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Article

Designing an advanced services contract in servitization strategy: A study from the B2B sector in Finland

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Abstract

Since the 1990s servitization has gained increasing recognition as a strategy for manufacturing firms to differentiate themselves from competition and gain sustained competitive advantage by integrating services to their products. Despite that there are still question marks on how to successfully implement it for value creation in a profitable way. This research addresses this need and aims to design the key steps of an advanced services contract, which is an important stage in servitization. In achieving this aim design-based research methodology is applied in the context of a multinational company (MNC) operating in the business-to-business (B2B) sector in Finland, a country which is second in the world by the percentage of servitized firms. Results are important for managers in the B2B sector who aim to servitize their firms' product offerings and develop advanced services contracts.

Keywords: Servitization, advanced services contract, design-based research, B2B, MNC, Finland

1. Introduction

Although the topic of servitization was introduced by Vandermerwe and Rada for the first time in 1988, it is a relatively new concept, as the academic interest on the topic has flourished mainly during the last fifteen years in line with the introduction and progress of research on the service-dominant logic (Luoto et al. 2017; Brodie et al. 2019). The topic has been studied by communities who research product-service-systems (PSS), solution business, service science, service marketing, service management, and operations management (Baines et al. 2017; Rabetino et al. 2018) under the themes of service offerings, strategy and structure, motivations and performance, resources and capabilities, and service development, sales and delivery (Raddats et al. 2019). Servitization refers to the process of integrating service concepts by the manufacturing firm and the accompanying transition from offering a pure product to offering integrated PSS, which are more difficult to imitate, and hence deliver sustainable revenue streams (Baines et al. 2009; Baines et al. 2017). There can be various levels of integration: Oliva and Kallenberg (2003) propose a product-service continuum, according to which servitization can range from products with “add-on” services to services with “add-on” products. Servitization is observed mostly at well-established large manufacturing firms from advanced economies as a response to differentiate their offerings in order to sustain their competitive advantage against low-cost manufacturers from emerging economies (Martinez et al. 2010; Vendrell-Herrero and Wilson 2017). It implies strong customer centricity and a shift from transaction-based customer interaction to relationship-based interaction (Vargo and Lusch 2004; Baines et al. 2009; Valtakoski 2017). In this logic services, not products, are assumed to be the real drivers of value creation, and the long-term relationship ensures the stability of revenue generation by

locking in customers and locking out competitors (Gebauer and Friedli 2005; Neely 2008; Grönroos and Helle 2010; Vendrell-Herrero and Wilson 2017). Value is defined by and co-created together with the customer in this relationship through successful configuration and bundling of knowledge components (Vargo and Lusch 2004; Valtakoski 2017).

Earlier studies present inconclusive findings on the financial performances of servitized firms (Ambroise et al. 2008). Neely (2008) argues that whereas servitized firms generate higher revenues, they have lower operating profit margins, which he claims to be a paradox. In explaining this paradox, he presents challenges related to shifting mindsets, timescale, business model, and customer offering. The transformation to servitization is challenging and not always successful due to possible resistance from employees, especially the sales staff, as well as established perceptions and assumptions among customers, which may be difficult to change (Luoto et al. 2017). Vladimirova et al. (2011) highlight further challenges of servitization such as organizational challenges, customer challenges, business process challenges, financial challenges, network challenges, and market challenges. As a result, servitization failure is not uncommon, and in some cases the manufacturing firm needs to deservitize or reverse servitize their offerings (Benedettini et al. 2015; Valtakoski 2017).

There are very few guidelines for managers on how to overcome the challenges of implementing servitization successfully, and thus there is the need for researchers to develop tools for managers to help in addressing these challenges (Baines et al. 2009; Baines et al. 2017; Valtakoski 2017). At the same time there are also opportunities for exploring and clarifying the conceptual links in servitization (Lightfoot et al. 2013; Baines 2015; Vendrell-Herrero and Wilson 2017). This research aims to contribute to these needs by studying the phenomenon of contracting of advanced services and designing a model for it. Advanced services, which are different than base services and intermediate services, focus on outcome assurance, and they involve many contact points between the manufacturing firm and the customer, extending the operations of the manufacturing firm to those of the customer for a long term of five to fifteen years (Baines et al. 2013; Baines et al. 2017). The significance of advanced services has increased a lot with the introduction of digital technologies such as big data and internet of things, and this necessitates to study advanced services from new and multiple perspectives, e.g., to figure out what risks the manufacturing firm and its customers face with technological advances in advanced services (Raddats et al. 2019; Sklyar et al. 2019). As a result, contract design for advanced services has become a very crucial step in servitization (Avlonitis et al. 2014).

