Shifting from a product-based business model to service-centric one: impact on supply chain management

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Abstract:

Servitization is a well-established phenomenon both in business practice and in academic research. It describes a move by manufacturers from offering product-centric value propositions to ones that rely on service elements that support, complement or enhance the product or equipment. Servitization therefore represents a change of business model that involves specifying a new or enhanced value proposition and re-configuring the value-creating system that delivers it.

Most studies investigate servitization from the perspective of the provider and its customers. However, value propositions address the entire supply chain rather than only the

next stage customer. The value creation system comprises all the activities and resources that play a role in supporting the value proposition including the customer and supply chain members. Academic research investigating the effects of adopting a service-centric business model on the characteristics and the management of the supply chain has been limited until now.

The purpose of this paper is to develop a research framework to inform future empirical work on the impact of servitization on supply chain management (SCM). We build on the main conceptualisations of the servitization phenomenon in the literature as well as on the nascent literature that investigates SCM in a servitized context to develop our research framework. The framework suggests that supply chains supporting the provision of different categories of value propositions are likely to operate differently. In other words, the characteristics and management of the supply chain are contingent on the type of value proposition it supports. Our literature review identifies two main categories of value propositions that can be considered polar opposites. 'Basic' value propositions are product-oriented, focus on the provision of a product, see service as add-ons to the main product offering, provide an incomplete solution to a customer's problem and are characterised by short term transactional relationships between the customer and the provider. In contrast, 'advanced' value propositions are service-oriented, focus on providing a capability, see the product as an add-on to the service offering, represent a complete solution to a customer's problem and are characterised by long-term customer-provider relationships. We also reveal the core supply chain management themes that are to be explored empirically. The themes include supply chain configuration, information sharing and communication, manifestations of relationships, supplier relationship management, innovation, risk, human resources and process management and integration. The framework supports the exploration of basic and advanced value propositions and the resultant implications on the characteristics and management of the supply chain. This provides a useful platform for future empirical research on the impact of servitization on supply chain management.

Key Words: Servitization, supply chain management, business model, manufacturing, service

1. INTRODUCTION

Servitization is a well-established phenomenon both in business practice and in academic research. It describes a move by manufacturers from offering product-centric value propositions to ones that rely on service elements that support, complement or enhance the product or equipment. Baines *et al.* (2009) define servitization as "the innovation of an organisations capabilities and processes (…) through a shift from selling products to selling integrated products and services" (p.561), which can be referred to as product service systems. These services range from basic add-ons such as maintenance, repair services and spare parts provisioning to advanced offerings including availability and outcome-based contracts. From a provider's perspective, this shift brings about a change in business model (Kindström, 2010). Intellectual enquiry into business models identifies a clear distinction between value proposition and value creation (Zott and Amit, 2010, Baden-Fuller and Haefliger, 2013). The former resonates with the product and/or service offering while the latter resonates with a production or delivery system perspective. Servitization therefore describes a change of business model that involves specifying a new or enhanced value proposition and configuring the value-creating system that delivers it.

To illustrate this shift, take the case of ABB for instance. Davies (2004) explains that ABB traditionally supplied power and automation products to a range of industries including water, rail and automotive. It then started to sell add-on services such as spare parts provision, equipment repair, maintenance training, remote monitoring and technical support. Through leveraging their knowledge of power products and target markets they eventually moved further downstream to offer turnkey solutions in power generation. In these turnkey solutions ABB tailor the engineering and manufacturing components, integrating them into unique plants or systems, which are installed and tested to ensure a guaranteed level of potential power output. This is contracted at a fixed and often reduced cost to the customer.

