STRATEGIC CHANGE TOWARDS FUTURE INDUSTRIAL SERVICE BUSINESS

MIIA MARTINSUO
OLGA PERMINOVA-HARIKOSKI
& TAIJA TURUNEN (EDS.)

Tampereen teknillinen yliopisto - Tampere University of Technology

MIIA MARTINSUO
OLGA PERMINOVA-HARIKOSKI
& TAIJA TURUNEN (EDS.)

STRATEGIC CHANGE TOWARDS FUTURE INDUSTRIAL SERVICE BUSINESS

Tampere University of Technology. Department of Industrial Management
Tampere 2015

fimecc

fimecc *fut*IS
HELPING TRANSFORM AN INDUSTRY

Tekes

© Miia Martinsuo, Olga Perminova-Harikoski, Taija Turunen

ISBN 978-952-15-3639-7 (printed)
ISBN 978-952-15-3640-3 (PDF)

Publisher: Tampere University of Technology
2015
Layout and cover design: Manu Pärssinen, Alasin Media Oy
Printed by Juvenes Print in Tampere, Finland

Table of Contents

PART 2. EMBEDDING SERVICES INTO OPERATIONS AND SUPPLY NETWORKS

PART 3. SERVITISATION AS A STRATEGIC TRANSFORMATION

INTRODUCTION

MIIA MARTINSUO
OLGA PERMINOVA-HARIKOSKI
AND TAIJA TURUNEN

Rationale for the book

Research on future industrial services has gained significant attention from the scientific community and practitioners alike. Services have increasing importance for industrial firms. Servitisation—the transition from manufacturing-oriented towards service-oriented strategies and business models—is and will more increasingly be the future for manufacturers around the globe. Topics like customer-oriented service operations, pricing of services, and value driven business models, to name a few, are believed to be the core competitive advantage for industrial firms.

In contrast to goods, services are co-created with customers. Although certain standardisation, via service modularisation, is believed possible, the customer experience received from services is individual and therefore unique. Managing customer experiences requires deep understanding of the customers' values, needs and problems. The customers' perspective must be addressed carefully in business operations to strengthen the service provider's position in global markets. In this respect, the concept of value-adding solutions as complex product-service bundles has become rather popular.

While increasing numbers of industrial firms are choosing to becoming solution providers, comprehensive change is not easy to achieve. Services cannot be treated merely as add-ons to a successful and valuable product, and the solution does not become successful only because goods and services are bundled into one offering. Similarly, a manufacturing-oriented company cannot change its organisational culture and way of working to deliver services in the short term. This book focuses on the challenge of strategic change towards service business in industrial firms. The book presents different aspects, benefits and requirements of industrial firms transitioning towards service-oriented strategies and shows various analytical approaches, methods and frameworks to assist such a change in practice.

The insights in this book are a result of collaboration between the researchers and practitioners of Finnish industrial firms as part of FIMECC's (Finnish Metals and Engineering Competence Cluster) Future Industrial Services (FutIS) research program. The program is characterized by years of hard work among Finnish industry and academics with the goal of taking Finnish industrial service businesses to the next level. While recognizing the challenges of technology-based firms' current practices, the preparation of this book promoted an open dialogue between companies, their customers and business partners, researchers and other stakeholders to

move all towards one goal: the transformation of manufacturing firms towards services. Therefore, the ideas in this book are not only grounded in scientific interests towards service strategy, business development, operations and innovations, but they are also supported by a deep understanding of the industrial environment and its evolving practice. The chapters in this book feature in-depth explorations of current developments and future prospects of manufacturing firms as well as the everyday challenges that managers face on the transformation path.

From ideas to articles

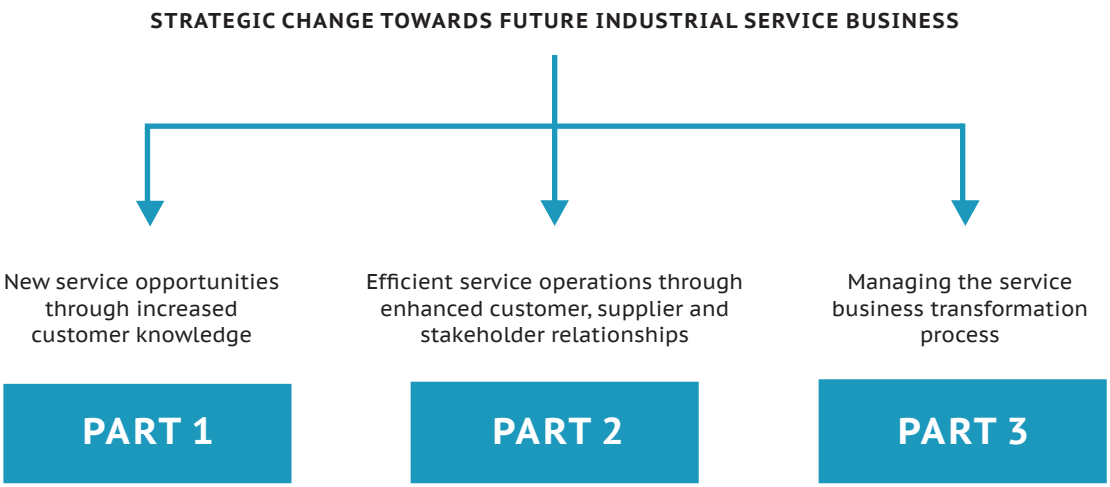
The first round of novel and more practically oriented results of the FutIS research program were reported in an earlier book Transforming Industrial Service Business: Means and Methods for Development (in Finnish), edited by Miia Martinsuo and Marko Kohtamäki and published by Teknova. However, upon reaching the final stages of compilation, many of the authors felt there was a need for further reporting on the methodologies and scientific approaches used in the research program and the results achieved; this was particularly true during the later stages, when ideas flourished into more scientific contributions. With this background in mind, this compilation of articles brought together research topics and results developed during the years 2013–2014, which were further tested and verified for this book.

The process of writing the chapters began with a call for proposals, and the first phase resulted in abstracts and a general idea of the book's structure. Next, a call for full papers was prepared, followed by full chapter submissions, a peer-review procedure that identified improvement opportunities in the chapters and rewriting and modifying the contents accordingly. During the editorial process, the chapters were organized into logical entities, and the consistency and flow of the text were revisited.

Introduction to the articles and key contribution of the book

This book is structured into three topics to highlight domains central to the industrial firms' strategic change towards service business. Figure 1 below presents an overview of the book's structure.

FIGURE 1.
Structure of the book



Overview to part 1:
Business opportunities through services

The first section of the book discusses opportunities and avenues that can be considered when enough years in the service business have provided organizations with a better understanding of customer needs and pre-requirements. The first chapter, written by Olga Perminova-Harikoski, Juha Tiihonen, Mikael Öhman, Max Finne and Juha Kuusela, provides a systematic literature review on ways to utilise installed base information in developing and operating industrial services. The study reveals that installed base information is mainly used to improve service quality and efficiency. However, the study reports that many companies lack a holistic approach to installed base information management in general as well as information utilisation. It is common for companies to build large databases without accurately analysing information based on the collected data.

The second chapter, written by Tuomo Eloranta, Sanna Nenonen, Eija Vaittinen and Laura Kanto, uses service dominant logic to approach companies' attempts to develop new offerings. The study suggests that companies should increasingly focus on value-in-use of the actualized benefits that their customers gain from their products and services. However, this requires a deep understanding of the customer, and many business-to-business companies face situations that entail having intermediaries, such as retailers or wholesalers, between them and the end customer in the value chain. The limited direct interaction between the company and its end customers can hinder access to consumer information and compromise efficient and effective innovation efforts. This study addresses this challenge by testing three different methods—interviews, questionnaires and mystery shopping—which business-to-business companies offering consumer products and services can use to involve end-customers in development activities. A variety of methods can be very useful in generating good ideas, especially for improving the commercialisation of new offerings and understanding the end-customers' different contexts.

The third chapter in the first section, written by Miia Martinsuo, Sannamari Lukkaroinen and Jussi Heikkilä, emphasises customers' known and latent needs as important drivers of service innovations in technology-based firms and links the customers' technology adoption with the technology supplier's service innovations. The study sought increased understanding of the creation of service innovations, based on customer firms' new technology adoption through a qualitative case study. The results show that contexts of technology use appear to be important, making technology adoption processes different across customers' companies. The study identified a broad range of service opportunities that can help suppliers adapt their service offerings according to the customers' processes and their unique phase of technology adoption.

Overview to part 2:
Embedding services into operations and supply networks

The second section discusses the topics of embedding services into operations and the broader supply networks. The first chapter, by Olga Perminova-Harikoski and Magnus Hellström, explores the role of the warranty period of the delivered equipment from both a project delivery and service provision point of view. The study emphasises operational capability, arguing that companies should shift attention from the project execution phase to warranty management, not only as a means for improving the financial parameters of the single project, but also as a means for securing long-term customer collaboration in service operations.

The second chapter, by Maria Ivanova-Gongne, Olga Perminova-Harikoski and André Näsi, elaborates on the changing industry requirements that motivate industrial suppliers to move beyond simply providing a product or a service that meets the customers' needs. The study argues for the development

of a customer value-driven offering or, rather, a solution to ensure the firm's competitive advantage in the market. The authors state that the firm's adaptations to the customer's needs and mind set require the development and adoption of a service-oriented organizational culture. The paper explores the triggers for change in organisational culture towards service-orientation and the possibility for the development of a service-oriented culture through learning and adaptation to the partners' cultural schemas in the business relationships.

The final chapter of the second section, written by Sanna Nenonen and Miia Martinsuo, claims that the transformation to a service business requires changing the business logic of the company and renewal of supplier relations. The paper explores the particular requirements and challenges of supplier relations in the early phases of service business transformation; this was accomplished through a qualitative multiple-case study in the context of high-volume, low complexity manufacturing. This study shows that the transformation to a more service-oriented business requires integration of the manufacturing company with suppliers to ensure service quality, fulfilment of service promises and maintenance of a good company image. Establishing new partnerships, as well as developing current ones, involves challenges with image, responsibility and readiness for change that need to be considered for successful transformation into a service business.

Overview to part 3:
Servitisation as a strategic transformation

The final section of the book looks at servitisation as a strategic transformation opportunity for manufacturing firms, and it particularly highlights potential hindrances for the transformation. The first chapter, written by Max Finne, Saara Brax and Mari Tanskanen, analyses the causes behind the challenges of trying to servitise. The research takes a stance on path-dependence to identify the development patterns that led companies to various operational rigidities, hindering the effective implementation of the chosen servitisation strategy. The findings show a clear resemblance between the development paths yet quite different factors in the hindering of servitisation. The authors concluded that early success and limited competitive pressures can impede service-oriented culture, which, together with a weakened contact with end users and a lack of established service development processes, not only hinder servitisation but also cause lock-ins. The results emphasise understanding of path-dependence as crucial to discovering the causes of operational rigidities that impede companies' abilities to servitise.

The second study, by Eija Vaittinen and Lauri Vuorinen, continues the theme of challenges in service transformation and provides information on factors that prevent servitisation in companies only starting to add services to their developed product offering. The study builds on the idea that not all manufacturing firms will adopt service business, and they may have various reasons for this strategic choice. The results of the study show two types of preventing factors in companies starting their servitisation efforts: issues of managing the servitisation change and prerequisites for servitisation. Various general change management issues, such as lack of management commitment and other simultaneous change efforts, can harm the servitisation initiative. Secondly, factors like production maturity may act as a critical prerequisite for the change.

Implications

Altogether, this book provides several contributions to service business research in Finland, with consideration of the latest international developments in the area. First, the authors present multiple ways in which business opportunities are discovered and managed through servic e development and operations. Current scientific literature has long elaborated upon these topics, but the concrete empirical evidence has remained scarce.

Second, the authors highlight the networked nature of the service business, showing how customer relationships, subcontractor relationships and other stakeholder relationships may be affected through increased service orientation. The networked aspects of the service business are becoming increasingly relevant in practice. Finally, the book points out companies' movement towards services as a cultural transformation process, which is potentially challenged by both internal and external forces. Not all firms choose servitisation as their long-term strategy, and not all firms succeed in their servitisation efforts, and learning during the FutIS program highlights key factors that need consideration for successful servitisation management. Due to the implications of the service business on strategies, technology support, cultures and routines in industrial firms, manufacturing firms' service business transformations appear to be a long-term effort, calling for further research beyond the FutIS program. The chapters in this book both suggest and inspire forthcoming research in various domains.

Part 1.

Business opportunities through services

INSTALLED BASE INFORMATION UTILISATION IN INDUSTRIAL SERVICE DEVELOPMENT AND OPERATIONS

OLGA PERMINOVA-HARIKOSKI
JUHA TIIHONEN
MIKAEL ÖHMAN
MAX FINNE
JUHA KUUSELA

Abstract

This paper describes a systematic literature review conducted to determine how installed base information (IBI) is utilised in developing and operating industrial services. We found that the reviewed literature considers IBI useful and relevant for industrial service operations, and that it is mainly used to improve service quality and efficiency. However, it is evident that there is a shortage of empirical studies and further investigations that show concrete applications of IBI in different service activities. The existing research concentrates on particular contexts, such as preventive maintenance and asset management. The asset owner perspective is emphasised in the literature, but the use of IBI for service offerings, service contracts and service sales is rarely discussed. The literature indicates that many companies lack a holistic approach to IBI management, in general, and utilisation as a part of it. It is not uncommon for companies to build large databases, but fail to do accurate analyses based on the collected data.