The methodology applied in this research is design-based research, and the case company is an MNC operating in the B2B sector in Finland. Finland ranks second in the world following the USA in terms of the percentage of servitized firms (Neely 2008). Reasons behind this fact can be that Finland has a high percentage of B2B firms, and labor costs in the country are high. Thus, Finnish B2B firms need to differentiate their product/service offerings in order to remain competitive in global markets. Due to confidentiality reasons, the MNC of the empirical study will be referred hereafter as the case company. Its operations used to focus mainly on manufacturing, and services consisted of transactional sales of spare parts, maintenance and consulting. Then the case company made its first advanced services contract with a customer in the oil and gas industry. As a result of that its manufacturing operations were outsourced to a low-cost country, and the case company transformed itself to a full-time service company, which implied significant changes in the company culture and the business logic. The results from its first servitization experience made it clear to the management that there was a need for developing a systematic approach to design advanced services contracts. Developing a model for advanced services contracts by studying the experiences of this case is a promising attempt to contribute to the servitization literature and help other manufacturing firms with similar needs.

The rest of the paper is organized as follows. In section 2 the relevant servitization literature is reviewed and a theoretical framework is developed, and in section 3 the methodology of research-based design as well as data collection and data analysis are described. Thereafter, the results of the research are presented in section 4, and the paper ends with a discussion of findings in section 5.

2. Literature Review

2.1 Servitization

Servitization is defined in various ways. The first definition by Vandermerwe and Rada (1988) conceives it as bundles of customer-focused combinations of goods, services, support, self-service and knowledge. This definition is quite inclusive. Later definitions focus more on the addition of services to products by the manufacturing firm (see Robinson et al. 2002). Some scholars consider it to be a strategy (see Avlonitis et al. 2014), while others view it as an organizational change process or the innovation of the organization's capabilities and processes in order to co-create value together with customers (see Vargo and Lusch 2004; Baines et al. 2009). It is also perceived as a kind of vertical integration in response to calls for manufacturing firms to go downstream and capture the value of supplementary services (Wise and Baumgartner 1999; Neely 2008). The use of servitization vocabulary in different countries is also different, and as a result there is lack of common understanding of the phenomenon (Baines 2015; Kowalkowski et al. 2017). It is even misunderstood by some practitioners as a service that should be provided automatically alongside the standard product offering rather than as a business model which will provide the firm competitive advantage over its competitors (Bustinza et al. 2015). Therefore, a clear and inclusive research agenda is needed in order to eliminate the confusion (Baines et al. 2017).

Vendrell-Herrero and Wilson (2017) provide a taxonomy of the fragmented servitization literature, grouping it under four themes. While research under the first theme focuses on organizational transformation processes to integrate services into the manufacturing firm's offering (see Vandermerwe and Rada 1988; Baines and Lightfoot 2013; Baines et al. 2017), research under the second theme studies the causal link between servitization and firm performance (see Neely 2008; Benedettini et al. 2015). Research under the third theme and the fourth theme expand servitization to contexts outside of manufacturing. Research under the third theme, also called digital servitization, looks into digital services provided by digital components in physical products such as smartphones and tablets. Finally, research under the fourth theme studies external knowledge-intensive business services delivered to small manufacturing firms which lack resources. We shall note that servitization research under the third and fourth themes is relatively scarce (Vendrell-Herrero and Wilson 2017), and this research clearly falls under the first theme, which according to Baines et al. (2017), is the most significant challenge facing both researchers and managers.

Bigdeli et al. (2017) make a classification of organizational change research in the servitization literature based on their descriptive vs. normative nature and based on their analysis of content, context, or process. They find out that in terms of content most of the research is descriptive and carried out at business and network levels. Their finding regarding context is that most of the research studies strategic and structural dimensions related to servitization decisions as well as the economic and industrial aspects of servitization. Finally, most of the process research is about servitization design, delivery and procurement processes, business models and innovation, scenario simulations, decision making process, and new service development (ibid.).