Operations management scholars have explored various facets of the servitization phenomenon over the past 15 years; see Baines *et al.* (2009) for a literature review. Most studies investigate servitization from the perspective of the provider and its customers. This focus is not surprising; this form of business model innovation involves changing the customer value proposition and the provider's operational system, processes and resources that support the delivery of the new proposition. However, Bititci *et al* (2004) argue that

value propositions address the entire supply chain rather than only the next stage customer. The value creation system includes all the activities that take place to deliver the value proposition in partnership with the customer and other actors in the supply chain. Additional effects from servitization are therefore expected beyond the boundaries of the customer-provider dyad and further up the supply chain. For instance, the use of digital tags and sensors to track and monitor product performance in use situations significantly affects the nature and intensity of flows within the chain of supplier organisations. This raises interesting questions about the characteristics of these flows as well as about their management. Academic research investigating the effects of adopting a service-centric business model on the characteristics and the management of the supply chain has been limited until now (Bastl *et al.*, 2012).

Against this background, the purpose of this paper is to develop a research framework to inform future empirical work on the impact of servitization on supply chain management (SCM). First, to provide a context for our argument, we examine the main conceptualisations of the servitization phenomenon in the literature. Then, we review the main characteristics of Supply Chain Management. Finally, we propose a research framework addressing SCM in a servitized context and discuss the nascent literature investigating SCM in a servitized context.

2. THE SERVITIZATION PHENOMENON: DIFFERENT CATEGORIES OF BUSINESS MODELS

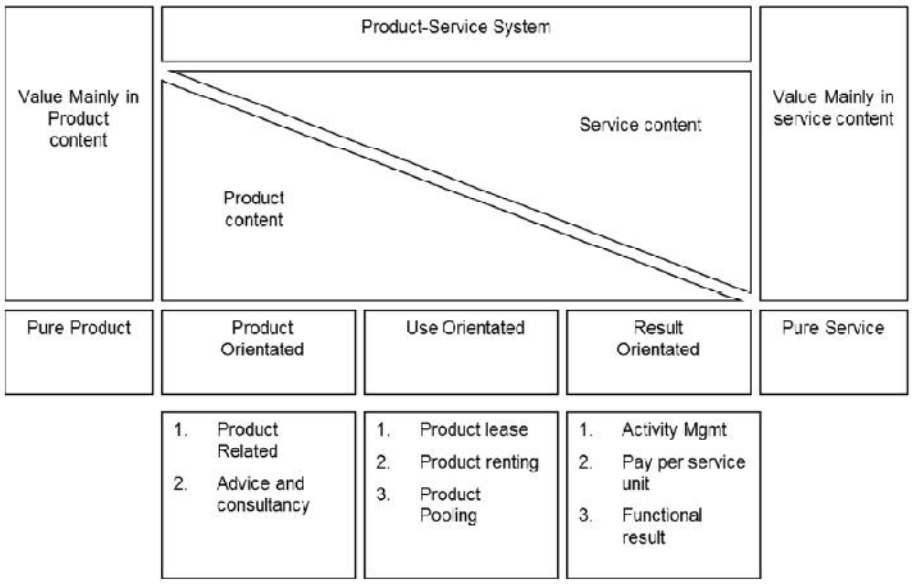
2.1. Servitization continuums

The literature describes several servitization continuums. On a general level, these continuums represent different categories of business models that are positioned along a 'product-service' axis. Scholars have conceptualised servitization as a state and as a journey. Proponents of the state view suggest that a servitized organisation occupies a particular position on the continuum, which describes a particular business model (Oliva and Kallenberg, 2003; Tukker, 2004; Penttinen and Palmer, 2007; Windahl and Lakemond, 2010). In contrast, the journey perspective proposes that servitizing is a process that takes place over time and that organisations move along the continuum in the course of that process. This perspective assumes that the business model is continually evolving (Day, 2000; Cook *et al.*, 2006; Ng *et al.*, 2012). In each case, there is considerable consensus that the servitization phenomenon encompasses a range of distinct business models, that is, a

range of distinct value propositions and associated value-creating delivery systems. In other words, manufacturing organisations can servitize in a number of ways. We review the main conceptualisations of the servitization continuum that have appeared in the literature below. As can be seen below, scholars have primarily focused on describing the value proposition component of the business model (Smith *et al.*, 2012; Baines and Lightfoot, 2013).