Introduction

Industrial capital goods manufacturers in developed – and lately also in emerging – markets have been shifting their operations towards the provision of high-value solutions which are innovative packages of products and services tailored to solve specific customer problems. This phenomenon and its implications have been discussed in the literature (Baines et al., 2009; Mathieu, 2001; Oliva & Kallenberg, 2003; Wise & Baumgartner, 1999), especially from the supplier–customer interaction perspective. Services constitute a significant part of the product life cycle and require specific capabilities that prove to be somewhat challenging for industrial firms that are to a large extent product-focused. Suppliers have the task of convincing their customers that they are capable of achieving a desired level of performance both in service provision and in customer support through

their ability to provide value as planned by applying the installed base.

A key question in industrial service development and operations is how well a supplier understands its customer's business. What products have been installed, how are they used by the customer, and what is the customer planning to achieve through utilising and managing these products? This knowledge forms significant input required in the provision of industrial services (cf. Sampson & Froehle, 2006; Sampson, 2000). Accordingly, the information about the customer's installed base is a crucial part of planning and executing successful service operations. For a supplier, the installed base includes all products sold and installed at the customer's premises. Suppliers can potentially apply information about the whole installed base to gain a competitive advantage in different phases of service business – from development to operations – but often the focus is on a single customer. Many industrial firms maintain extensive databases on their customers' sales, deliveries, and contracts, to name a few. However, in many cases the value of this information for different functions is not clear. This can be due to, for instance, insufficient integration between the databases developed for different functions, as well as to no overall installed base overview or incompatibility of different databases or data management systems (Ala-Risku, 2009). This results in a poor understanding of how the data can be utilised for service operations. The purpose of this paper is to provide an overview of the installed base information (IBI) utilisation problems and solutions derived from the literature in the field of industrial services. IBI can be defined as ". . . all available information on the . . . installed base" (Dekker, Pinçe, Zuidwijk, & Jalil, 2013). We set the following question for this study:

RQ: What are the key domains of IBI utilisation in industrial firms' service business?

As for the method, we use the systematic literature review (Kitchenham et al., 2009; Tranfield, Denyer, & Smart, 2003) to be able to rigorously aggregate evidence from the scientific studies available in the field. This method not only allows for discovering and aggregating the existing research on the topic, it also supports the development of evidence-based suggestions for future research as well as managerial applications. After evaluating more than 2000 articles in the field, we outline the main challenges and solutions related to IBI utilisation for successful service operations and development. This helps in finding the most attractive avenues for further research in IBI utilisation.

Method

We decided to use the systematic literature review as the method to reach an explicit understanding of the current body of knowledge regarding the utilisation of IBI in industrial service operations. It should provide a structured, transparent and replicable method to analyse the existing literature in a rigorous way (Kitchenham et al., 2009; Tranfield et al., 2003). Thereby, we aim to build a strong basis for academia and practice to understand the phenomenon. Research papers in this field tend to focus on a particular problem in a given domain. A systematic literature review focusing on IBI allows us to summarise the role for IBI, in general, and also reveals gaps in the existing research. We followed the five general phases of a systematic literature review:

1. Planning the review
2. Identifying and evaluating studies
3. Extracting and synthesising data
4. Reporting
5. Utilising the findings

The first three stages of the process are presented in this section on a general level, while the findings are reported in the following sections. The fifth and final stage is then left after the publication of this paper, and in addition to the authors, it will be carried out by our colleagues and practitioners.

Planning the review involved forming the research group, narrowing down the focus of the topics, designing the search string,

and deciding on which databases to use. We formed a group of five researchers working on the same research project who eventually became the authors of this article. The selection of topics was influenced by our participation in a research project on industrial services. Developing the review protocol, however, was a rather resource-consuming task, mostly because the existing studies on IBI belong to a range of diverse research fields that are not all interconnected.

We listed the topics of interest to develop keywords for the search: for instance, "management and collection of IBI" and "challenges" related to aspects of "industrial services". We developed a number of potential search strings and ran trial searches with each one to acquire an understanding of how broad the yield of the results, in terms of publications, would be. We also tested the proportion of previously identified central research papers that appeared in the search results. After numerous trials with greatly varying results by different search strings, as well as corrections based on the results, we were left with the final search string:

Title, abstract, or keywords/subject ("installed base" OR "service base" OR "asset base")

We ran searches with this string in all major databases that we were able to access (via two large Northern European universities) with the intention of seeing the breadth and quality of the results and their dependence on the database. Based on this analysis, we decided to use the following databases: Academic Search Elite, Business Source Complete, ProQuest, Scopus, and Web of Science.

To maintain the focus, we decided to exclude articles that discuss sales and marketing of new equipment, product development or other company functions without a direct relationship to industrial services. This is purely due to the scope of this paper: the usage of IBI, data and knowledge on industrial services. Duplicate reports of the same study are also excluded.[1] To further constrain the scope, we ruled out studies focusing on detailed methods, e.g. algorithms, for the use of IBI in health assessments, diagnostics, and prognostics of equipment condition. Only reviewed works were included in this study. This refers to journal articles and conference papers, where the whole paper is peer-reviewed, but also theses. Further, the search was restricted to works written in English, although when carrying out the forward and backward searches (see below), also German, Swedish, Russian, Finnish and French studies were included if they met the criterion of relevance.

After reaching the initial sample of studies via the database search, their relevance was evaluated first based on title and abstract, and then on full text. If an article was deemed potentially relevant, it was passed on for full-text evaluation. The database search identified 2,479 potentially relevant studies. Ultimately, 54 of these papers were deemed relevant. They were extracted based on the protocol below, and their reference lists were analysed to identify potential additional studies to be included in the sample (we call this process backward search or backward snowballing).

The data was extracted from each study based on the following structure:

- The source (journal or conference) and full reference
- Research metadata (approach, qualitative-quantitative, method(s))
- Application domain
- Quality appraisal (rigor, trustworthiness, practical relevance, practical applicability)
- Validation of the results in the article

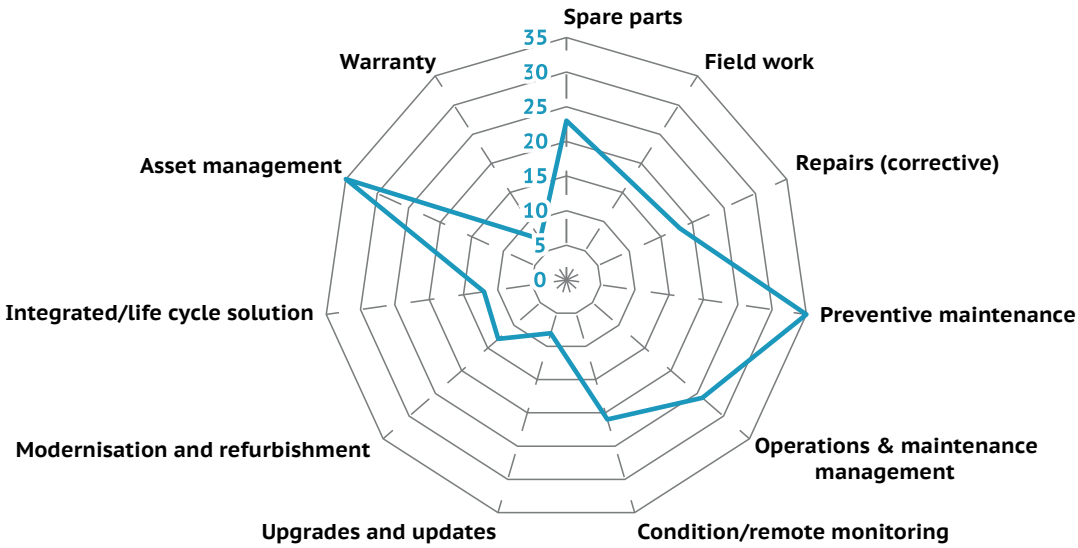
[1] By duplicating results, we refer to situations when one and the same study was reported in, for example, different journals or other outlets. To avoid duplication, we included only one and the most complete version of the study.

- Definition of IBI applied in the paper
- Description of contents on IBI
- The applied point of view – user, service provider, manufacturer
- Main contribution of the paper
- IBI collection, generation and sharing: central ideas and anecdotes
- IBI utilisation: central ideas and anecdotes, claimed benefits
- IBI management: central ideas and anecdotes
- References for backward search
- Other information identified as relevant for the article

A forward search, or forward snowballing, was also carried out by identifying studies that cite the studies in the original sample. All relevant studies added to the sample were extracted, and further forward and backward searches were run on those according to the same protocol. Snowballing added 60 studies, thus the total number in the final sample was 114. To terminate the snowballing that had progressed, in many cases, to four rounds, inclusion criteria were tightened. In order to be included in the sample, the article had to make a clear contribution not covered by the earlier included studies. Figure 2 below presents the distribution of papers on different core topics (application domains). Some papers discussed several topics, meaning that the topic volumes do not add up to the sample size, but to a larger number.

Regarding data extraction, we utilised the process described by Kitchenham et al. (2009, p. 9): One researcher extracted the data and another checked the extraction. The procedure of having one extractor and one checker is not consistent with the medical standards summarised in Kitchenham's guidelines, but is a procedure we had found useful in practice. Similarly to Kitchenham's (2009) approach, we also coordinated data extraction and checking, involving all of the participating researchers. In order to do that in a proper manner, we kept a master spreadsheet, which covered all of the studies to be extracted, and noted whose responsibility each extraction and check was. We proceeded as described by Kitchenham et al. (2009, p. 9): Allocation was not randomised,

FIGURE 2.
The number of papers discussing each of the defined core topics (n = 114).



it was based on the time availability of the individual researchers. When there was a disagreement, we discussed the issues until we reached agreement. In addition, we took into account areas of expertise of our multi-disciplinary researcher team when allocating papers for extraction and validation.

Our search results covered a wide array of topics. However, for the purpose of this article, we will focus on the topic of IBI utilisation in industrial service development and operations. Within this scope, we cite 53 of the 114 articles. In the following chapter, we present findings of the systematic literature review pertaining to the research questions outlined at the beginning of this article. Table 1 below cross-tabulates the sample based on the core topics covered by each paper and the industry domains covered. The number of papers concerning asset management and preventive maintenance in the water industry is notably high. Note that many papers discuss more than one core topic and some more than one industry domain.

TABLE 1.
Summary of articles reviewed on IBI utilisation in industrial service development and operations.

Number of papers in total in the sample	CORE TOPICS / INDUSTRY DOMAIN	Automobiles	Aviation	Electrical utilities	Electronics	Elevators and escalators	Emergency services	Energy	Engineering	Facilities	Healthcare	Heavy machinery	Industrial utilities	Infrastructure	ICT	Logistics	Manufacturing	Military	Mining	Oil and Gas	Process industry	Telecommunications	Transportation	Water utilities	Consumer products	Generic
	Number of papers in total in the sample	**2**	**7**	**3**	**3**	**3**	**1**	**2**	**1**	**4**	**4**	**4**	**8**	**1**	**6**	**3**	**12**	**3**	**3**	**4**	**1**	**1**	**3**	**25**	**2**	**24**
23	Spare parts		4		2				1	1			3		4	1	4	2	1		1		1		1	5
17	Fieldwork		1		2	1	1			2	1	1	4			1	4	1	2				1	3	1	1
18	Repairs (corrective)		2		1		1			2	1		3		1	1	3	3	1				1	5	1	1
35	Preventive maintenance		2	2	1	2	1			2	1	1	3	1	1	1	2	2	2	1	1		1	14	1	3
26	Operations & maintenance management		2	1	1	1				1		3	4			1	4	2	2	1			1	5	1	7
21	Condition/ remote monitoring		3		1			1		1			4			2	1	1	1	2			2	7	2	5
8	Upgrades and updates		1		1			1		1			2			1	2	1	1				1	4	1	
13	Modernisation and refurbishment		1					1					1	1		1	1	1	1	1			1	8	1	
12	Integrated/life cycle solution		2					1				2	2			2	1	2	2				2	2	1	3
35	Asset management		2	2	1			1		1		1	2		1	2	2	1	1	1		1	3	15	2	7
16	Warranty	2	1		1					1			2			1	3	1	1				1		1	1

Results

IBI utilisation: creating value for the customers

The main use of IBI in industrial service delivery relates to the general goals of ensuring service quality and service delivery efficiency (Ala-Risku, 2009, p. 125; Holmström, Främling, & Ala-Risku, 2010). Service assets should be managed flexibly for the purpose of effective and profitable service delivery (Cohen, Agrawal, & Agrawal, 2006). To achieve this, Cohen and his colleagues (ibid.) propose investing in processes and information technology to collect, analyse and disseminate relevant information in a timely and collaborative manner. On a general level, it is claimed that IBI improves the planning of service operations (Ala-Risku, 2009), which is useful for enabling the delivery of timely and cost-effective services (Borchers & Karandikar, 2006). Furthermore, IBI provides customers and service providers with a common basis for analysing and improving product and service performance (Holmström et al., 2010). In sum, effective and profitable service provision is based on managing service assets and fulfilling service demand in a flexible and integrated manner.

The customer relationship is at the core of the utilisation of IBI. The extent of the different services available to be offered to each customer correlates with the level of mutual trust, because some parts of IBI can only be acquired through a trustful relationship (Ahonen, Ojanen, Reunanen, & Lanne, 2008). The acquired IBI can then be used for enabling the delivery of tailored services, discovering patterns of service jobs, ensuring service quality and service delivery efficiency, and for predicting future service needs (Ala-Risku, 2009; Bakirov & Stich, 2011). For example, Cohen, Zheng and Wang (1999) found that the optimal utilisation of IBI contributed to their case company's operational efficiency by reducing late shipments by over 90% and inventory investments by 37%, and at the same time, the case company could improve its customer service level (in terms of parts availability).