The fragmented servitization literature has utilized a number of theoretical perspectives (see Valtakoski 2017). These include the system selling perspective, the industrial marketing and purchasing perspective, the value stream perspective, the service-dominant logic, and the knowledge-based view. Whereas the system selling perspective views servitization as a system that consists of a product and a service, the industrial marketing and purchasing perspective studies servitization as a dynamic relationship building on resource dependence and social exchange theories (ibid.). Furthermore, while the value stream perspective looks into value chain activities and sees servitization as integrating forward or backward along the value chain, the service-dominant logic treats it from the perspective of co-creating value together with the customer (ibid.). Finally, the knowledge-based view looks at it as a solution created by bundling and configuring knowledge components from the manufacturing firm and the customer (ibid.).

Servitization offers opportunities for achieving competitive advantage by allowing the manufacturing firm to differentiate itself through services that create value for customers (see Neely 2008; Luoto et al. 2017). This is because compared to products, services are more difficult to imitate and more customer-centric, and as a result, they offer higher profit margins and more stable sources of income (Oliva and Kallenberg 2003; Gebauer 2009). Servitization also contributes to building a long-term relationship with the customer and better understanding of the customer's needs through enhanced communication between the manufacturing firm and its customer on a continuing basis (Bastl et al. 2012; Kastalli and Van Looy 2013). Value co-creation through enhanced communication leads to innovations and helps to lock in customers and lock out competitors (Vargo and Lusch 2004; Gebauer and Friedli 2005; Neely 2008; Grönroos and Helle 2010). Servitization especially through advanced services creates value for and thus benefits customers in that they get customized services, reduce their operational risks by transferring responsibilities, and predict their repair and maintenance costs more accurately (Neely 2008). Empirical

evidence shows that manufacturing firms pursuing product customization strategies are better positioned to servitize (Sousa and da Silveira 2019).

Neely (2008) suggests five types of servitization, namely product-oriented PSS, use-oriented PSS, result-oriented PSS, integration-oriented PSS, and service-oriented PSS. In product-oriented PSS the ownership of the product is transferred to the customer, and additional services related to the product, such as installation services, maintenance and support services, and consulting services are provided. In use-oriented PSS the ownership of the product is retained by the service provider firm, and services are leased through the product. Software as a service and car leasing are examples of this type of servitization. Result-oriented PSS differs from both product-oriented PSS and use-oriented PSS in that the product is fully replaced by a service. An example of this rather rare type of servitization is the replacement of answering machines by voicemail service (ibid.). Integration-oriented PSS is similar to product-oriented PSS in that it is a product plus service, but the manufacturing firm goes downstream by adding services which are not integral to the product. Vertical integration can take place in this type of servitization by moving into for example retail and distribution or financial services. Finally, service-oriented PSS incorporates the service into the product, hence it is a coupled product and service. The ownership of the product is transferred to the customer, and additional services are provided. An example of this type is Intelligent Vehicle Health Monitoring services (ibid.). In another typology, Ambroise et al. (2018) present three types of servitization strategy, namely added services, activities reconfiguration, and business model reconfiguration. While ownership rights and risks are transferred to the customer in the added services and the activities reconfiguration strategies, they remain with the manufacturing firm in the business model reconfiguration strategy (ibid.). Whereas the customer's activity chain does not change in the added services strategy, it changes significantly in the activities reconfiguration and business model reconfiguration strategies (ibid.). Finally, the business model configuration strategy also has a strong impact on the customer's business model, which the other two strategies do not (ibid.).

Implementing servitization is not without challenges, and as a result of poor implementation the overall performance of the manufacturing firm can decline, resulting even in bankruptcy (Neely 2008; Parida et al. 2014; Benedettini et al. 2015). Hence, servitization can fail, and the manufacturing firm may need to deservitize or reverse servitize, reducing the role of services in its offering (Valtakoski 2017). Benedettini et al. (2015) take a risk-based perspective on servitization and suggest that as the manufacturing firm adds more services to its existing offerings, it is more vulnerable to additional internal risks due to mistakes arising from decision-making characteristics of top managers. One reason behind poor performance can be the high expectations of managers from servitization: they invest heavily on its implementation, but the increase in revenues remains limited in comparison to the increase in costs (Gebauer et al. 2005; Reinartz and Ulaga 2008; Kastalli et al. 2013). Internal risks also increase because there can be challenges for managers to adapt to the shift in the mindset from transactional to relational marketing, from selling products to selling service contracts and capabilities, and from product ownership by customers to becoming service users (Neely 2008). Servitization can also fail when the offered solution is not what the customer wants or when it fails to create sufficient incremental value for the customer (Valtakoski 2017). In addition, the shift to a long-term partnership introduces new risks in the implementation which need to be understood and managed well, and the manufacturing firm is in need of a transformation to develop a service culture which should build new capabilities to design and deliver services rather than products by better understanding what customers value (Neely 2008). Servitization can also fail during implementation if there is lack of trust between the manufacturing firm and the customer, especially when the knowledge bases of the manufacturing firm and the customer are close to each other (Valtakoski 2017). Furthermore, power difference between the manufacturing firm and the customer can also affect the nature of the relationship (see Akpınar and Zettinig 2008; Akpınar 2017). Mismanaging long-term customer relationships and failing to develop a service culture and corresponding service capabilities will not deliver the promised benefits of servitization.