Tukker (2004) depicts three main categories and eight sub-categories of product service systems (i.e. servitized value propositions), as illustrated in Figure 1. Product-oriented service systems refer to situations where the ownership of the product or equipment is transferred to the customer and a service arrangement is provided to "ensure the utility" of the artefact over a given period of time. Use-oriented product service systems relate to situations where the ownership of the product or equipment is retained by the provider who sells the "function" of the product to the customer, such as leasing of office equipment. The manufacturer sells the 'availability' of the product and customers pay only when the equipment is in use. Result-oriented product service systems represent situations where the provider sells "results" rather than "functions". In other words, the customer purchases "utility" as an outcome instead of the "function" of the product and typically there is no-predetermined product or equipment involved (Cook *et al.*, 2006). The customer and provider collectively focus on establishing a desired outcome or result. In outcome based contracts, the customer pays only when the desired outcomes from product or equipment use have been achieved. Well-known examples of outcome based contracts include Rolls-Royce's Power-by-the-hour (Kim *et al.*, 2007) or BAE Systems ATTAC contract (Ng *et al.*, 2009). An outcome-based contract, for example, can be the provision of an agreed number of flying hours.

Figure 1: Categories of Product-Service Systems



Oliva and Kallenberg (2003) argue that manufacturing organisations which produce core products and equipment, with service elements purely as add-ons, are located at one extreme of the product-service spectrum. As firms move along the continuum they incorporate more product-related services into the value proposition, the relative importance of service elements increases and the relative importance of tangible goods decreases (Baines *et al.*, 2009). At the other extreme, service providers whose products are merely add-ons to services are found (Gebauer and Friedli, 2005).

Penttinen and Palmer's continuum (2007) classifies value proposition in terms of their degree of completeness. A more complete offering exhibits higher levels of service, which they define as the application of specialized competences (knowledge and skills) through deeds, processes, and performances. This 'service' is applied to the customer's 'problem'. The position of an organisation on the continuum is determined by the extent to which customer problems are solved and by the amount of additional work left to the customer.

Windahl and Lakemond (2010) and Oliva and Kallenberg (2003) adopt the dimension of product to process oriented offerings to describe servitization. This dimension represents a change in value proposition from product efficacy at one end of the continuum (i.e. does the product work?) to product efficiency and effectiveness within the customer's use processes at the other.

Day (2000) conceptualises the servitization continuum based on the nature of the buyer-seller relationship. Following the general relationship marketing literature, he suggests

that relationships between providers and customers can range from discrete transactions to relational exchange. This dimension can be found in other servitization frameworks and studies (Penttinen and Palmer, 2007, Smith *et al.*, 2012).

Finally, a recent contribution by Baines and Lightfoot (2013) puts forward three categories of value propositions referred to as basic, intermediate and advanced. These categories are defined and described in Table 1 below.

Table 1: Three categories of value propositions

Value propositions	**Definition**	**Implications for the production/delivery system**	**Value proposition components**
Basic	Product provision	Execution of production competence (i.e. we know how to build it)	Product/equipment provision, spare part provision, warranty
Intermediate	Maintenance of product condition	Exploitation of production competence to also maintain the condition of products (i.e. because we know how to build it we also know how to repair it)	Maintenance, technical help-desk, repair, overhaul, delivery to site, operator training, condition monitoring, in-field service
Advanced	Capability delivered through product performance	Translation of production competences to also manage the products performance (i.e. because we know how to build it we know how to keep it operational)	Customer support agreement, risk and reward sharing contract, revenue-through-use contract

Adapted from Baines and Lightfoot (2013)

2.2. Implications of servitization for organisations

While there is some disparity in the literature concerning the categories of value propositions along the servitization continuum, there is widespread agreement that changes to a value proposition result in changes to the resources and processes that comprise the value-creating system supporting its delivery (Smith *et al.*, 2012). Ng *et al.* (2012) suggest that the dominant transformation within the operational system of the provider shifts from building material and equipment to processing customers and managing information, and this requires a different set of capabilities such as equipment management capability and embedded human capability. In this regard, companies have to move from a traditional contracting system based on predictability and cost control to a complex adaptive system emphasising flexibility and responsiveness. Building service capability is a significant challenge which requires the adoption of a different approach to the management of combined product-service operations