Sharing real-time information enables service providers and their customers to co-create value by increasing transparency and dialogue (Coyne, 2011), and possessing a detailed understanding of customer operations will contribute to improved quality and accuracy of service provision (Kowalkowski, Brehmer, & Kindstrom, 2009). Increased transparency and visibility created by smart products may bring the provider and customer closer to each other and increase the understanding between the parties (Coyne, 2011). Thus, some risks can also be mitigated, providing significant value to the customer (Brax & Jonsson, 2009). In addition, for long-term optimisation of investments, the provider and customer both need to acquire the knowledge regarding several issues: what is installed and in what kind of condition the equipment is, the expected investments and their costs, and the development of both industry regulation and demand (Banyard & Bostock, 1998). Therefore, acquiring, managing, and utilising IBI optimally is crucial.

Although important, sometimes the discussions on IBI concentrate heavily on aspects of information availability and quality. It is essential to emphasise the importance of how the information will be used in industrial service operations to reap the best value (Turunen & Toivonen, 2011). For example, a great proportion of the value of smart products comes from increased visibility and the utilisation of real-time information, both of which provide a competitive advantage by increasing the service lock-in of customers (Coyne, 2011). This is due to the service provider being able to understand customer needs on a completely different level than competitors, because of having access to the real-time information, while the competitors might struggle even with the spare part planning as a result of poor visibility (Jalil, 2011). Information based on failure and service events can provide insights of high value, provided that the information can be aggregated in a manner that properly reflects the behaviour of different types of machines (Richardson, 2008). The application areas where IBI can provide the most value include

equipment replacement and upgrade, forecasting service demand, equipment health diagnostics for supporting operations, carrying out reliability analyses for designing and pricing maintenance contracts, and finally, communicating customer value through utilising IBI and calculation tools (Colen & Lambrecht, 2013; Saccani, Alghisi, & Borgman, 2013; Vijayaraghavan, 2006). In addition to these, Yoder and Delaurentiis (2003) identified three usage areas of IBI: tailored publications and catalogues, for example, for regulatory audiences; development of applications in situations where reports can be automatically generated; and scenario analysis in which "what if" scenarios can be tested by decision makers.

Most of the studies were done in connection with actual industrial applications and can be seen as case studies. Attempts to generalise are often based on modelling the observed relationships and validating the models on different cases. The value created depends both on the availability and quality of IBI, and on the accuracy of the model. In some cases, other models already work so well that relatively small benefits can be gained. For example, demand-based spare parts management systems have reached such accuracy that relatively little can be gained by adding IBI into the mix (Wagner et al., 2012).

IBI in decision-making

In respect to decision-making, many studies discuss IBI as an essential input for root cause analysis of failures, preventive and corrective maintenance, and budgeting of service operations (Ahonen, Reunanen, Heikkilä, & Kunttu, 2006; Ahonen et al., 2008; Goh & McMahon, 2009; Schwenke, Vasyutynskyy, Röder, & Kabitzsch, 2011; Skytte af Sätra, Christensen, Tanase, Koppervik, & Rokke, 2011). The utilisation of IBI is particularly important in industrial service delivery and in field services, where operational efficiency and effectiveness can be improved by linking the information of individual products, use locations and events (Holmström et al., 2010; Lehtonen, Ala-Risku, & Holmström, 2012). The research investigating statistical approaches supporting decision making received much attention, highlighting the importance of data aggregation (Bufardi et al., 2007), visualisation (Schwenke et al., 2011) and the correlation between different parameters (Miles & Andrews, 2008), in order to specify, plan, budget and deliver different service activities, both preventive and corrective.

Service supply requires information corresponding to demand chain activity where the offer is targeted (Holmström, Brax, & Ala-Risku, 2010). As IBI is utilised in decision-making, typically, various types of information items are brought together, originating from both the supplier and the customer (Ahonen et al., 2008). Skytte et al. (2011) state that having more relevant information available combined with both system embedded and human competence will yield better decisions on timing and prioritisation of maintenance activities. However, obtaining representative data is described as problematic. For example, according to Fenner (2000), for both technical and financial reasons, field measurements in urban drainage systems are limited in both space and time. It follows that operational and maintenance decisions are often made on insufficient and unrepresentative data, leading to investment and operational costs far in excess of the cost of making the missing field measurements.

The research also identifies aspects when IBI contributes not only to services but also to the issues of product development. For example, information on usage patterns provides feedback for product development (Johnson & Mena, 2008). An IBI database can be used to identify relationships between products (Bakirov & Stich, 2011). Intelligence about the use and reliability of the equipment is an important contribution for equipment design and the marketing department (Colen & Lambrecht, 2013). It helps in predicting and defining new parameters for future products (Coyne, 2011).

The relevancy of information for improved decision-making is one of the factors addressed

in the literature. Various types of information items originating from both supplier and customer are usually combined (Ahonen et al., 2008). In many industrial segments, field measurements are limited both time-wise and in terms of the amount of measured elements due to financial and technical reasons. As a result, unrepresentative data is used for operational and maintenance decisions. This leads to the fact that investment and operational costs exceed the cost of obtaining field measurements (Fenner, 2000). Event data, new technology/system change data, and failure records are critical for decision-making on maintenance (Ahonen et al., 2006).

Factors affecting data usability

IBI is available from many different sources. These include customer service, contract data, spare parts demand and sales, test and simulation data, calculations performed for product dimensions, expert estimations and value analysis (Fleischer, Weismann, & Niggeschmidt, 2006). However, the usability of IBI to a large extent depends on the way it is collected, the targets and purpose behind the collection methods, as well as the required quality and detail. It should be noted that in some industries the collection of information is regulated, which dictates what information is collected (minimum may become de-facto) (Fenner, 2000). In the literature, the collection of information is typically depicted as purpose-driven, where information is collected in order to achieve a specified business objective, be it operational (cf. Honari & Donovan, 2007; Miles & Wastling, 2003; Wagner & Lindemann, 2008; Wu & Meeker, 2002) or strategic (cf. Holmström et al., 2010), or to sustain a business function (cf. Banyard & Bostock, 1998). Information can also be collected for business intelligence purposes (Ives & Vitale, 1988). Considering the different purposes a company has, a scope of relevant information can be defined (Borchers & Karandikar, 2006) and collecting information outside of this scope might not be beneficial (Goh & McMahon, 2009). Thus, setting the targets and strategy for information collection, and indeed, the accessibility of information, is one aspect that will affect the usability of the information for different purposes.

Depending on the intended use of the collected information, both the timespan over which the information is collected and the frequency with which the information is collected can be crucial (Miles & Wastling, 2003; Miles & Andrews, 2008). Further, different levels of detail (also referred to as granularity) of information is required for different purposes (Miles & Andrews, 2008). Examples of granularity-related issues were encountered in service district design (Baker, Clayton, & Aggarwal, 1990), product improvement (Fleischer et al., 2006), customised solutions (Cohen, Kamesam, Kleindorfer, Lee, & Tekerian, 1990; van der Feltz, Lamers, Priem, & Melief, 2003), condition monitoring (Ahmad & Kamaruddin, 2012), warranties (Wu & Meeker, 2002) and failure information(Fleischer et al., 2006). Further, Wu & Meeker (2002) note that when the data is used for statistical analysis, there is a trade-off between the detail of the analysis and the statistical reliability. Finally, considering the costs associated with collecting information, we note that even small changes in inspection frequency (or detail) have a large financial impact when projected over a large service base.

However, even if the targets and required quality for information collection are set, data availability might still be an issue as the suppliers tend to assume that the data is easily available (Colen & Lambrecht, 2013; Romeijnders, Teunter, & van Jaarsveld, 2012). Even very basic information can be missing. Vijayaraghavan (2006) provides an example of serial numbers that fail to be properly recorded for most subsystems and, thus, are unavailable. This leads to the fact that software packages cannot be traced for their release levels. Some measures can be used to ensure improved data availability and make data quality explicit. Data structuring can be used to improve quality, and assigning uncertainties to each asset model can be used to make quality explicit (Ugarelli, Venkatesh, Brattebø, Di Federico, & Sægrov, 2010).

Some of the difficulties with data accessibility stem from the lack of co-operation between suppliers, service operators, subcontractors and customers. Direct competition between services supply chain parties may be a reason to refrain from sharing critical information on an installed base, inventories and demand. One way to secure data quality and accessibility for further utilisation is through contractual obligations (D'Agata, 2003). In this respect, an important source of IBI are the customer interactions (Kowalkowski et al., 2009). There are many contact points to the customer, but these interactions should also be seen as opportunities to collect IBI. The customers' willingness and ability to share information determines the type of service that can and, perhaps, should be offered (Ahonen et al., 2008; Holmström et al., 2010), and thus the usability.

Information about the installed base and spare parts demand has direct value for service development and operations (Dekker et al., 2013). Service operations by a third party make service information and knowledge less visible or inaccessible to the OEMs (Goh & McMahon, 2009).

Understanding the context of operations and the business environment is crucial for designing strategies as well as ways of managing service operations that yield the best results. The same also applies to IBI: the data acquisition and usage environment should be identified and understood for yielding the maximum gain (Jalil, 2011).

Examples of IBI utilisation in the literature

In this chapter, we will address some of the core contexts we found in the reviewed literature: preventive maintenance – related issues, spare parts management and development, and development and design of services. These categories emerged during the analysis phase as having the greatest correlation with the IBI utilisation topic; that is IBI seemed to offer clear benefits in these areas. These categories will be further addressed in the Discussion chapter.

Preventive maintenance

Preventive maintenance schedules can be optimised and planned based on IBI. In their study of an aerospace case company, Johnson and Mena (2008) show that by using real-time data monitoring the assets in use, the company was able to predict with 95% accuracy in a two-year horizon time the timing for a required repair or an overhaul. It enabled scheduling time slots for the work and placing orders for parts just in time.

Extensive research has taken place particularly in the context of water and sewer pipe works, 25 of which are included in this review. Fenner and Saward (2002) provided a study which deemed that IBI could support effective sewer maintenance: service actions, scheduling, and optimizing of economics. They showed that case-based reasoning and knowledge-based systems can be used to develop a performance assessment methodology for sewers. In such a system, future management actions can be based on data collected from previous similar situations. In a decision support system for renewal planning of sewer networks, it was stated that critical IBI for sewers are condition and risk indices. Based on these, a list of sewers is prioritised according to their urgency of intervention (Halfawy, Dridi, & Baker, 2008).

Preparing for the site visits is critical because it directly affects service performance. From this point of view, IBI, to which service engineers have access, is crucial (Lehtonen et al., 2012). Ala-Risku (2009) proposed that in field service operations, one should maintain systematic IBI to support the identification of prerequisites for successful service deliveries to achieve required service quality, and to improve and expedite decisions in the service delivery process to achieve high service efficiency.

IBI is also used for predicting and forecasting equipment performance. Forecasting service life or the condition of equipment is of interest for many purposes, such as planning maintenance times, scheduling personnel

and managing service logistics (Schwenke et al., 2011). Reliability analysis of machinery can be performed to gain insight into the effect of maintenance actions on the probability of failure; in addition, this information can be used to improve the maintenance policy (Colen & Lambrecht, 2013). Warranty databases can be a good source of IBI for early detection of reliability problems (Wu & Meeker, 2002). Another use of IBI for forecasting is to predict or simulate the effect of operations. For example, in the context of sewer networks, it was proposed that a system for analysing risk for sediment build-up could also be used to test the effect of remedial action (Gérard & Chocat, 1999).

Spare part management

Spare part management is one context where IBI is frequently applied, for example: spare part demand and inventory management of an OEM; machine user's own inventory management and acquisition; identifying and arranging spare parts for a specific service task. Spare part inventory management is an extensively researched topic with most researchers agreeing that it can be optimised by applying IBI (Cohen et al., 1990; Colen & Lambrecht, 2013; Wagner & Lindemann, 2008).

Using IBI facilitates improved stock positioning in the network (Holmström et al., 2010; Jalil, 2011). This can result in considerable savings by reducing the requisite transportation needs (Jalil, 2011). With reliable demand forecasts, spare part demand can be anticipated and inventory allocation and replenishment adapted (Jin & Tian, 2012). For instance, machine location and machine type data can be used to derive transportation costs, travel times, and demand forecasts, even at the customer's postal code level to optimise spare part stock level planning by stock location (Jalil, 2011).

In addition to demand forecasting, other benefits of applying IBI in spare part management include improved forecasts of spare part returns (Dekker et al., 2013; Krikke, van Nunen, Zuidwijk, & Kuik, 2003), eliminating having obsolete stock at the end of the product life cycle (Wagner & Lindemann, 2008), and the ability to derive other input parameters, such as transportation costs and possible delivery options for spare parts inventory planning (Dekker et al., 2013). The logistics of returns benefit from knowing the location and condition in advance, which may be provided by tracking and tracing (Krikke et al., 2003).