Parida et al. (2014) suggest that in order to manage the transformation to servitization successfully, the manufacturing firm should develop four distinctive capabilities, namely business model design capability, network management capability, service delivery network management capability, and integrated development capability. Whereas the business model design capability adopts a value-driven marketing approach, uses a value-based pricing strategy, makes risk- and revenue-sharing agreements, and emphasizes flexibility and customization, the network management capability establishes a relationship management unit, involves new and existing partners, understands the partners and aligns incentives with them (ibid.). Similarly, the service delivery network management capability extends the involvement of delivery partners, facilitates their transition, and develops a support strategy for them, and finally, the integrated development capability links disconnected

development processes, increases the potential to capture customer needs, and makes use of product-in-use information (ibid.). Rajala et al. (2019) further argue that in the future the manufacturing firm will need to develop especially modular design capability and resource integration capability in order to benefit from economies of repetition and achieve additional competitiveness. Finally, taking a knowledge-based view, Valtakoski (2017) suggests knowledge management capability as a key success factor. This capability covers bundling and configuring of the knowledge components of the manufacturing firm and the customer in optimal ways for co-creating value for the customer as well as transferring knowledge between the manufacturing firm and the customer in the implementation of servitization (ibid.).

2.2 Services and service contracts

The concept of services to be included under servitization is broad including design and development services, systems and solutions, retail and distribution services, maintenance and support services, installation and implementation services, financial services, property and real estate, consulting services, outsourcing and operating services, procurement services, leasing services, and transportation and trucking services (Rajala et al. 2019). Brax and Visintin (2017) conceptualize service value constellations with increasing levels of servitization in the following order: products with limited support; installed and supported products; complementary services; product-oriented solutions; systems leasing; operating services; managed service solutions; and total solutions. Baines et al. (2013) classify services as base services, intermediate services, and advanced services. Base services focus on product provision: they have a narrow scope with low risk, and the payment for these services is realized upon the completion of the contract (ibid.). An example is ad-hoc service support in case of product failure or breakdown. In base services the relative importance of services to the manufacturing firm's performance is low, and accordingly investments in the service business are insignificant (Fischer et al. 2012; Avlonitis et al. 2014). Intermediate services focus on condition maintenance: they have a broader scope to assure the condition of the equipment with medium risk related to consequences of equipment failures, and the payment for these services is periodic (Baines et al. 2013). Examples of intermediate services include scheduled maintenance, operator training, technical helpdesk, and condition monitoring (ibid.). The relative importance of services to the manufacturing firm's performance is medium, and accordingly investments in the service business are average (Fischer et al. 2012; Avlonitis et al. 2014). Finally, in advanced services the focus is on outcome assurance (Baines et al. 2013). As a result, the scope is extended to include activities that are internal to the customer, and the payment for these services is made linearly based on use: examples of advanced service contracts include customer support agreements, pay-per-use contracts, and risk and revenue sharing contracts (ibid.). Advanced services are highly customized to the needs of the customers. The business logic in advanced services is performance-based; as such, the relative importance of services to the manufacturing firm's performance is high, and accordingly investments in the service business are very significant (Fischer et al. 2012; Avlonitis et al. 2014). While base services require more of a product-centric approach, intermediate services need a balanced product-service-centric approach, and advanced services demand more of a service-centric approach. The combination of product-centric and service-centric approaches at various levels in servitization creates paradoxes and tensions, which managers need to tackle for the successful implementation of their business models (Smith et al. 2010).