(Johansson and Olhager, 2004). For example, as manufacturing firms integrate a mixture of product and service production systems, they increasingly face challenges typical of service operations such as increased customer-induced variability, as well as a requirement for innovation, flexibility, and customisation (He and Lai, 2012). Baines and Lightfoot (2013) explore the operations practices and technologies in the value creating system of four manufacturing organisations that have successfully servitized. They find that delivering advanced services requires the deployment of new, specific operational capabilities. These include building product remote monitoring capacity, integrating activities with the customer's processes, aligning performance measures to individual customers, co-locating and distributing facilities throughout the customer's operations and developing the front-liners' service mindset.

Furthermore, Windahl and Lakemond (2010) contend that when firms increase the relevance or share of service elements in the value proposition the boundaries of activities performed by providers and customers change and providers become part of customer processes. As a result, providers rely heavily on customer resources and close collaboration between customer and provider is required to achieve desired outcomes (Guo and Ng, 2011). Penttinen and Palmer (2007) show that the relationship between a servitized organisation and its customers is characterised by strong operational linkages, extensive information exchange and high cooperative norms.

Based on the above, it can be argued that changes to the value propositions also result in changes to the entire supply chain and to the way it is managed (Chakkol *et al.*, 2014). This resonates with Bititci *et al.* (2004) who argue that value propositions address the entire supply chain rather than only the next stage customer. The supply chain represents an extended view of the organisation's operational system. This extended view broadens the scope of organisational boundaries to include all of the actors who play a role in delivering the value proposition to the customer. The value creating system component of a business model therefore includes all the actors and their activities that support the customer value proposition. Johnson and Mena (2008) suggest that supply chains which support the provision of servitized value propositions are different to those that support pure products or services. Moreover, the literature suggests that there may be both positive and negative consequences of 'going upstream' (Lockett *et al.*, 2011). Positive effects include the development of close ties between supplier and the provider which could result in an

enhanced ability to deliver customer value as well as higher levels of risk sharing. As for the negative consequences, possible instances of knowledge leakage have been discussed. The next section reviews the nascent literature that explores how the supply chain of servitized organisations is configured, characterised and managed.

3. SUPPLY CHAIN MANAGEMENT CHARACTERISTICS

Table 2 synthesises and defines the main themes and associated characteristics that have been discussed in the mainstream SCM literature (Autry *et al.*, 2008, Bowersox and Daugherty, 1987, Kim, 2007, Narasimhan *et al.*, 2008). Many of these themes have not yet been addressed, theoretically or empirically, by the servitization literature. They thus offer a useful platform for future research. For each theme, scholars can explore three interrelated research questions: i.e. what are the characteristics (i.e. what does the supply chain look like), why do we observe these characteristics (i.e. why does the supply chain look like that?) and how have those characteristics come about (i.e. how is the supply chain implemented and managed).

Table 2: Supply Chain Management: main themes and associated characteristics

Themes	Characteristics / Definition	Related literature
Supply chain configuration	- Chain or network - Main actors - Length and complexity of the chain - Stability of the chain - Supplier base - Main relationships, exchanges and flows	- Anderson *et al.* (1994) - Chakkol*et al.* (2014) - Michel *et al.*, (2008)
Information sharing and communication	- Level, quality, purpose, type and effect - Information flow management process	- Bastl*et al.* (2012) - Johnson and Mena (2008) - Paulraj*et al.*; (2008)
Manifestations of relationships	- Type of relationship - Collaboration - Dependency - Trust - Proximity - Facilities and their location - Suppliers' engagement in the organisation's strategy - Negative effects of partnering within the supply chain - "Vertical" integration	- Handfield and Bechtel (2002) - Lin *et al.*, 2010 - (Narasimhan*et al.*, 2006).
Supplier relationship management	- Formalisation, including contracts and legal bonds - Control mechanisms and governance - Conflict management mechanisms - Work methods - Coordination mechanisms - Alignment of incentives	- Daugherty *et al.*, 2006 - Kim (2007) - Tan *et al.*, (2002)