Service design and development

The importance of access to IBI to support services offering development and service design has been clearly recognised (Ala-Risku, 2009; Colen & Lambrecht, 2013; Coyne, 2011). For example, new services become possible because of information (IBI) visibility enabled by smart products (Coyne, 2011). IBI enables integrated product and service offerings, where the main business benefits are increased customer value, a long-term improved return on investment, and a more stable cash flow (Isaksson et al., 2009). When the manufacturer provides and guarantees function instead of product, the equipment ownership stays with the manufacturer, and maintenance and repair cost have to be optimised. Good use of IBI brings mutual benefits.

IBI utilisation helps in forming clear and modular service offerings customised according to heterogeneous customer needs (Korpi, 2008). Further, designing for reliability and maintainability can be supported by using IBI (Colen & Lambrecht, 2013). It is also possible to optimise the allocation of resources to design, manufacturing, and service logistics, in a way that the total costs (design, manufacturing, repairs, inventory costs, downtime costs) are minimised while the system performance goals are still met (Jin & Tian, 2012).

Discussion

Context of IBI utilisation in industrial firms' service business

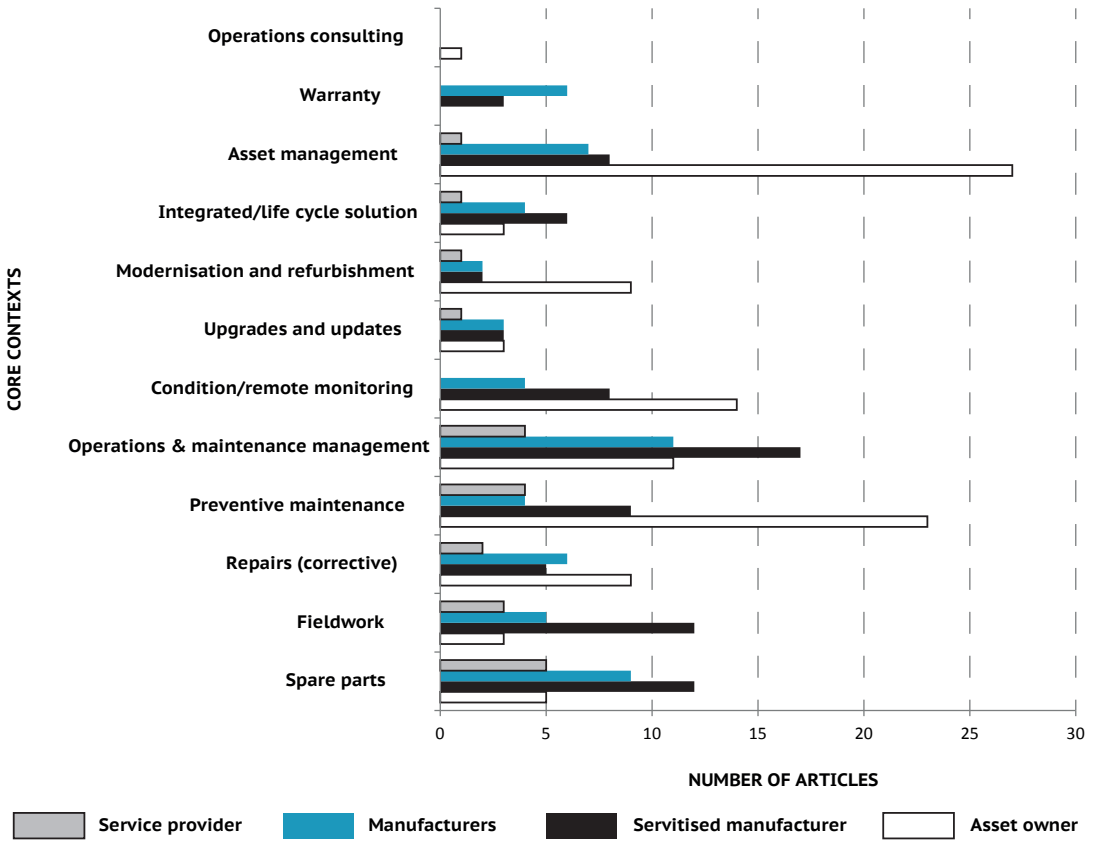
We aimed to better understand the focus of the research on the utilisation of IBI. Therefore, we analysed the core contexts of the ar-

ticles through the lens of different perspectives presented in the academic discussions (see Figure 2). The four perspectives – servitised manufacturers, manufacturers, service providers and asset owners – emerged from the analysis of the literature. The perspective of the servitised manufacturer is the most frequently addressed one. This can be explained with the growing focus on the capital goods manufacturers shifting the focus from stand-alone products towards the provision of life cycle solutions that include services as an integral part (Baines et al., 2009; Mathieu, 2001; Oliva & Kallenberg, 2003). The literature does not always maintain a clear distinction between the concepts, for example, of servitised manufacturer and [pure] manufacturer or servitised manufacturer and [service] supplier. In this study, we do not analyse the differences between the different concepts used in the literature; rather, we present them as they were used in the articles we reviewed.

Figure 3 shows that IBI usage in the context of preventive maintenance is fairly well-covered from all perspectives. In this context, preventing value-destroying unexpected disruptions increases the importance of preventive maintenance compared to corrective maintenance. Thus, the topics of failure prediction, condition monitoring, forecasting of performance for both equipment and services, as well as planning for needed service operations, are widely discussed, especially from the perspectives of asset owner and servitised manufacturer as the examples of IBI utilisation show (see pp. 8–9).

Similarly, operations and maintenance management, asset management, condition monitoring and warranty received attention

FIGURE 3.
Core contexts addressed in the analysed articles from different perspectives (n = 114).



within all three perspectives. However, in this case, the asset owner perspective received the most attention. Naturally, asset performance is a prime concern from the asset owner point of view. It is equally important for the servitised manufacturers to address these issues to deliver value for the customers. Considering that these topics are also relevant and urgent for manufacturers and [pure] service suppliers, we found a lower number of articles addressing these perspectives to be an unexpected result.

Much of the discussion on IBI use in the industrial context is concentrated around spare parts forecasting for industrial products. For example, Dekker et al. (2013) state that forecasting the demand and return of spare parts can be considerably more accurate and timely using IBI, compared to forecasts only based on historic demand. Somewhat interestingly, the topic of spare parts is significantly addressed in the literature from the servitised manufacturer perspective, while one would expect it to be more connected to pure manufacturers. However, for servitised manufacturers, the issue of spare parts remains highly relevant as many of them seem to focus on life cycle support and services where spare part supplies is one of the core activities. Another explanation potentially lies in how different researchers in the field defined services and servitised manufacturers in the reviewed literature.

Research topics in IBI utilisation

The research on IBI seems to be concentrated on particular topics when it comes to the utilisation of the information (see Figure 4). As the literature review shows, much of the discussion is around information collection for the purposes of service scheduling and planning. This is also true for service resource management as it is connected to the scheduling and planning topic. One important context within the service planning topic is condition monitoring and the utilisation of IBI for forecasting asset performance, especially spare parts needs and potential failures as traditional manufacturing issues. IBI utilisation for the purposes of condition monitoring and asset performance forecasting is especially well-addressed by the researchers focusing on infrastructure, particularly water and sewer pipe networks and less so for industries.

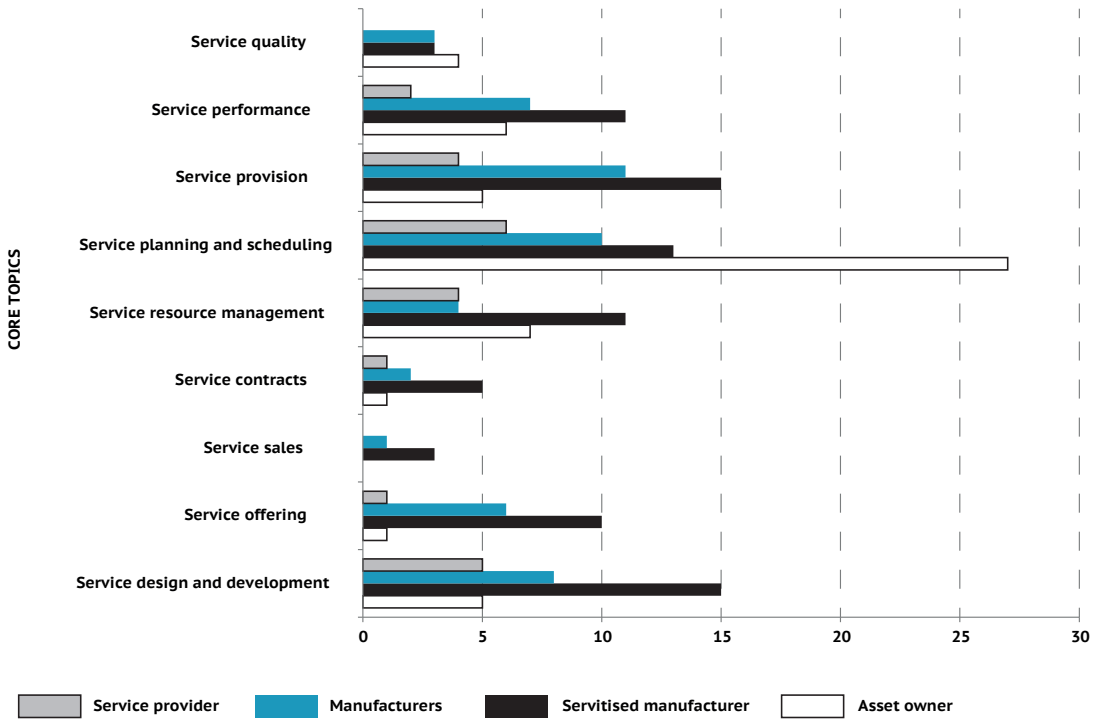
Service design and development- and service offering-related research are dominated by the perspective of the servitised manufacturer, while few papers are related to these issues from the asset owner perspective. Although the servitised manufacturers in designing services and co-creating life cycle solutions between them and their customers (asset owners) is gaining attention, it seems that the research covering the customer – asset owner perspective is scarce and concentrated on particular issues. Also notable is the relative lack of IBI utilisation-related research on the topics of service sales, service development and service contracts from all perspectives. As integrated service and product offerings become more common, we expect more research in these areas.

Conclusions

In sum, the reviewed literature deems IBI useful and relevant for industrial service operations. However, it is evident that there is a shortage of empirical studies and further investigations that show concrete applications of IBI in different service activities. The existing research is somewhat concentrated on particular contexts, such as preventive maintenance and asset management. Many other contexts are not significantly addressed. Furthermore, attention devoted to servitised manufacturers compared to the asset owner (or customer) perspective in many of the reviewed topics (see Figures 2 and 3) is lacking in the literature. The use of IBI for service offering, service contracts and service sales is rarely discussed in the literature. These are potentially the avenues for the researchers to explore in greater detail.

From the practitioner's perspective, the literature indicates that many companies are lacking a holistic approach to IBI manage-

FIGURE 4.
Core topics addressed in the analysed articles from different perspectives (n = 114).



ment, in general, and utilisation as part of it. It is not uncommon for companies to build information databases of considerable size. However, an understanding of which data is crucial for different aspects of service operations, as well as how to present and analyse it in an effective way, is lacking. This leads to similar or even repetitive data, which differ only in the way they are presented in the database, being collected in abundance (see, e.g., Ugarelli et al., 2010). The interrelationship between pieces of information is then lost, the analysis is difficult and the results are inaccurate.

The use of information is, to a large extent, dependent on whether it is easily available in a needed form, or whether the service supplier is dependent on the other actors to obtain it. For example, it is not always possible for a service provider or servitised manufacturer to make the customer share the needed information via the contract terms or based on trust. If the parties having access to the installed base do not wish to share the information, effectiveness in service provision might be hindered.

Even though we reviewed only a specific segment of publications and scientific works due to the methodological criteria of the study, we can conclude that the current research has already outlined practitioner problems and defined potential remedies well in terms of IBI utilisation. The next step for researchers in the field of industrial services is to address these problems by focusing on the development and testing of tools and processes that support IBI utilisation in industrial service operations to help practitioners overcome the gaps. This should be done considering the roles and perspectives of multiple actors involved in service operations.

References

Ahmad, R., & Kamaruddin, S. (2012). An overview of time-based and condition-based maintenance in industrial application. Computers & Industrial Engineering, 63(1), 135-149.

Ahonen, T., Reunanen, M., Heikkilä, J., & Kunttu, S. (2006). Updating a maintenance programme based on various information sources. The 4th international conference on safety and reliability, KONBiN, Kraków, Poland. 8pp.

Ahonen, T., Ojanen, V., Reunanen, M., & Lanne, M. (2008). Utilisation of product lifetime information across organizational boundaries in the development of maintenance services. 2008 IEEE International Conference on Industrial Engineering and Engineering Management, Singapore. 650-654.

Ala-Risku, T. (2009). Installed Base Information: Ensuring Customer Value and Profitability after the Sale. Doctoral dissertation, Industrial Engineering and Management, Helsinki University of Technology.

Baines, T., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A., Shehab, E., & Swink, M. (2009). Towards an operations strategy for product-centric servitization. International Journal of Operations & Production Management, 29(5), 494-519.

Baker, J. R., Clayton, E. R., & Aggarwal, A. K. (1990). An Attribute-Balancing Heuristic for the Design of Service Districts. Journal of Business Logistics, 11(1), 69-94.

Bakirov, R., & Stich, C. (2011). Data mining on the installed base information: Possibilities and implementations. Proceedings of the 3rd International Conference on Agents and Artificial Intelligence (ICAART 2011), Rome; Italy. Vol. 1, 649-654.

Banyard, J., & Bostock, J. (1998). Asset management-investment planning for utilities. Proceedings of the Institution of Civil Engineers (ICE), 126(2), 65-72.