Contract formation is a very important task in servitization, and there are different types of contracts for different types of services, such as spare parts sales contract, time and material contract, availability contract, development contract, outsourcing contract, and performance-based contract (Colen and Lambrecht 2013; Avlonitis 2014). The amounts of responsibilities, investments and risks as well as the potential for profits increase on the continuum from base services towards advanced services (Fischer et al. 2012; Colen and Lambrecht 2013; Avlonitis et al. 2014). The pricing of advanced services contracts can be cost-based, fixed-price, or performance-based (Kastalli and Van Looy 2013). The choice of the pricing model as well as its calculations are difficult tasks due to the need to integrate increasing uncertainties in the long-term (Parida et al. 2014). Contracts need to cover a sufficiently long period in order for the manufacturing firm to justify its initial heavy investments and for the customer to capture the benefits of servitization (Euchner 2014). Baines and Lightfoot (2013) identify operational and contextual factors which contribute to the successful delivery of advanced services contracts. Operational success factors are co-locating of facilities near the customer's operations, vertical integration to ensure control over responsiveness and continuous development, remote asset monitoring, aligning outcome measures to individual customers, having flexible, service-centric, and technically adept front-office staff, and having proactive customer-integrated processes (ibid.). Contextual

success factors, on the other hand, require good understanding of product design features, customer characteristics, characteristics of the application of the product, as well as characteristics of the offering (ibid.).

2.3 Theoretical framework

The theoretical framework aims to set the boundaries for the empirical study in line with the objectives of the research. In doing that it presents an overview of the stages in the successful delivery of an advanced services contract and sets the place for contracting in this overview (see Figure 1).

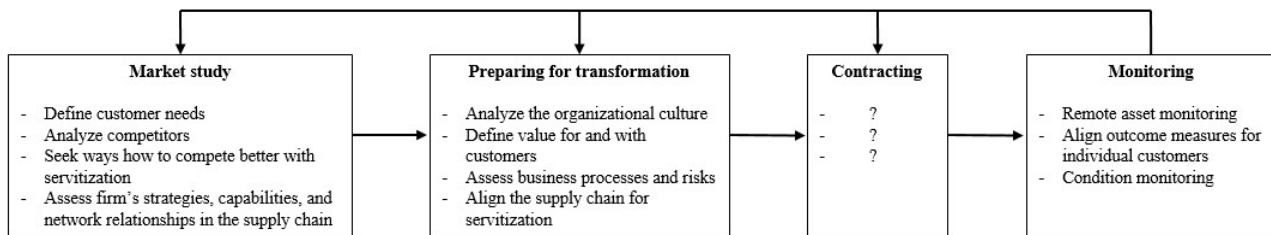


Figure 1. The theoretical framework: Stages in the successful delivery of an advanced services contract. Synthesized from Vladimirova et al. (2011), Baines and Lightfoot (2013), and Avlonitis et al. (2014).

Based on a synthesis of the literature we identify four stages in the successful delivery of an advanced services contract. These are market study, preparing for transformation, contracting, and monitoring. The market study stage includes, as suggested by Avlonitis et al. (2014), the analysis of the external environment, e.g., understanding of the customers and defining their needs, analyzing competitors, and seeking ways how the manufacturing firm can better compete with servitization, as well as analysis of the internal environment, e.g., the firm's strategies, capabilities, and network relationships in the supply chain. Outputs from this stage are important inputs for preparing the firm to transform to servitization in the second stage. Servitization demands operational and organizational transformation (Vladimirova et al. 2011; Benedettini et al. 2015; Bustinza et al. 2015). In order to identify the needs of this transformation, managers should carefully analyze the organization, its business processes, and networks (Vladimirova et al. 2011). Borrowing from Vladimirova et al. (2011) and Avlonitis et al. (2014) the following questions should be addressed at this stage. What are the main barriers and enablers to servitization? Does servitization suit the existing organizational culture? How will the services be delivered? How will value be created for and with the customers? What are the risks of servitization, and how will they be managed? How will performance be measured? How will the supply chain be organized for servitization? Answers to these questions will be valuable together with outputs from the first stage in designing the advanced services contract in the third stage. Contracting is a critical stage in servitization because the contract will set the legitimate framework for the relationship with the customer over the long-term (Fischer et al. 2012; Colen and Lambrecht 2013; Avlonitis et al. 2014). In literature this stage remains less researched, and this research aims to make a contribution by developing a holistic, yet practical and detailed approach to design advanced services contracts. The fourth and last stage is about monitoring of servitization performance in order to sustain the successful delivery of the advanced services contract. The operational and contextual factors of Baines and Lightfoot (2013) provide a good list for this purpose including for example remote asset monitoring, aligning outcome measures for individual customers, and condition monitoring. The framework is dynamic in that performances should be assessed on time, and necessary implications should be reflected to the other three stages on a continuous basis.