	- Performance measurement and value demonstration - Relationship management processes	
Innovation	- Type of innovation - Suppliers' involvement in innovation - Resources and competencies dedicated to innovation - Innovative capabilities	- Garcia and Calantone (2002) - Maglio and Spohrer (2008) - Van de Ven (1986)
Risk	- Type of risk - Consequences of risk - SC Risk management	- Johnson and Mena (2008) - Jüttner (2005) - Lavastre *et al.* (2014) - Mason-Jones and Towill (1999) - Shapiro and Varian (1999) - Smith *et al.* (2007)
Human resources	- Skills and knowledge - Attitudes and behaviours - Empowerment - Co-location of employees - Project team	- Handfield and Bechtel (2002) - McAfee *et al.* (2002)
Process management and integration	- Financial Flow Management - Customer support - Production Management - Returns Management and End-of-life - IT systems	- Maull *et al.* (2013) - Das *et al.*(2006) - Childerhouse *et al.*(2003).

Theme #1: Supply chain configuration

This theme is concerned with identifying the key actors in the supply chain as well as the relationships between these actors in terms of the main "things" that flow through the chain. These may include materials/equipment people, skills, information, knowledge, data flows and reports. Chakkol *et al.* (2014) suggest that the network concept is more appropriate to describe supply chains in a servitized context. They argue that the delivery of a servitized value proposition is supported by an extended delivery system comprising the operational activities of the supply network actors. The supply network concept extends the idea of a linear supply chain to a more complex set of interactions between multiple actors including the servitized manufacturer and its suppliers (Michel *et al.*, 2008). Supply networks encompass sets of connected firms or sets of connected relationships between firms (Anderson *et al.*, 1994). For instance Chakkol *et al.* (2014) map the interactions between network members to provide insights into the role of the overall network in supporting the delivery of the customer value proposition.

Theme #2: Information sharing and communication

This theme refers to the types of information that are exchanged within the supply chain and the effect of this information sharing on the businesses of suppliers. Bastl *et al.* (2012) suggest that sharing information openly might be useful for suppliers. For instance, some of the flows are flows of knowledge exchanged across participants. Information-sharing and communication facilitates the development of a rich knowledge base relating to the delivery of the value proposition (Paulraj *et al.*, 2008). Key dimensions to explore include the degree, quality, purpose, type and effect of information sharing. Additionally, a connected issue relates to the way in which data and information flows are captured, exchanged, stored and processed to generate insights that are shared across supply chain members (Johnson and Mena, 2008).

Theme #3: Manifestations of relationships

Manifestations of relationships describe informal and sometimes organic aspects that characterise inter-firm relationships within the supply chain (Narasimhan *et al.*, 2006). This theme encompasses a range of dimensions including the type of relationship (e.g. frequency, intensity and nature of interactions); the type, level and purpose of collaboration (e.g. use of cross-organisational teams to deal with service failures or to pursue service innovation); the extent of dependency of organisations in the chain; the type and level of trust between suppliers (Handfield and Bechtel, 2002); the geographical (Tan *et al.*, 2002), cultural and technological proximity between suppliers; questions around the presence of suppliers within or close to other organisations' operations; the extent to which suppliers are involved in defining the overall business strategy of the provider; the level of participation of suppliers in delivering the offering to the end customer (Lin *et al.*, 2010); and negative effects of partnering with suppliers. This theme also includes supply chain positioning issues which refers to situations where servitized manufacturers extend their operations backwards to undertake a range of activities that were previously performed by suppliers, or vice versa