Borchers, H. W., & Karandikar, H. (2006). A data warehouse approach for estimating and characterizing the installed base of industrial products. Service Systems and Service Management, 2006 International Conference on, Troyes, France. Vol. 1 53-59.

Brax, S. A., & Jonsson, K. (2009). Developing integrated solution offerings for remote diagnostics: a comparative case study of two manufacturers. International Journal of Operations & Production Management, 29(5), 539-560.

Bufardi, A., Edler, A., Frey, M., Kiritsis, D., Metin, A., & Smith, B. (2007). Improving Product Development by Design-for-X (DfX) Support. In F. Krause (Ed.), The Future of Product Development. Proceedings of the 17th CIRP Design Conference (pp. 75-84) Springer Berlin Heidelberg.

Cohen, M. A., Kamesam, P. V., Kleindorfer, P., Lee, H., & Tekerian, A. (1990). Optimizer: IBM's multi-echelon inventory system for managing service logistics. Interfaces, 20(1), 65-82.

Cohen, M. A., Agrawal, N., & Agrawal, V. (2006). Achieving Breakthrough Service Delivery Through Dynamic Asset Deployment Strategies. Interfaces, 36(3), 259-271.

Cohen, M. A., Zheng, Y. -., & Wang, Y. (1999). Identifying opportunities for improving Teradyne's service-parts logistics system. Interfaces, 29(4), 1-18.

Colen, P. J., & Lambrecht, M. R. (2013). Product service systems: exploring operational practices. The Service Industries Journal, 33(5), 501-515.

Coyne, B. R. (2011). The 21st Century Manufacturer: The Role of Smart Products in the Transition from a Product to a Service Based Focus in Manufacturing Industries. Unpublished B.Sc. thesis (Informatics). Jönköping University, Jönköping International Business School, Jönköping, Sweden.

D'Agata, S. (2003). The "go with what you know approach" to forecasting future asset replacement expenditure. Water Supply, 3(1-2), 51-54.

Dekker, R., Pinçe, Ç, Zuidwijk, R., & Jalil, M. N. (2013). On the use of installed base information for spare parts logistics: A review of ideas and industry practice. International Journal of Production Economics, 143(2), 536-545.

Fenner, R. A. (2000). Approaches to sewer maintenance: a review. Urban Water, 2(4), 343-356.

Fenner, R. A., & Saward, G. (2002). Towards Assessing Sewer Performance and Serviceability using Knowledge Based Systems. 9th International Conference on Urban Drainage (9ICUD), Portland, Oregon, USA. 1-16.

Fleischer, J., Weismann, U., & Niggeschmidt, S. (2006). Calculation and optimisation model for costs and effects of availability relevant service elements. 13th CIRP International Conference on Life Cycle Engineering (LCE), Leuven, Belgium. 675-680.

Gérard, C., & Chocat, B. (1999). Prediction of sediment build-up from analysis of physical network data. Water Science and Technology, 39(9), 185-192.

Goh, Y. M., & McMahon, C. (2009). Improving reuse of in-service information capture and feedback. Journal of Manufacturing Technology Management, 20(5), 626-639.

Halfawy, M. R., Dridi, L., & Baker, S. (2008). Integrated decision support system for optimal renewal planning of sewer networks. Journal of Computing in Civil Engineering, 22(6), 360-372.

Holmström, J., Brax, S., & Ala-Risku, T. (2010). Comparing provider-customer constellations of visibility-based service. Journal of Service Management, 21(5), 675-692.

Holmström, J., Främling, K., & Ala-Risku, T. (2010). The uses of tracking in operations management: Synthesis of a research program. International Journal of Production Economics, 126(2), 267-275.

Honari, B., & Donovan, J. (2007). Early detection of reliability changes for using field failure a non-poisson life model data. Reliability and Maintainability Symposium (RAMS '07), Orlando, FL, USA. 346-349.

Ives, B., & Vitale, M. R. (1988). After the Sale: Leveraging Maintenance with Information Technology. MIS Quarterly, 12(1), 7-21.

Isaksson, O., Larsson,T., Rönnbäck, A. (2009) Development of product-service systems: challenges and opportunities for the manufacturing firm. Journal of Engineering Design 20.4 (2009): 329-348

Jalil, M. N. (2011). Customer information driven after sales service management: lessons from spare parts logistics. PhD thesis, Erasmus University Rotterdam , Erasmus Research Institute of Management (ERIM).

Jin, T., & Tian, Y. (2012). Optimizing reliability and service parts logistics for a time-varying installed base. European Journal of Operational Research, 218(1), 152-162.

Johnson, M., & Mena, C. (2008). Supply chain management for servitised products: a multi-industry case study. International Journal of Production Economics, 114(1), 27-39.

Kitchenham, B. A., Brereton, P., Budgen, D., Turner, M., Bailey, J., & Linkman, S. (2009). Systematic literature reviews in software engineering–A systematic literature review. Information and Software Technology, 51(1), 7-15.

Korpi, E. (2008). Contingency theoretical approach to harmonization of service operations. Unpublished M.Sc. thesis (Technology). Helsinki University of Technology, Industrial Engineering and Management, Espoo, Finland.

Kowalkowski, C., Brehmer, P. O., & Kindstrom, D. (2009). Managing industrial service offerings: requirements on content and processes. International Journal of Services Technology and Management, 11(1), 42-63.

Krikke, H., van Nunen, J., Zuidwijk, R., & Kuik, R. (2003). E-business and Circular Supply Chains: Increased business opportunities by IT-based Customer Oriented Return-flow Management. (working paper No. 2003-03).CentER Applied Research, Tilburg University.

Lehtonen, O., Ala-Risku, T., & Holmström, J. (2012). Enhancing field-service delivery: the role of information. Journal of Quality in Maintenance Engineering, 18(2), 125-140.

Mathieu, V. (2001). Service strategies within the manufacturing sector: benefits, costs and partnerships. International Journal of Service Industry Management, 12(5), 451-475.

McNabb, J. K. (2012). Vulnerabilities of wireless water meter networks. Journal of the New England Water Works Association, 126(1), 31.

Miles, T. J., & Andrews, B. (2008). Managing the Risk of Vibration Related Failures on Facility Pipework. 7th ASME International Pipeline Conference (IPC2008), Calgary, Alberta, Canada. 385-393.

Miles, T. J., & Wastling, M. A. (2003). Understanding compressor pipework vibration and fatigue. 2nd International Conference on Compressors and their Systems, Vol. 4, 559-568.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. International Journal of Service Industry Management, 14(2), 160-172.

Richardson, S. A. (2008). Interpretation of the HCR for QRA - and its Application Beyond the North Sea. 20th Hazards Symposium - Process Safety and Environmental Protection - Harnessing knowledge - Challenging complacency, England. (154) 641-651.

Romeijnders, W., Teunter, R., & van Jaarsveld, W. (2012). A two-step method for forecasting spare parts demand using information on component repairs. European Journal of Operational Research, 220(2), 386-393.

Saccani, N., Alghisi, A., & Borgman, J. (2013). The Value and Management Practices of Installed Base Information in Product-Service Systems. In C. Emmanouilidis, M. Taisch & D. Kiritsis (Eds.), Advances in Production Management Systems. Competitive Manufacturing for Innovative Products and Services (APMS 2012), IFIP WG 5.7 International Conference on (pp. 415-421) Springer Berlin Heidelberg.

Sampson, S. E., & Froehle, C. M. (2006). Foundations and implications of a proposed unified services theory. Production and Operations Management, 15(2), 329-343.

Sampson, S. E. (2000). Customer-supplier duality and bidirectional supply chains in service organizations. International Journal of Service Industry Management, 11(4), 348-364.

Schwenke, C., Vasyutynskyy, V., Röder, A., & Kabitzsch, K. (2011). Analysis of maintenance histories of industrial equipment with frequent maintenance demand. Paper presented at the Industrial Informatics (INDIN), 2011 9th IEEE International Conference on, Lisbon, Portugal. 299-304.

Skytte af Sätra, U., Christensen, R., Tanase, A., Koppervik, I., & Rokke, E. (2011). Proactive Maintenance in the Context of Integrated Operations Generation 2. SPE Economics & Management, 3(3), 102-108.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. British Journal of Management, 14(3), 207-222.

Turunen, T., & Toivonen, M. (2011). Organizing customer-oriented service business in manufacturing. Operations Management Research, 4(1-2), 74-84.

Ugarelli, R., Venkatesh, G., Brattebø, H., Di Federico, V., & Sægrov, S. (2010). Historical analysis of blockages in wastewater pipelines in Oslo and diagnosis of causative pipeline characteristics. Urban Water Journal, 7(6), 335-343.

van der Feltz, G., Lamers, F., Priem, H., & Melief, R. (2003). Continuously optimizing the value of an installed base of semiconductor manufacturing equipment. Advanced Semiconductor Manufacturing Conference and Workshop.

Vijayaraghavan, E. V. (2006). A Conceptual Data Design for an Installed Base and Configuration Management for the Philips Healthcare IT Products. M.Sc. thesis, Technical University Eindhoven).

Wagner, S. M., & Lindemann, E. (2008). A case study-based analysis of spare parts management in the engineering industry. Production Planning and Control, 19(4), 397-407.

Wagner, S. M., Jonke, R., & Eisingerich, B. (2012). A strategic framework for spare parts logistics. California management review , 54(4), 69-92.

Wise, R., & Baumgartner, P. (1999). Go downstream: The New Profit Imperative in Manufacturing. Harvard Business Review, 77(5), 133-141.

Wu, H., & Meeker, W. Q. (2002). Early detection of reliability problems using information from warranty databases. Technometrics, 44(2), 120-133.

Yoder, S. L., & DeLaurentiis, J. (2003). The Framework for a Regional Transit Asset Management System. ITE Journal, 73(9), 42-47.

INCREASING CUSTOMER UNDERSTANDING FOR INNOVATION

TUOMO ELORANTA
SANNA NENONEN
EIJA VAITTINEN
LAURA KANTO

Abstract

Based on service dominant logic, when companies develop new offerings, they should increasingly focus on value-in-use – the actualised benefits that their customers gain from their products and services. This requires a very deep understanding of the customer, since it is their subjective perception that determines value at the end of the day. However, many business-to-business (B2B) companies face a situation where there are intermediaries, such as retailers, wholesalers, etc., between them and the consumer in the value chain. This means limited direct interaction between the company and its end-customers and hindered access to consumer information, which can compromise efficient and effective innovation efforts. Our study addresses this challenge by testing three different methods – interviews, questionnaires and mystery shopping – which B2B companies offering consumer products and services can use to involve the end-customers in development activities. We examine what kind of new information can be gathered using these methods and what should be taken into account when implementing the methods in practice. While all three methods are associated with traditional market research techniques that have received much criticism, our findings show that they can be very useful in generating good ideas, especially for improving the commercialisation of new offerings and understanding the end-customers' contexts.

Introduction

The importance of customer understanding and the benefits it brings have been widely examined. Previous research has noted that good customer knowledge enables responding to customer needs and even creating new customer demands (Mont, 2001), gaining a competitive edge over rivals (Kosonen, 2004) and improving business performance (Rollins et al., 2012). When it comes to innovation, information about customers has been found to improve the development of new products and services. Gruner and Homburg (2000)

noted that increased customer interactions during the product development phase leads to increased product success. In a similar vein, Alam (2002) found that involving customers in service innovation can lead to better service offerings, faster development speed and diffusion of the innovations, improved customer relationships and a positive public image. Prahalad and Ramaswamy (2000) further note that customer interactions help in the commercialisation phase of innovation as a way of educating customers and shaping their expectations related to new products and services, which can be very significant when developing more radical offerings.

While the view that involving customers in development efforts can be very beneficial seems to be shared, less attention has been paid to the processes of actually doing it (Payne et al., 2008). This problem is especially prevalent in the context of developing new offerings, where the concept of customer co-creation has been much discussed, but on a relatively conceptual level rather than on examining it as a concrete activity taking place in innovation processes (Gustafsson et al., 2012). Magnusson et al. (2003) further argue that we need a better understanding of how customer involvement is performed in practice, instead of listing generalised types, as there can be significant differences in results between technically similar methods depending on how they are implemented.

To address this call, our paper examines three different methods for gathering information about end-customers: interviews, questionnaires and mystery shopping. These methods were selected based on our practical observations that all three seem rather widely used despite the fact that they represent much criticised "traditional market research techniques" (e.g., Gustafsson et al., 2012; Witell et al., 2011), so there must be some concrete benefits for their use. The examination of each tool was linked with development efforts at three large manufacturing companies, where the tools were utilised for gathering and validating novel service ideas and to understand the customers' world. Our investigation focuses on the kinds of input these different methods for interacting with customers can bring to companies' innovation efforts, as well as the types of issues one should consider when undertaking the practical task of using the tools.

Literature Review

In this section, we explore existing research on how to integrate customers into companies' innovation and development activities. We start off by looking at high-level guidelines of customer involvement, and proceed to an examination of the three methods in focus - interviews, questionnaires and mystery shopping.

Involving customers in innovation efforts

Companies considering engaging their customers in the development of new products and services are not facing a simple binary decision, but a multifaceted challenge requiring thorough contemplation on at least four fronts. First, how intensively should customers be involved? Second, at which point(s) of development should the collaboration take place? Third, to what kind of customers should the company reach out? Fourth and finally, how should the effort be organised? These are all crucial questions that firms face when striving to integrate customers in innovation efforts and which we will examine further.