3. Methodology

3.1 Research approach and context

Most of the earlier research on servitization is qualitative, based on cross-sectional and descriptive case studies (Rabetino et al. 2018). This research also applies a qualitative research approach, and there is a case company, but the applied methodology

is design-based research. Design-based research suits well when the aim is to solve a practical problem and improve both the practice and the theory through close collaboration between researchers and practitioners (Edelson 2002; Barab and Squire 2004; Wang and Hannafin 2005; Kananen 2013). In this research there was continuous collaboration between the researchers and the practitioners as one of the researchers was employed by the case company, thus wearing the hat of a researcher and practitioner simultaneously. He experienced the process of servitization at the case company as a primary observer and took the initiative to develop a model for an advanced services contract. This interventionist pragmatic approach takes place in a natural context in a real-world setting, and it uses the logic of abduction in that theory and empirical data interact over time in coming up with the solution (Barab and Squire 2004; Kananen 2013). It has been applied in earlier management studies for example in designing gamified services and solutions (see Blohm and Leimeister 2013; Kananen and Akpinar 2015). The case company is an MNC in the B2B sector located in Finland. Due to confidentiality reasons the names of the company and the interviewees are kept anonymous. The development target is a model for advanced services contracting. The empirical study was initiated and guided by the theoretical framework (see Figure 1) building on the earlier works of Vladimirova et al. (2011), Baines and Lightfoot (2013), and Avlonitis et al. (2014), and the proposed model was developed iteratively after collecting and carefully analyzing the data from the case company.

3.2 Data collection and analysis

Qualitative primary data was collected from a number of sources. First, the process of servitization in the case company was observed including the development of the advanced services contract with the customer. In addition two semi-structured interviews were conducted with the business development manager and the regional sales manager, who were also actively involved in the development of the advanced services contract. Interview questions were designed with the aid of the theoretical framework, and the interviews, which were conducted in Finnish language, the native language of the interviewing researcher and both interviewees, were recorded and transcribed. Interview data comprised of two and half hours of recorded data which was converted into twenty pages of transcribed text. Furthermore, the case company's internal documents were studied including the existing advanced services contract, company presentations and training materials for servitization. Data from multiple sources was triangulated and analyzed using the method of content analysis with the aid of coding using Microsoft Word and Excel (see Corbin and Strauss 2008; Krippendorff 2012). During the analysis data was organized and combined under themes based on patterns of similarities, and in doing that there was continuous strong collaboration with the theoretical framework (Eriksson and Kovalainen 2008).

3.3 Validity and reliability

Design-based research is criticized regarding the validity of its findings in two ways. First, it is not always easy to relate the observed effects to the design (Reimann 2011), and second proposed designs are limited in their generalizability (Barab and Squire 2004). Especially the latter concern is highly valid for advanced services contracts which can exhibit unique features as they are customized to the needs of the customer (Fischer et al. 2012; Avlonitis et al. 2014). Awareness of these issues required attention in the analysis, and the principles of Wang and Hannafin (2005) for design-based research were followed rigorously throughout the research process to achieve validity and reliability. In solving the practical problem the design of the research was connected to theory from the very beginning of the project, and strong linkages to the case company allowed to achieve reliable linkages between theory and practice. Triangulating the data from various sources as well as the rigor applied in collecting and analyzing the data further contributed to the reliability of findings. Finally, in proposing the model for advanced services contracts features that are unique to the case company and its customer were carefully detected and removed.

4. Results

The analysis revealed three key steps and their related sub-steps in contracting which are integrated into the original theoretical framework (see Figure 2). The key steps are feasibility study, service model proposal, and contracting of advanced services. These steps and their sub-steps are described in detail in sections 4.1, 4.2 and 4.3 respectively.