Theme #4: Supplier relationship management

This theme refers to the creation of a structure for managing and developing relationships with suppliers, such as establishing Service Level Agreements (SLAs) and the negotiation

and execution of contracts. It comprises a range of dimensions that characterise the way in which relationships between suppliers are governed and supported. Important issues to consider include the extent of formalisation in the relationships (Daugherty *et al.*, 2006, Kim, 2007) as embodied in contracts and legal bonds (i.e. detailed and binding contractual agreements that specify the obligations and roles of both parties in the relationship), control mechanisms and governance (i.e. safeguards that firms put in place to govern inter-organizational exchange and minimize exposure to opportunism), conflict management mechanisms (i.e. how disagreements and disputes are handled and resolved), work methods (i.e. the adoption of common procedures and ways to do things), coordination mechanisms (i.e. mechanisms to ensure that suppliers work together to achieve mutual and individual goals jointly), alignment of incentives, performance measurement and value demonstration, and relationship management processes (i.e. activities that support relationships such as establishing SLAs, identifying and selecting suppliers and negotiating and executing contracts).

Theme #5: Innovation

This theme broadly deals with innovation which has been defined as "a new idea, which may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach which is perceived as new by the individuals involved. As long as the idea is perceived as new to the people involved, it is an "innovation", even though it may appear to others to be an 'imitation' of something that exists elsewhere" (Van de Ven, 1986, p.591-592). Although innovation may be defined very broadly, the research on innovation is largely product oriented (Garcia and Calantone, 2002). Nevertheless as services become more a differentiated source of advantage, service innovation has gained attention (Maglio and Spohrer, 2008). We discuss the role of supply chain members in participating jointly in the development and implementation of new or enhanced products, services, processes and business models. The theme seeks to explore if organisations within the supply chain collaborate to develop new or enhanced value propositions as well as to understand the processes and mechanisms through which this happens. Additionally, it addresses the effect of servitization on the development and management of suppliers.

Theme #6: Risk

This theme addresses the type, consequences and management of risk in a servitized context. Johnson and Mena (2008) state that "with servitization, much of the risk for non-performance transfers to the product provider as the product user is paying an ongoing fee for the availability or capability of a product or service. This means that the risks of not delivering the product/service promised, even if exogenous to the firm promising the result, need to be controlled and mitigated. Thus, risks within the firm and supply chain need to be controlled and mitigated". Supply Chain Risk Management (SCRM) can be deployed to manage these risks (Jüttner, 2005). In SCRM, inter-organizational and collaborative practices are particularly efficient (Lavastre *et al.*, 2014). Visibility throughout supply chain is an effective and a timely effort solution that minimise adverse effects of disturbances (Mason-Jones and Towill (1999). It relies heavily on good information systems, connectivity throughout the supply chain, and collaboration between all supply chain partners (Smith *et al.*, 2007). Moreover, Shapiro and Varian (1999)argue that networks offer value in the form of shared risks and economies of scale and scope.

Theme #7: Human resources

This theme represents the changing role and responsibilities of human resources. It addresses issues related to the type and level of employees' skills and knowledge, education, empowerment, attitudes and behaviours, commitment to the project and co-location across different suppliers (Handfield and Bechtel, 2002). The diversity of experiences and skills of people involved in value proposition are an extremely favorable lever for it (McAfee *et al.*, 2002). Also, for businesses, getting individuals or different services to work together allows them to take advantage of existing complementary skills and knowledge. In this regards, the capacity of the organization to implement cross-functional teams including, for example, supply chain and marketing, is important because this cross-functionality drives the servitization process. Implementing such internal teams can enhance and boost exchanges and communication between members of the same company and have a strong impact on servitization.

Theme #8: Process management and integration

The final theme refers to changes in business processes such as changes to the degree of integration between organisations and the degree to which systems, procedures and routines have been linked to facilitate the operations of organisations within the supply chain (Maull *et al.*, 2013).

