goods chain management, the scope of this paper focuses on patient flows within and between care providers. In so doing Meijboom *et al.* concentrate on organisational issues related to interface problems between different care providers. Interestingly, they conclude that in the area of health care services many problems related to communication, patient safety, waiting times and integration can be addressed as organisational problems. Based on best practices from the area of supply chain management, performance improvement apparently can be established by transforming knowledge on continuous integration practices, lead time control, and the usage of information technology from an industrial setting to a health care setting.

In line with the article of Meijboom *et al.* is the article of Aronsson, Abrahamsson and Spens on developing lean and agile health care supply chains. Interestingly, the arguments of Meijboom *et al.* on developing a supply chain orientation in health care are also emphasized in the article of Aronsson *et al.* Illustrated by examples from Swedish health care providers lean and agile strategies are presented. According to Aronsson *et al.* supply chain management can be the overall philosophy providing health care providers to handle unique processes in a structured and a flexible way. Moreover, they argue that a system approach together with a supply chain orientation will enable health care providers to improve their performance. Similar to the article of Meijboom *et al.*, the level of analysis of Arronnson *et al.* also relates to patient flows rather than to good flows.

Supply chain practices are closely related to information technology. Moreover, the application of information technology and e-business processes often is considered as a necessary requirement for integrated supply chains. In the third paper of Bhakoo and Chan, results of a single longitudinal case study on e-business process implementation in the Australian pharmaceutical health care

Figure 2 Research classification matrix



Source: Based on Croom *et al.* (2000)

supply chain are presented. The study identifies the lack of consistency and poor qualities of data during the implementation of e-business processes and its implications for establishing sustainable supply chain management relationships. Additionally, the longitudinal study of Bhakoo and Chan also addresses the element of trust. The dynamics of the relationships within the project the case study reports on, to a great extent can be explained by Stakeholder theory. The paper provides the reader with a powerful insight into the experiences of the stakeholders involved in the project on implementing e-procurement in the Australian health care-sector. Interestingly, the paper identifies both more general issues, which have influenced the implementation of e-business processes as well as issues that are specific to the character of the health-care industry. Trust, collaboration and a positive attitude toward completing the project successfully have shown to be of eminent importance during the Monash Pharmacy project. Contrary to the first two papers, the contribution of Bhakoo and Chan concentrates on physical products related to health care supply chains. In doing so, their level of analysis focuses on a network of organisations and the way e-business practices are applied in this network in order to support the health care supply chain.

Finally, the fourth paper returns to the flow of patient to, within and out of health care providers. Based on two case studies and a conceptual analysis, Lillrank, Groop and Venesmaa concentrate on the question how process management in a health care setting can be modelled and managed. Basically, the main question posed in the paper of Lillrank *et al.* is to what extent and under what conditions supply chain and process concepts are applicable in a health care setting. Based on two explorative case studies, the authors conclude that it makes sense to concentrate on (strings of) events as a unit of analysis in situations, which are characterized by many exceptions regarding the sequence and flow of patients. Process management at the other hand seems to be appropriate in situations where there is a structured flow with a sufficient volume of similar repetitions. Clearly, the notion that modelling patient flows and applying supply chain management concepts in a health care context needs a translation of concepts and modelling techniques developed for industrial settings is important for future research in the area of supply chain management in health services.

5. Summary and conclusions

This special issue presents a collection of papers that explore the complexity of supply chain management in health services. Clearly, much research work needs to be done. All authors in this special issue emphasize the fact that supply chain management in a health care setting is characterized by some unique features, which make it difficult to transfer knowledge from the industrial sector to a health care sector in a direct way. At the same time however, it can be concluded that existing concepts, models and supply chain practices can be extended to supply chain management in health services and existing research underpins the assumption that the health sector can benefit from the lessons learned in the industrial sector.

Starting from the research classification matrix depicted in Figure 2, many issues that need to be explored further, can be addressed. Based on the papers in this special issue, at least five main research areas with respect to supply chain management in a health care setting can be defined.

First of all, it seems to be important to further explore the role information technology can play in supporting the management and control of supply chain practices. Additionally, more research seems to be necessary to

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address the enablers and barriers when implementing information technology in a health service context. Second, the influence of different stakeholders on establishing supply chain management relationships both within as well as between different health service providers still is rather unknown. It seems to be worthwhile therefore, to study into more depth the influence of power and interest relationships between the stakeholders during the process of adopting, shaping and implementing supply chain management relationships. Third, it seems to be of importance to study into more depth the strengths and weakness of management philosophies like lean and agile manufacturing, business process management and Lean Six Sigma in the context of health services. Many of these philosophies are often used together with supply chain management practices. Little is known however, about how these philosophies are applied by health care providers and to what extent health care providers can benefit from these practices. A fourth main field of research which can be associated with supply chain management in health services relates to performance metrics and the results being achieved by health care organisations when implementing supply chain practices. Clearly, performance measurements in a health care setting seems to be more complicated compared to industrial companies due to the complexity of concepts like "quality of care" and the rather tacit character of some performance metrics. There seems to be a general consensus about the added value supply chain management practices can have for health care organisations. Making this added value more explicit by performance metrics as well as the conditions under which this added value emerges without doubt is one of the main challenges research on supply chain management in a health service context is facing. Finally, applying supply chain management concepts to patient flows requires special attention to the specifics of services. Being inseparable multi-actor delivery processes in which the patient himself participates as both object and co-creator in the interaction with various healthcare professionals (customer-supplier duality) supply chain management in a service setting is far from simple. New developed concepts of disease management for chronic diseases show that supply chains get longer with combinations of different care providers in which the patient himself often is in the lead. How this interacts with and influences the supply chain definitely is an important and challenging issue in future research on healthcare Supply Chain Management.

In line with the conclusions of Croom *et al.* (2000), it can be concluded therefore that next to studies with a mono-disciplinary focus, an interdisciplinary focus on supply chain management issues in health services seems to be necessary. The complexity of the questions as well as the multi-dimensional scope of the problems requires knowledge from different disciplines. Hopefully, this special issue is going to be a small step towards gaining a more thorough understanding of supply chain management in health care services.

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