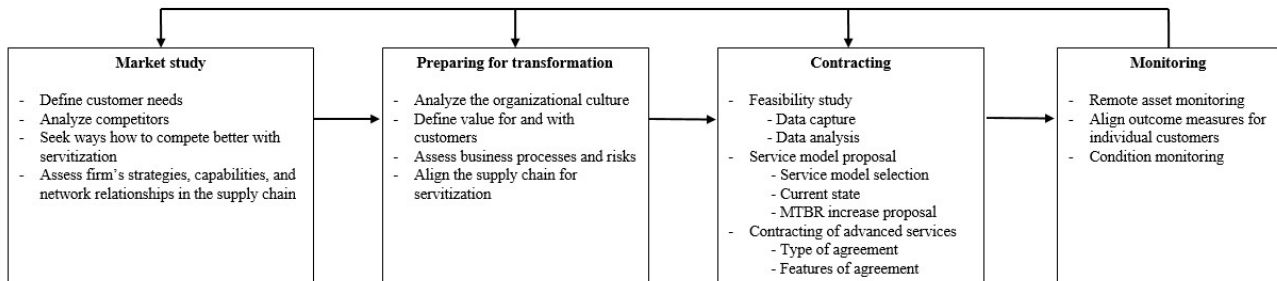


Figure 2. The model for advanced services contracts. Synthesized from Vladimirova et al. (2011), Baines and Lightfoot (2013), and Avlonitis et al. (2014).

4.1 Feasibility study

This is the starting step in preparing an advanced services contract in which the customer's current and historical states of performance and cost profile are analyzed. At this stage the manufacturing firm already knows the customer and its business at some level. However, there is need to access detailed operational data from the customer for the previous three to five years in order to accurately define the total cost of ownership, to assess the historical and current performance levels of the customer's equipment, to quantify potential cost savings and the potential for performance improvement, and to propose the right service model to meet the customer's needs. The success of the contract depends on a profound understanding of the customer's performance and cost profile. Feasibility study has two sub-steps: data capture and data analysis.

Data capture aims to receive as much raw data as possible from the customer regarding the installed base, inventory, equipment history, and operational costs. The installed base and inventory include lists of all the equipment, products, spare parts, bill of materials and inventories that the customer has in use or in its stocks which will be in the scope of the advanced services contract. This data helps the manufacturing firm to understand the needs for refurbishment and inventory management. The data which will be retrieved from the customer's database should be physically checked by the manufacturing firm for accuracy. Equipment history provides insights on the equipment's failure frequency and repair costs, and a history of three to five years is good to gain reliable insights. Finally, collecting data on operational costs is critical for the manufacturing firm because according to the advanced services contract it will take full ownership of the customer's installed base and inventories, which requires a huge investment. The costs must be traceable to the equipment and inventories and calculated accurately in order to determine the total stock value of the redemption, the costs of refurbishment, the costs of investment, and the purchase price. Having a good knowledge of costs is vital for understanding improvement areas and forecasting the potential for savings.

Data captured from the customer is analyzed using the techniques of mean time between repair (MTBR) analysis and bad actor analysis. MTBR is the most important key performance indicator to assess the reliability of the customer's total installed base. It measures the failure frequency of the equipment which forms the basis to suggest the cost saving potential that the customer will gain from the advanced services contract. Bad actor analysis, on the other hand, aims to identify the equipment that fail the most often, i.e. bad actors by failure frequency, and equipment that generate the highest costs of failure, i.e. bad actors by total cost, in the customer's installed base. This analysis helps both the manufacturing firm and the customer to understand which equipment they should pay more attention and take corrective actions proactively.

4.2 Service model proposal

The second key step following feasibility study is service model proposal, which has three sub-steps, namely service model selection, current state, and MTBR increase proposal. Analysis of the data from the customer allows the manufacturing firm

to assess which type of service model suits best the interests of both parties, and accordingly make a proposal to the customer. Once the appropriate service model is selected, it is also important to quantify the current state of performance (e.g., refurbishment costs, failures) and to propose an increase or improvement in MTBR that will come with the proposed service model. This proposal should also suggest a list of carefully selected actions which will deliver the target improvement. The more that the manufacturing firm offers to improve the MTBR, the more attractive that the advanced service model and contract will be to the customer.