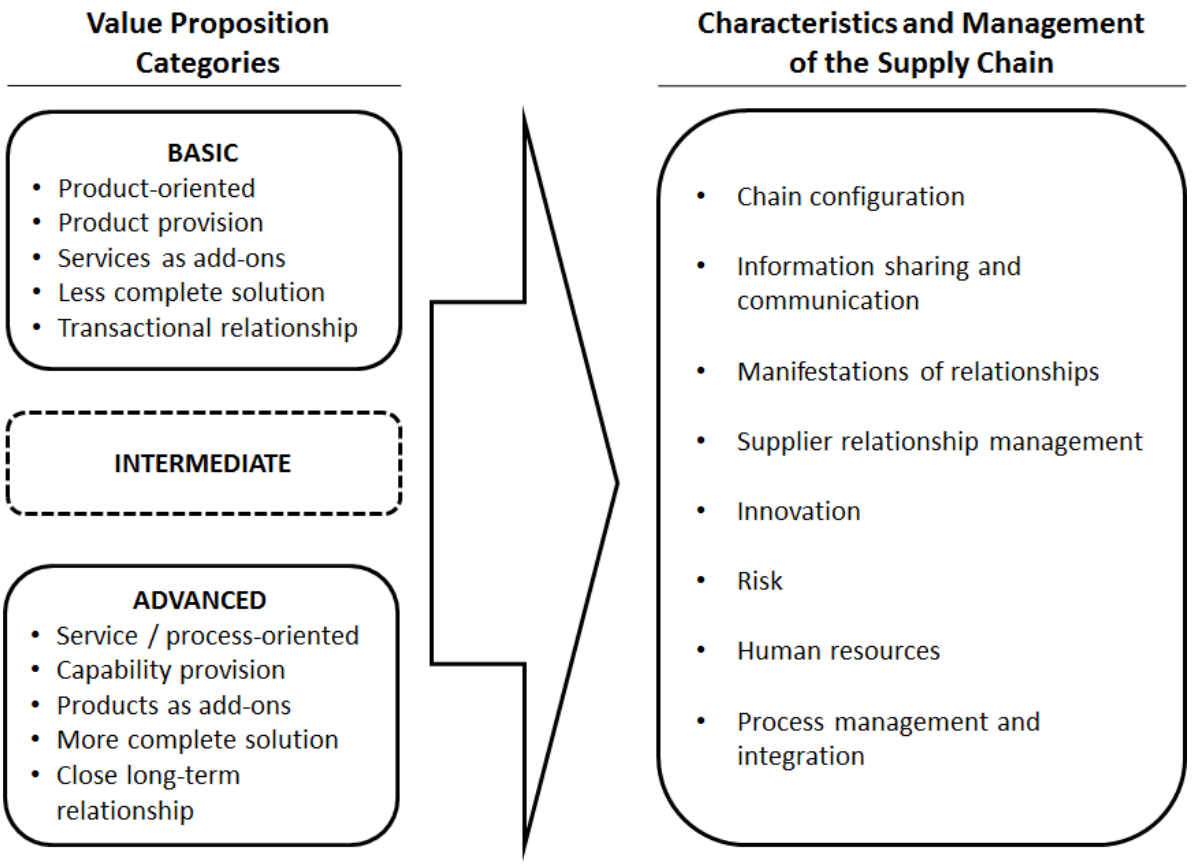
Research has repeatedly demonstrated that the achievement of high levels of integration of key business processes drives supply chain performance. It was accepted that higher integration levels lead to higher performance until Das *et al.* (2006) found that there is an optimal set of supplier integration practices, and that moving away from this optimum causes a decrease in supply chain performance. This idea of an optimal point of integration is consistent with the collaboration maturity model put forward by Childerhouse *et al.* (2003). According to this framework, there are different desired levels of integration between a firm and its suppliers.

The next section reviews the nascent literature that explores how the supply chain of servitized organisations is configured, characterised and managed.

4. MANAGING THE SUPPLY CHAIN IN A SERVITIZED CONTEXT: TOWARDS A RESEARCH FRAMEWORK

Based on our analysis of the developing knowledge base, we synthesise the arguments presented in the previous sections into a research framework (Figure 2).

Figure 2: Managing the supply chain in a servitized context: a research framework



This framework outlines the possible contingencies and characteristics of supply chains in a servitized context. On a general level, research is needed to provide an understanding of how multiple organisations within a servitized supply chain coordinate their operations to support a customer value proposition. More specifically, we propose that a natural next step for servitization research is to explore several categories of value propositions and the resultant implications on the characteristics and management of the supply chain.