There are many different ways to involve customers in innovation. Alam (2002) defined four types of customer interaction: customer giving ideas unprompted, focal company approaching the customer to discuss certain aspects of the development, focal company approaching the customer to discuss the development on a large scale and customers being a part of the actual development team. According to Witell et al. (2011), more integrative methods should lead to more profitable end results when compared to techniques, which keep the customers at arm's length. Similarly, Gustafsson et al. (2012) found more

benefits in frequent and in-depth collaboration with customers compared to less active ways of involvement. However, close cooperation can have its drawbacks. Magnusson et al. (2003) observed that intense involvement can lead to customers internalising similar mental constraints that the company people themselves suffer from, decreasing customers' ability to suggest novel ideas. In terms of industry practice, Alam (2002) found the in-between approaches the most commonly used among service organisations, usually concretizing in customer interviews or inviting them to meetings with development teams to give feedback and share insights. The reasoning behind these choices was mainly based on a cheap price and a small required effort. This highlights well the fact that the benefits more integrative techniques bring need to be reflected against their costs in terms of money and resources. An optimum approach is thus highly dependent on situation and context.

When should customers be involved then? According to Alam and Perry (2002), customers can make meaningful contributions to more or less all steps in the innovation process. However, the phases with the largest potential benefits are the beginning and end of the development (Alam, 2002; Gruner & Homburg, 2000). In the product development context, Gruner and Homburg (2000) argue that customers are especially helpful in early concept development, but not so much in actually coming up with ideas. Interestingly, several studies conducted in the service innovation context contradict this by showing positive results of involving customers in the idea generation stage (Alam, 2002; Magnusson et al., 2003). Magnusson et al. (2003) found that regular consumers were able to generate more original ideas than professional developers, though their ideas were less feasible to implement. Similarly, Alam's (2002) study of service development managers echoed the meaningfulness of involving customers in idea generation. In the final phase of commercialisation in the innovation process, most aspects of the new offering might be already set in stone, but customer involvement can still make important contributions (Gruner & Homburg, 2000). Gaining an understanding of the drivers of consumers purchasing behaviour helps when forming marketing and sales strategies, which play a crucial role in determining the financial performance of the new offering (Meyer & Schwager, 2007).

It is important to also consider what kind of customers the company strives to interact with when innovating, since benefits gained from collaborating with customers depend on their knowledge and skills and willingness to learn (Prahalad & Ramaswamy, 2000). Some have argued that the views of the regular consumers should be ignored when developing breakthrough innovations because they lack sufficient information of what is technically possible or feasible to do (Martin & Faircloth, 1995), though this view has been challenged (Magnusson et al., 2003). First, a lack of information does not necessarily hold true for all customer groups. Von Hippel (1986) identified lead users, people who face upcoming needs of the general public earlier than the mainstream, as an especially important group to involve in development efforts because of their increased expertise and intrinsic motivation to search for novel solutions. Second, Magnusson et al. (2003) found that given sufficient reinforcement, even regular consumers can actually come up with more original ideas than professional experts. Thus, the question of who to involve is very much interlinked with how involvement will take place and how the creative collaborative process is supported.

The final question is who should be involved when interacting with customers for innovation purposes? Payne et al. (2008) have argued that the responsibility of interacting with customers should not be assigned to a single entity, such as sales or marketing, as customer understanding is vital throughout the organisation. While doing just that might save resources and streamline coordination, it can also create a situation where other groups do not see thinking about customers or seeking their input relevant or beneficial

(Meyer & Schwager, 2007). Also, as understanding customers and customer experience is largely tacit and sticky knowledge (Gustafsson et al., 2012), diffusion of such information inside the organisation gets more problematic as the amount of intermediaries in the communication chain increases. Involving different groups in the effort directly can mitigate this challenge. Related to this, Meyer and Schwager (2007) argue that those with more experience from direct interaction with customers tend to grasp more easily the benefits of customer understanding.

Having now reviewed the fundamentals of interacting with customers for innovation, we now proceed to examining in detail three different ways for carrying it out in practice – interviews, questionnaires and mystery shopping. Based on previous research, we examine what kind of information these methods can create for the innovating company as well as key issues related to each technique.

Collecting customer experiences through interviews and questionnaires

Interviews and questionnaires are commonly used in market research to review customer perceptions. Survey methods tend to be utilised to gain an understanding of customers' use of current products and services and, accordingly, to satisfy customers' needs (Slater, 2001). Haynes (1997) states that, for example, customer satisfaction questionnaires fit well in a service environment where objective measures of the service quality cannot be realised, but the quality is determined in relation to the customers' expectations towards and realisation of the service. However, empirical literature on the use of these methods in service innovation is quite limited even though, for example, customer acceptance of technology-related services has been studied with questionnaires (e.g., Chen et al., 2007; Jang & Noh, 2011).

Even though widely used, these techniques have been criticised due to their reactive and backward-looking nature. For example, Johnson (1998) states that interviews and questionnaires capture only customers' previous experiences. This is a consequence of the fact that customers have difficulties imagining situations or needs that they have not experienced (Trott, 2001). Matthing et al. (2014) even state that the customers' actual needs and valuations of services cannot be accessed by interviews and questionnaires. Therefore, interviews and questionnaires mainly result in incremental improvements instead of more innovative ideas (Harari, 1994).

Despite the critique, the use of interviews and questionnaires also has several benefits. With these methods, insights can be easily and quickly collected from a large group of customers. In addition, utilisation of these methods requires only little effort and resources compared with the amount of collected data. Interviews also enable the creation of personal contact with customers. Lüthje (2004) conducted a survey study among users of outdoor sports equipment and found that these users are highly innovative. He found that innovative users can be distinguished from non-innovative users through questionnaires or standardised telephone interviews. However, he noted that the need for survey methods in recognising innovative users is clearer in markets where it is challenging to observe the innovation potential in other users (Lüthje, 2004). Similarly, Matthing et al. (2006) found that questionnaires can be an effective tool for identifying lead users who can be valuable for a company's service development. It seems that customers are not prone to proactively contact manufacturers with their ideas; thus, questionnaires and interviews or other methods are needed to discover the customers' ideas (Lüthje, 2004; Vaittinen et al., 2014). Thus, customer survey methods can be a suitable information source for innovation and improvements in the company, but they need to be planned carefully (Faché, 2000).

When using interviews or questionnaires to chart new service ideas from consumers, the content should be designed with the aim in mind. Commonly, questions regarding only consumers' previous experiences or the usability of an existing service are included, re-

stricting the possibility of respondents' sharing totally new insights on services (Trott, 2001) and, consequently, limiting the usability of results for future service development. Thus, interviews and questionnaires must be carefully developed in order to measure things intended and steer decisions in the right direction (Hayes, 1997). The appropriateness of questions ensures that respondents do not get bad customer experiences due to frustrations towards the survey or even the subject company (Meyer & Schwager, 2007). When used wisely, appropriately realised survey methods can yield valuable information on customer perceptions about the services for the use of service development (Hayes, 1997).

Collecting customer experiences through Mystery Shopping

Mystery shopping is a form of participant observation, where the researcher enacts the role of a customer interacting with the company or its offerings (Finn & Kayande, 1999; Wilson, 1998). In practice, this can mean, for example, visiting a cafeteria and then providing a report on different aspects of the experience, such as the quality of the drinks and food, the friendliness of the staff or the cleanliness of the premises, depending on which kind of information is sought. Mystery shopping is used by different types of organisations, such as financial services, travel, transport, motoring, retail and the public sector (Wilson, 1998). The main benefit of mystery shopping is that it supports better decision-making by bringing in new information which is more strongly based on the perspective of users and customers, instead of the internal perceptions of the company (Van der Wiele et al., 2005; Wilson, 1998). Compared to other usual data collection methods, Finn and Kayande (1999) noted that mystery shopping can be more cost-efficient than customer surveys, though these tools capture different types of information and should be used in tandem.

There are different ways to conduct mystery shopping, but usually the process involves coming up with a suitable scenario to enact the mystery shopping act itself, documenting and reporting the results, and finally analysing the data and acting on the findings (Finn & Kayande, 1999; Wilson, 1998). The scenario needs to be believable and the researcher needs to be credible in his or her role (Wilson, 1998). Of course, not all cases require a specific type of person or large amounts of background information, the cafeteria case being a good example. However, enacting a buyer of professional medical equipment can be significantly more challenging.

Previous research has focused on using mystery shopping for assessing the gap between realised service experiences and official service quality guidelines set by the company (e.g., Van der Wiele et al., 2005; Wilson, 1998) as well as understanding and benchmarking competition (Finn & Kayande, 1999). Interestingly, while scientific research observations tend to be associated with a non-positivistic approach, Finn and Kayande (1999) argue that mystery shopping is best suited for assessing objective characteristics of service quality, whereas surveys are better for more subjective measurements. Similarly, Wilson (1998) claims that mystery shopping "aims to collect facts rather than perceptions". While the possibility for more subjective approaches and using open-ended research questions is recognised, there seems to be a strong emphasis on using structured checklists and focusing on the reliability of the method. However, we argue that the possibilities for mystery shopping are wider than this. As an observational method, it can provide a great opportunity to gain a greater understanding of the subjective experiences and contexts customers face when interacting with the company or its offerings. The importance of these aspects is highly emphasised in research on service dominant logic (e.g., Vargo & Lusch, 2011) and have been noted to be beneficial in service development activities (Edvardsson et al., 2012).

Research context and methodology

The research was conducted as a qualitative case study. The case study approach makes it possible to gain novel insight from the em-

pirical world (Yin, 1994). We used the extended case method (Burawoy, 1998) as a guide for data analysis. This methodological approach uses empirical data gathered through case study to conceptualise and extend theory. The researcher examines the literature relevant to his/her problem area, and employs the empirical data to fill in the gaps, reveal its flaws, elaborate its meaning, and extend its coverage. First, each case was examined separately, and next, we cross-examined the two mystery shopping cases in tandem. Finally, we cross-examined all three cases together and compared our observations from each company and method to create a holistic picture of gaining customer understanding for the purposes of innovation activities in B2B companies.

Interviews and questionnaire

Case company A is a large European consumer durables manufacturer. The company's products are directed both to regular customers and professionals. The company does not sell their regular customer products directly to the end-customers, but the distribution is realised through retailers. Thus, only the retailers have direct customer contact, leaving company A reliant on information obtained through retailers. Company A wants to widen their regular customer offerings to product-related services, and therefore needs to gain more profound insight into their end-customers' needs.

A group of interviewers conducted a series of interviews among consumers to chart their opinions on a current product-related, guarantee-type service of company A and the need for additional services from this manufacturer. These interviews were structured with predesigned questions in order to ensure the comparability of the interview results as there were several interviewers working separately. The content of the interview questions was based on the manufacturing company's needs and literature on the subject. The interviews were realised in one Nordic country during the spring of 2014. The informants consisted of consumers visiting product dealers to purchase a new product or service related to the product currently in use. Interviews were realised as face-to-face discussions at five dealer stores over 16 days. In total, 188 interviews were conducted, lasting an average of 10 minutes. When the interviewee accepted, which was the case with most of the interviews, the discussion was recorded and these recordings were used in the analysis.

Based on the interviews, a questionnaire for adopters of the guarantee service was conducted in two other Nordic countries. The questionnaire was conducted online a few weeks after the interview round. The invitation to take part in the research was sent to a group of current users of the service under review by using the service customer register of the case company. The goals of this questionnaire were similar to the interviews, thus, charting customers' insights about the current service and future service possibilities. In total, 820 questionnaire responses were received.

Both methods concentrated only on service development themes by reviewing improvements needed for the current guarantee service and needs for additional services. The themes included in the interviews and the questionnaire are presented in Table 2.

Mystery shopping

Case organisation B, hereafter referred to as Company B, is a business unit of a European manufacturing company, producing various materials for the building and decoration industry. Company B's products are used both by professionals and regular consumers, but it is still best characterised as a B2B company, as it does not sell directly to the end users of the products nor even retailers. Its position in the value chain has created a situation where very little end-customer information reaches the company, which has been hampering its efforts to create a new innovative offering and especially commercialise it effectively.

Case organisation C, hereafter referred to as Company C, is a business unit of a European

TABLE 2.
Interview and questionnaire themes.

THEMES	SUBTHEMES
Selecting products	• Selected product brand • Customer's brand loyalty • Grounds for choosing certain brand • Price comparison (is this done and how) • Needs for facilitation of product selection
Familiarity of guarantee service	• Familiarity with the guarantee service • Use of guarantee service • Perceptions of service (usefulness, easiness, content, effect on product selection, willingness to recommend) • Service development needs
Dealers' services	• Use of dealers' services • Grounds for use of dealers' services • Need for service facilitation
Additional services	• Suggestions for additional manufacturers' and dealers' services • Other providers' services offered • Satisfaction with used product-related services

manufacturing company focusing on producing services and products for the construction industry, including tangible products as well as services related to them. While the company in general operates in the B2B market, this specific business unit is more focused on consumer products and sells its products and services via retailers. During the past few years, Company C has started to develop more and more services aiming to support the main product, in order to differentiate itself from the competition. However, as with Company B, intermediaries in the value chain have made it difficult to manage the launch stage of innovation, get feedback on further development needs and ensure that the desired information is delivered by retailers to customers as well as from customers to Company C. Problems with receiving end-customer feedback prompted both companies to look for different ways to gain more insight into the desires and preferences of end users.