4.3 Contracting of advanced services

The last step in contracting is the actual contracting of advanced services, which includes the sub-steps of agreeing upon the type of the agreement and the features of the agreement. The type of the agreement concerns the duration of the contract and the fee structure of the contract. Both interviewees suggested that the duration of the contract should be minimum five years for the manufacturing firm to capture the benefits and minimize the risks. Given the scale and complexity of the operations it takes a number of years before the manufacturing firm learns the customer's business processes and culture well enough to deliver the promised improvements. As an alternative, the duration can be 3+2 years or 3+3 years in the contract. This gives both sides the chance to review the situation at the end of the third year, and the contract continues automatically if there is no major issue. The fee structure can be fixed fee based or transactional. Fixed fees are more suitable in advanced services for both the manufacturing firm and the customer. For the customer it means the transfer of risks to the manufacturing firm, and for the manufacturing firm it motivates to deliver the promised improvements in MTBR faster.

Features of the agreement refer to the type of service offerings that will be provided to the customer. Services that are recommended to be included in the contract are front office support, inventory optimization, equipment failure analysis, root cause analysis for bad actors, structured reporting and review procedures, and training programs. Physical presence of the manufacturing firm's service engineers at the customer's site may be needed to provide some of these services. This is also in the interest of the manufacturing firm to control operations at the customer's site in fixed fee based agreements.

5. Discussion

5.1 Contributions

This research developed a theoretical framework for advanced services contracting based on literature review (see Figure 1) and then improved it as a model by unveiling the contracting stage based on evidences from an MNC in the B2B sector in Finland (see Figure 2). The importance of advanced services has increased lately with the introduction of digital technologies and services in manufacturing (Raddats et al. 2019; Sklyar et al. 2019), and as Baines et al. (2009) as well as Baines et al. (2017) suggest, managers of manufacturing firms are in need of practical models to help them in transforming their organizations to compete through advanced services. Hence, the model proposed in Figure 2 contributes to the servitization literature by addressing this need. The concrete contribution to the literature is that the model clarifies the steps of the contracting stage, which is a very critical stage of servitization (Fischer et al. 2012; Colen and Lambrecht 2013; Avlonitis et al. 2014), and which according to our literature review has been relatively less researched.

5.2 Limitations and future research avenues

It was possible to develop an insightful model for managers thanks to the extent literature review and the access to rich data from the case company. However, each case of advanced services is unique as it is designed to fit the unique needs of the customer (Fischer et al. 2012; Avlonitis et al. 2014). As a result, advanced services contracts are also different. This sets a natural limitation for the generalizability of the findings. Acknowledging this fact, we assessed the data carefully and avoided case-specific elements in developing the model. Although this relaxes the limitation to a certain extent, managers should remember that this is a general road map and that they also need to analyze the unique aspects of their customers in designing advanced services contracts. We recommend two future research avenues. The first one is to replicate this study in other case

companies from different sectors and geographies. Insights from multiple cases will improve the model further. The second research avenue is to test the model using a survey with a sample of manufacturing firms and their customers. This will increase the generalizability of the model.

5.3 Managerial implications

The proposed model in Figure 2 provides a road map for managers of manufacturing firms in the B2B sector to develop successful advanced services contracts. This demands long-term close cooperation with the customer based on mutual trust and transparency such that both parties open their books and reveal their secrets to each other. The proposed model states that advanced services contracting is a dynamic process comprising of four stages. In the first stage, managers of the manufacturing firm should carry out an external market study to identify possible opportunities of servitization. The second stage aims to prepare the manufacturing firm for servitization. During this stage managers should make an internal assessment of how the firm can align its organizational culture as well as its supply chain network in order to deliver value for the customer. The third stage is the critical contracting stage. It is critical because its output is the contract which will serve as the legitimate basis for the long-term relationship with the customer. There are three important steps at this stage. First of all, managers should make a feasibility study to calculate the value for the manufacturing firm and the customer by carefully analyzing the data captured from the customer (see section 4.1 for details of the analysis). Secondly, they should develop and propose a suitable service business model which shows the improvement in MTBR and how it will be achieved. And finally, they should outline the type of contract and its features (see section 4.3 for details). Contract type and features may vary from one customer to another based on customers' unique needs, but a period of minimum five years is recommended for the length of the contract since it is a realistic time frame to capture value for both the manufacturing firm and the customer. Once the contract is in force, we recommend managers to continuously monitor equipment performance as well as market conditions and utilize the feedback from this activity to revise the decisions of the earlier stages.

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