This framework echoes and completes the recent studies conducted in servitized organisations. Johnson and Mena (2008) study the challenges and opportunities facing the supply chain management function of five servitized organisations. They define supply chain management in a servitized context as "the management of information, processes, capacity (people, equipment and facilities), products, services and funds from the earliest supplier to the ultimate customer" (p. 30). They draw on the process reference models for service supply

chains and product supply chains to develop a process framework for servitized supply chains, which they then explore empirically. Their framework includes the following core processes: information flow management, customer relationship management, supplier relationship management, demand management, production management, order delivery management, financial flow management, returns management and end-of-life, product development management and risk management. Their findings reveal that these processes were important and applicable to varying degrees in the case organisations. Specifically, they note the role of information flow management processes in allowing information and knowledge exchange between firms as well as the role of risk management processes in ensuring that risks are spread across the supply chain.

Lockett *et al.* (2011) conduct an exploratory case study into the effect of product service systems on the upstream supply chain. Specifically, they select two distinct value propositions, one traditional contract and one service-product contract, and compare and contrast the relationships between the manufacturer and two supplier organisations. They examine these relationships along several dimensions such as structure (i.e. information and data flows), supplier engagement in provider's strategy and delivery, alignment of incentives, information sharing in delivery, and life cycle considerations related to delivery. They observe significant differences in the supplier-provider relationships relating to product provision and to product-service provision on two dimensions only. They conclude that successful servitization requires aligning incentives across the entire supply chain and sharing information effectively.

Bastl *et al.* (2012) set out to explore the characteristics of buyer- supplier relationships in a servitized context. They collect case study data to examine the intensity or degree of information exchange, operational linkages, legal bonds, cooperative norms and adaptations in the relationships between a servitized organisations and two separate, but similar, suppliers. They find no evidence about changes in information sharing practices and some evidence about the emergence of cooperative norms. They observed more significant changes concerning the importance of contractual agreements that specify the obligations and roles of both parties and the intensity of process and systems integration between the provider and its suppliers.

Chakkol *et al.* (2014) carry out a single case study of a truck manufacturer and its supply network. They focus on three categories of value propositions that represent varying

degree of servitization (i.e. basic product offering, product and service offering, full-service solution). For each value proposition they explore the configuration of the associated supply network in terms of the type and number of actors that are involved in co-creating value as well as the characteristics of the networks including the type of relationships, the level and purpose of coordination and information-sharing and the nature of exchanges (e.g. materials/equipment, skills, information, knowledge, data flows and reports). Their findings reveal that each value proposition has different supply network configurations and characteristics. They also suggest that the effects of servitization on the supply chain are more pronounced for service-oriented value propositions than for product-oriented propositions. This finding resonates strongly with the extant service design literature (Ponsignon *et al.*, 2011), which empirically shows that offering different value propositions (e.g. standardised versus customised) require executing service delivery systems exhibiting markedly different operational characteristics. Thus, supply chains supporting the provision of different categories of value propositions are likely to operate differently. In other words, we propose that, in a servitized context, the characteristics and management of the supply chain are contingent on the type of value proposition it supports.

5. CONCLUSIONS

The purpose of this paper was to set out directions for future empirical on SCM in a servitized context. If servitization does have an impact upstream but that the magnitude of this impact is not as significant as what may have been expected. Fine grain analysis of previous research findings seem to indicate that the servitized organisation can be reluctant to engage more closely with the members of its supply chain. This may suggest a maturity issue and that further effects may be found as servitization becomes increasingly established over time.

Based on our analysis of the developing knowledge base, we synthesise the arguments presented in the previous sections into a research framework (Figure 2). The framework proposes that the characteristics of servitized supply chains are contingent on the category of customer value proposition that the chain supports. We suggest that this framework offers a useful platform for future empirical research on the impact of servitization on supply chain management.

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