The actual mystery shopping was conducted as follows. In both case organisations B and C, sales and marketing managers (n = 2 in each) were interviewed to create an understanding of the context and to gather insights for a mystery shopping checklist to guide data collection. Two main goals were also specified. The first was to gain an understanding about the sales process and customers' context as they gather information about potential solutions and make purchasing decisions, as well as gain ideas for improving the features and support of sales processes of existing products and services. The second goal was to find out whether this kind of research method is suitable for producing customer understanding from the innovation process point of view. The actual mystery shopping was conducted by two of the authors plus a third researcher.

In both cases, two different simple and believable customer scenarios were created. The scenarios were not scripts, but rather briefs for the shoppers that provided a plausible reason for their enquiry. In case C, the two scenarios were defined beforehand, while in case B, the second scenario was done after encountering problems with the first scenario. In both cases, adjustments to the checklist were made based on the experiences on the first few visits.

In case C, the mystery shopping was done at 15 different retailers in Finland. Five of these

dealers were selected by case organisation and these pilot visits were used to test the scenarios and checklist. The rest (n = 10) of the dealers were selected by researchers from a list of 17 dealers provided by Company C. In the pilot visits, observations were made by two researchers who visited the store at the same time. The last 10 visits were made by two researchers, but only one researcher visited each store. In case B, the mystery shopping was conducted at 10 different retailers in the capital area of Finland. All visits were made by a two-person team, who also selected the dealers to visit. In both cases B and C, the visited retailers were hardware stores, though the products and services under study were very different. The salespersons in the stores were selected at random. The mystery shopping visits lasted 15–45 minutes and were documented immediately after each visit. An understanding of the context and preliminary analysis were deepened by discussing the findings with each case organisation separately at pre-determined checkpoints.

Results

In this section, we discuss the results of the study, describing separately the type of input the selected methods were able to generate for the purpose of innovating new services, products or ways to operate, as well as findings related to the practical application of these tools. First, the interviews and questionnaires are examined in tandem; then, we look at the results from the mystery shopping, and finally summarise our findings.

Findings through interviews and questionnaires

Insight for innovation

The main results of the interviews and questionnaires were about understanding consumer insights of current and new services related to the reviewed consumer product. These results are useful for further service development, which is important, as there were surprisingly few registered users of the reviewed guarantee service. Also new services are necessary for the company to get closer to end-customers and meet their potential service needs. The most significant result relating to the reviewed current guarantee-type service was that it is not commonly known among consumers. Most of the interviewees familiar with the service had heard about it from the product dealers. This was surprising as the service had already been on the market for a few years, and at the time of the interviews, an extensive marketing campaign by Company A was ongoing. This result raised the question of why consumers were so unaware of the service; interviews helped to identify the problem, but did not explain the reasons behind unawareness of the service. Interviewees had seen advertisements, but still did not recognise the service. It seems that cooperation with dealers is essential so that manufacturers and dealers can achieve a common understanding about marketing and offering the service. Furthermore, this cooperation is needed to ease the dealers' role as the service seller and to achieve higher customer satisfaction. Therefore, this study also indicated a need for further research to gain an understanding from the dealers' viewpoint.

Those interviewees and respondents who had used the service were mostly satisfied with it and hoped that it would continue to be available in the future. They also had ideas for further development of the service. These suggestions related, for example, to the validity of the guarantee service, easiness of registration for a service user and the availability of information about the service. However, only a minority of respondents hoped for these improvements. Many focused on the strong points of the service; thus, this study offered Company A feedback about the positive perceptions customers have about the service. This was considered very beneficial as the company usually only hears customer complaints, but not the praises from dealers. Furthermore, these methods presented an opportunity to compare results between different countries and respondent groups.

Another important theme in the results related to the need for new services. A great

share of respondents did not long for additional services and were mainly satisfied with the current situation. One reason for the customers' satisfaction may be that dealers already offer the services needed and there is no need for manufacturers to start offering competing services. Another possibility is that our case company offers easily replaceable consumer durables, the lifespan of which is not that long, making services somewhat unnecessary. Even though the interviewees did not identify the kinds of services manufacturers could offer, their attitudes towards the idea of manufacturers providing services were generally positive. However, about every fourth respondent wished for services from manufacturers that were mainly product-related information and additional guarantees. On the other hand, many ideas did not concern manufacturers or were not in the purview of manufacturers, such as lower product prices and wider opening times of dealerships. These service ideas still provide important information about certain parts of the value stream in which manufacturers do not operate themselves, but could potentially be addressed by collaborating with partners so that the needs of end-customers are better fulfilled.

Innovating new services was much more difficult for the respondents than evaluating current services. The customers had limited time when interviewed and did not want to spend a lot of time filling in questionnaires or thinking about their answers. This meant that only the most substantive issues came up. Noteworthy is that interviews and questionnaires still provided ideas for totally new services. Some of these were so innovative and surprising that their realisation may be challenging and even unreasonable for the case company. Thus, respondents did not linger on easy and obvious aspects, like previous literature suggests. In our case, the interviews took place at the dealers' premises; therefore, consumers were already oriented to the subject, which may have made innovating new ones a bit easier. If the interviews had been conducted elsewhere, the quality and innovativeness of ideas could have suffered. Also, it might not have been as easy to grab consumers' attention and interest. However, even though some new radical service ideas did come up, compared with the effort, the number of them was rather low. Interviews are very time-consuming, and if only charting totally new ideas, the spent time per idea would be quite high and the use of this method would not be beneficial. In our case, charting new ideas was merged with a review of current services; thus, the new ideas can be somehow seen as additional value.

Practical insight

Customers felt comfortable talking about current services, and some even mentioned that they were happy that the case company was interested in their insights and that they had a chance to share their perceptions. However, in our case, the interviewees had time to spend on the interviews while waiting at the dealers for service. Thus, it can be stated that this method works when interviewees have time to spend on the interview. It is important to think about the context where the interviews are conducted. The wrong time and place might make customers annoyed about the company, but a good choice of venue, as in the present case, can be a form of communicating customer orientation and care, while simultaneously improving the quality of the received data. This also affects the response rate; thus, almost everyone asked to be interviewed agreed to the request, while only every tenth person took part in the questionnaire.

For the comparability of responses, it is necessary to always present the questions in the same way and ensure that they are understood correctly. The benefit of interviews, compared to questionnaires, is that complex and unclear answers can be easily verified by asking check-up questions. When developing a questionnaire, it must be tested carefully. Thus, it is easy for deficiencies to exist that cannot be corrected, such as the effect of dialects or case-specific vocabulary. For example, we found that even a professional translator might not be familiar with professional

terms, making testing with actual respondents extremely important. Furthermore, different scenarios must be carefully considered. In our case, we had to construct slightly different question patterns depending on the type of respondent, e.g. for customers who had used the guarantee service and for those who were familiar with the service but had not used it. Similar questions would have made answering some questions impossible, but it could also have created unwanted situations, e.g. if a customer was entitled to a service and had not been told about it.

In conclusion, interviews and questionnaires are an easy way to collect data from a large group of people, but they must be kept short. Interviews yield more profound information, but require more time than questionnaires. On the other hand, respondents of questionnaires have more time to think than interviewees do, which may result in more or even better ideas. However, in questionnaires questions can be easily skipped if they require some deeper thinking, and answering these kinds of questions requires interest in the subject.

Findings through Mystery Shopping

Insight for innovation

In general, the main insights gained from mystery shopping were related to improving the commercialisation of innovations by providing information about the context where customers look for solutions to their problems and the challenges they face during the process. The most important benefit in both cases was the increased understanding about the communication bottlenecks that exist in the chain of intermediaries from the focal firm to the end-customer for new offerings' value propositions. For example, in case B, we noticed that the focal firm's offering was sold in a different department in retail stores than their competitors' alternative solutions. This was a significant problem as customers were more likely to search for solutions in the other department where the salespeople were often unaware of the focal firm's offering. Thus, the focal firm recognised that it is especially in these departments where awareness of their offering should be increased. Very similar observations were made in Company C, in which the focal firm's offering was sold quite differently at each visited retailer and, in general, the value proposition of the company's main product was not communicated as expected. Perhaps more surprisingly, however, it also became evident that newly launched add-on services related to the main product were offered only if the customer (here the mystery shopper) knew to ask about them. Even then the sales personnel were quite passive in promoting the service and lacked detailed information. Thus, it was evident that the launch of the new services had not been successful and more emphasis should have been put into supporting sales at the retailers.

Related to this, the second key benefit was competitor benchmarking. In case B it was noted that competitors who offered the same solutions as the focal company suffered from the same problem: the large gaps between what these firms think gets communicated to end-customers and the information that actually reaches them. Thus, it became obvious that improving marketing communications and rethinking information printed in packaging could actually be easy sources for differentiation. While the value propositions of competitors were in principle already known by the focal firms, mystery shopping also provided insights into which parts are highlighted to end-customers, how different alternatives are presented to them, and how retailers perceive the value-in-uses of different solutions. These insights were especially valuable in answering the "what?" question related to value proposition: which aspects of a firm's own offering should be emphasised in marketing communications, etc.

In sum, both cases showed that customers of the focal firms are making their decisions in a context where they get surprisingly limited support for their decision-making. Mystery shopping provided a new understanding as to whom the focal firm should try to influence in order to generate more awareness about their

offering among potential customers. This information gave good ideas on how companies can better support the purchasing process of end-customers, as well as differentiate themselves from their competitors. Thus, mystery shopping worked well as a tool for not only increasing the understanding of the customers' context, but also generating actionable insights on how to ensure successful commercialisation of new offerings.

Practical insight

Planning-wise, while the background scenario was planned very carefully, interactions with retailer salespeople uncovered holes in the story that needed to be filled by improvising. We also noted that it is important to consider the specific scenario, especially if the goal is to determine the range of solutions that are offered to customers facing a certain high-level problem. In this case, the scenario needs to be vague enough so that there is no obvious "right" solution, which will encourage dealers to present the whole range of alternatives. In case B, the problem we presented to the dealers initially was related to which ones were very aware of the benefits of the focal company's offerings. Thus, very few alternative solutions were presented, which meant that we obtained very limited information about the competition. When the background scenario was changed, the dealers started suggesting a much wider range of possibilities, which was more in line with the initial goals of the mystery shopping.

The aforementioned example shows well how mystery shopping requires a certain amount of reflexivity with continuous consideration of observations and the potential reasons behind them. In our case, without the adjustments to the scenario in case B, the picture painted by mystery shopping would have been very limited and many important findings would never have been made. One needs to not only focus on known unknowns, but also be sensitive to recognising unknown unknowns. Here, conducting the mystery shopping in two-person teams helped, as it was possible to reflect on observations immediately after each dealer visit. In addition to helping fine-tune the mystery shopping strategy and tactics, two-person teams helped to mitigate the challenges in recalling events, because recording was not possible for ethical reasons. In case C, where the visits were conducted by a single researcher, a predefined mystery shopping question checklist helped to mitigate problems in documenting the findings.

Mystery shopping generated a wide variety of material ranging from notes and memos to photographs and marketing brochures taken from retailers. To ensure that the results and material can also be utilised later, it is good to think about systematic archiving beforehand. In terms of workload, the mystery shopping efforts were surprisingly light. In case B, planning took approximately one whole workday, actual retailer visits one day and analysis work one day for two persons in total. Even with such a small effort, very interesting findings could be made. In case C, the process took a little bit more effort than in case B, but still the effort was very light.

When reporting the findings, two things were particularly important. First were the narratives from the field. The stories of the shopping visits highlighted particularly well the general findings, and helped those who weren't taking part in the actual mystery shopping work to put themselves in the customers' shoes. Second were the photos from the stores showing how products were presented to end-customers. This combination of narratives and pictures was instrumental when conveying information about the context end-customers were facing when searching for solutions to their problems.

Synthesis

All three methods were able to provide very interesting new information from the perspective of innovating new products and services. The main results have been summarised in Table 3. Interviews and questionnaires provided new ideas for services and improving collaboration with distributors, feed-

back on current products and services, and strengthened the customer-oriented image of the company. Mystery shopping opened a window to the world where end-customers compare different solutions and make decisions, providing key insights related especially to the commercialisation of innovations.

Discussion

There has been considerable debate on the ability of customers to contribute meaningfully to innovation in companies. Gustafsson et al. (2012) noted that customer involvement is beneficial for generating and developing incremental ideas, but when pursuing radical innovation, firms might be better off trusting their own expertise and knowledge. At first sight, our findings seem to support this claim as the type of customer understanding that we were able to generate with interviews, questionnaires and mystery shopping was mainly related to an increased understanding of the present moment prompting incremental development ideas, rather than exploring more radical future possibilities. Based on this, it is tempting to say that when it comes to radical service innovation, customers are not in a key role. However, our interviews were very concise, targeted existing regular customers and aimed to simultaneously create an understanding about customer perceptions of existing offerings and probe ideas for future products and services. It is likely that concentrating more strongly on finding radical ideas through longer interviews, us-

TABLE 3.
Summary of results

	INTERVIEWS AND QUESTIONNAIRES	MYSTERY SHOPPING
FOCUS	• Customer perceptions of manufacturer's existing services • New service ideas	• Customer's purchasing/decision-making context • Commercialisation-related issues
INSIGHT FOR INNOVATION	• New ideas for improving cooperation with distributors • Customers able to generate especially conservative service ideas, but also some radical ideas were proposed • Insight into the strong points of current offering	• Increased understanding of the environment where consumers are searching for suitable solutions for their needs • Reviewing information available for decision-making and recognising bottlenecks in value-in-use communication • Suitable for competitor benchmarking
PRACTICAL INSIGHT	• Customers motivated to participate: manufacturer's interest towards their opinions considered very positive • Interviews need sufficient time to spend with customers • Testing of questionnaire form is necessary for ensuring quality • Innovating new services more difficult for customers compared with evaluating existing ones	• Background scenario needs to be planned carefully, but should not be too specific • Provides wide variety of material for analysis, careful documentation and preparation is required • Narratives and photography particularly beneficial for solution search and result dissemination

ing specific tools for examining latent needs such as design probes or involving certain recognised pioneer customer segments such as lead users (Von Hippel, 1986) could have resulted in different findings. It is notable that even without a strong radical innovation focus, we were still able to gain several new radical service innovation ideas. In this sense, our results lend support to Magnusson et al. (2003), who observed that even regular consumers have the capability to come up with meaningful radical ideas presuming they are given sufficient support for the task. In our case, this held true even though the given support was minimal.

Gustafsson et al. (2012) highlight that customer co-creation is not only about interacting with customers, but also their context, and our findings suggest that mystery shopping is one good way to do this in practice. Previous research has mainly examined mystery shopping as a tool for measuring service quality and customer experience in the business-to-consumer (B2C) context (Finn & Kayande, 1999; Van der Wiele et al., 2005; Wilson, 1998). We contribute to this discussion by showing that it is also an excellent way for B2B companies to peek into the world of the end-customer and support especially the commercialisation phase of innovation. It can provide in-depth insights into the context where consumers are searching for suitable solutions for their needs, the kind of information that is available and how the potential value-in-use of a company's products and services is communicated to them. There are also clear synergies between mystery shopping and the two other tested methods. First, based on our results, the type of information generated with mystery shopping was rather distinct from the interviews and questionnaires. Second, the increased contextual understanding gained through playing the role of the customer could also help in comprehending results from other data collection methods. Thus, our results complement the findings of Finn and Kayande (1999) by showing that using mystery shopping in conjunction with other customer research methods is a good idea not only when measuring service quality but also in the innovation context.

Our results also suggest that when mystery shopping is used as an innovation tool, some of the previously proposed rigorous guidelines for mystery shopping can be somewhat relaxed. Finn and Kayande (1999) claim that getting good results requires large number of independent researchers. While this might be true when the focus is on service quality issues, our results indicate that the same does not necessarily apply in the innovation context, as we were able to gather very valuable information with very few investigators. Of course, it is important to remember that if actual end-customers are not directly involved in the act of mystery shopping, a certain amount of caution needs to be exercised with the results in order to avoid false inferences. However, especially for B2B companies manufacturing consumer products, mystery shopping can create eye-opening results related to the end-customers about their products and services with relatively little effort.

The information that we were able to gather using these three different methods spanned a wide range of different areas, consisting of ideas and observations related to marketing, sales, distribution channels and inter-organisational collaboration, improving current offerings, as well as input for completely new products and services. Thus, a key challenge when it comes to utilising the fruits of these efforts is the capability to diffuse this information efficiently and effectively to all the different groups responsible for these different areas. Our observations resonate with the findings of Payne et al. (2008) and Meyer and Schwager (2007) who underline that customer interaction should not be assigned to a single department. Doing that can create a perception that only a single department needs to be concerned about customers, and can also lead to overemphasising certain aspects of customer understanding while aspects relevant to other departments are ignored. Customer involvement can create highly beneficial information for a variety of purposes, and

to get the maximum benefit from the effort it is critical to involve people broadly from different departments and units. This will ensure that insights are diffused throughout the organisation and, hopefully, will also lead to concrete action. One good approach could be to document results in an easily understandable form in a central repository where the documents are available for everybody who might benefit from them in their work. It might also be a good idea to archive the raw data that was gathered. This allows for re-examinations of past data from new perspectives, which can help to avoid repetitive data gathering efforts and save costs. A common repository for all departments could also help the organisation to stay on track and coordinate different customer insight collection activities. Furthermore, it can be useful to gather employees from different functions and locations to discuss the results and the further development of the ideas received, as was done in Company A.

Making inferences based on gathered data is not always easy and findings often need to be squeezed out with considerable effort (Meyer & Schwager, 2007). While a thorough understanding of the demands of the customers is a key prerequisite for making good business decisions, potential misunderstandings of their desires run the risk of creating false complacency of meeting their needs (Hayes, 1997). Thus, it is not only important to ensure that customer information is gathered, but also that it is processed in a manner that creates accurate and high quality insights that are put into use. It is also crucial to realise that implementing the customers' ideas or other insights gained in customer interactions is not necessarily easy (Matthing et al., 2004). Implementation challenges have been linked especially with "soft data", such as interviews or observations, as their results can be interpreted in different ways, which can make taking action difficult (Meyer & Schwager, 2007). However, based on our results from the interviews and mystery shopping – which both represent soft, qualitative data – this concern might be overemphasised. Both methods provided very concrete and actionable information related to the commercialisation of new offerings and how to improve the final steps of the value chain.

Implementing the ideas that arose from the three customer understanding methods used in this paper was not in the scope of our work, but is a crucial aspect to consider and should be explored in-depth in future research. By adopting a proactive approach and involving customers early and intensively, service firms can facilitate learning and reduce the risk of being imitated and surpassed by competing organisations (Matthing et al. 2014). Still, these benefits are unlikely to be realised unless new insights are translated into concrete action. One key aspect in this sense is that customer needs and preferences are not static, but evolve constantly (Rothwell et al., 1974). Thus, customer interactions need to become a continuous effort and extended beyond single projects, and more towards the portfolio level so that involving customers in service and product development projects using various methods becomes part of the company culture. To understand how to achieve this, we need more research on different efforts aimed to increase the involvement of customers in innovation.

Finally, we feel that it is crucial to highlight that how a certain customer involvement method is used exactly can make a large difference. In principle, many customer involvement tools that are touted more suitable for radical innovation, such as the lead-user method (Von Hippel, 1986) or techniques utilised in CuDIT experiments (see Kristensson et al., 2004; Witell et al., 2011), are at their core creative combinations of the criticised traditional market research techniques. Thus, we echo the criticism of Magnusson et al. (2003) in that we feel it makes little sense to try to create general guidelines on where or how to use a specific tool. Every tool can be used in various ways both individually and fused with other techniques, resulting in nearly a limitless amount of potential combinations with distinct success factors, making general guideline creation both very chal-

lenging and somewhat superfluous. Thus, we suggest future research should increasingly focus on how to support recognising the best strategies for gathering customer understanding in different contexts.

Limitations

The main limitation of the study is that the interview and questionnaire data were collected in a different context than the mystery shopping data, which made comparing the type of information generated with each method somewhat challenging. However, this problem was mitigated by conducting mystery shopping in two different contexts, which had considerable similarities with the context of the interviews and questionnaire. Another limitation related to this is that each of the three methods reviewed was used only in the context of B2B companies that make consumer products and services, making more generalizable inferences and conclusions problematic. Thus, the results of this study represent certain cases and circumstances, and will not necessarily reveal all the potentially important context-specific aspects of using the methods. In this sense, further studies should be conducted to review the benefits of the methods for innovation purposes in other contexts. Furthermore, the review of the methods' usefulness for innovation mainly describes the researchers' own interpretations even though the case companies' representatives' opinions expressed in the results workshops were carefully considered during the analysis. For further study, it would be interesting to examine how company people themselves would use the tools and what kind of practical challenges might arise between the day-to-day life in firms and conducting end-customer studies using the three reviewed methods.

Conclusions

Despite all the criticism that so-called traditional market research techniques get, our results show that interviews, questionnaires and mystery shopping can all provide very interesting information for the purposes of new service and product development. While there are probably more suitable techniques available for gathering ideas for radically novel offerings, the ease of implementation and relatively small required effort can make the three examined methods very intriguing, especially to companies that are not very experienced in gathering knowledge about their end-customers and their context. Interviews and questionnaires provided excellent insights into issues about existing offerings and their distribution, as well as ideas for new services. Mystery shopping on the other hand was a highly efficient tool for understanding the context where end-customers are making purchasing decisions and getting ideas about how to successfully commercialise new products.

Even if the three methods are far from ground-breaking, none of them should be approached too lightly. Each tool requires careful planning, high reflexivity during data collection and analysis, and determined action based on the results to be used efficiently and effectively. Special effort should be put into ensuring that the goals for using the methods are in line with how they will be applied in practice. It is important to note that it is not enough to select the right tool for the job, but also to use it in a suitable fashion. Especially for interviews and questionnaires, careful consideration of who to ask, about what and how exactly are of the utmost importance in order to ensure that the initial goals are met. Still, the results might be different to what were expected. However, in some cases, it is exactly this kind of information that might prove to be extremely valuable for the company.

References

Alam, I. (2002). An exploratory investigation of user involvement in new service development. Journal of the Academy of Marketing Science, 30(3), 250-261.

Alam, I. (2006). Removing the fuzziness from the fuzzy front-end of service innovations through customer interactions. Industrial Marketing Management, 35(4), 468-480.

Alam, I., & Perry, C. (2002). A customer-oriented new service development process. Journal of Services Marketing, 16(6), 515-534.

Burawoy, M. (1998). The Extended Case Method. Sociological Theory, 16(1), 4-33.

Chen, C. D., Fan, Y. W., & Farn, C. K. (2007). Predicting electronic toll collection service adoption: An integration of the technology acceptance model and the theory of planned behavior. Transportation Research Part C: Emerging Technologies, 15(5), 300-311.

Edvardsson, B., Kristensson, P., Magnusson, P., & Sundström, E. (2012). Customer integration within service development—A review of methods and an analysis of insitu and exsitu contributions. Technovation, 32(7–8), 419-429.

Faché, W. (2000). Methodologies for innovation and improvement of services in tourism. Managing Service Quality, 10(6), 356-366.

Finn, A., & Kayandé, U. (1999). Unmasking a phantom: a psychometric assessment of mystery shopping. Journal of Retailing, 75(2), 195-217.

Gustafsson, A., Kristensson, P., & Witell, L. (2012). Customer co-creation in service innovation: a matter of communication? Journal of Service Management, 23(3), 311-327.

Gruner, K. E., & Homburg, C. (2000). Does customer interaction enhance new product success?. Journal of Business Research, 49(1), 1-14.

Harari, O. 1994 The tar pits of market research. Management Review, 83(3), 42-44.

Hayes, B. E., 1997. Measuring customer satisfaction. Survey design, use, and statistical analysis methods. American Society for Quality, Quality Press, Milwaukee, US.

Jang, H. Y., & Noh, M. J. (2011). Customer acceptance of IPTV service quality. International Journal of Information Management, 31(6), 582-592.

Johnson, M. D. (1998) Customer orientation and market action. Upper Saddle River, N.j.: Prentice Hall,

Kosonen, V. (2004). BestServ. Industrial Service Business Strategy. Generic Framework and Case Examples. Technology Industries of Finland, Helsinki. 51 p.

Kristensson, P., Gustafsson, A. and Archer, T. (2004), Harnessing the Creative Potential among Users. Journal of Product Innovation Management, 21(1), 4–14.

Lüthje, C. (2004). Characteristics of innovating users in a consumer goods field: An empirical study of sport-related product consumers. Technovation, 24(9), 683-695.

Martin, J., & Faircloth, A. (1995). Ignore your customer. Fortune, 131(8), 121-126.

Matthing, J., Kristensson, P., Gustafsson, A., & Parasuraman, A. (2006). Developing successful technology-based services: the issue of identifying and involving innovative users. Journal of Services Marketing, 20(5), 288-297.

Matthing, J., Sandén, B., & Edvardsson, B. (2004). New service development: learning from and with customers. International Journal of Service Industry Management, 15(5), 479-498.

Magnusson, P. R., Matthing, J., & Kristensson, P. (2003). Managing user involvement in service innovation experiments with innovating end users. Journal of Service Research, 6(2), 111-124.

Meyer, C., & Schwager, A. (2007). Understanding customer experience. Harvard Business Review, 85(2), 116.

Mont, O. K. (2001). Introducing and developing a Product-Service System (PSS) concept in Sweden. IIIEE Reports, Lund University, Sweden. No. 2001:6.

Payne, A. F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. Journal of the Academy of Marketing Science, 36(1), 83-96.

Prahalad, C. K., & Ramaswamy, V. (2000). Co-opting customer competence. Harvard Business Review, 78(1), 79-90.

Rollins, M., Bellenger, D.N. & Johnston, W.J. (2012). Does customer information usage improve a firm's performance in business-to-business markets? Industrial Marketing Management, 41(6), 984–994.

Rothwell, R., Freeman, C., Horlsey, A., Jervis, V. T. P., Robertson, A. B., & Townsend, J. (1974). SAPPHO updated-project SAPPHO phase II. Research Policy, 3(3), 258-291.

Slater, S.F. (2001). Market orientation at the beginning of a new millennium. Managing Service Quality, 11(4), 230-232.

Trott, P. (2001). The role of market research in the development of discontinuous new products. European Journal of Innovation Management, 4(3), 1171-25.

Vaittinen, E., Lukkaroinen, S., Heikkilä, J. & Martinsuo, M. (2014) Use of customer information in business model development for new technologies. Paper presented at EUROMA European Operations Management Association Conference, 22-24 June, 2014, Palermo, Italy.

Vargo, S. L., & Lusch, R. F. (2011). It's all B2B… and beyond: Toward a systems perspective of the market. Industrial Marketing Management, 40(2), 181-187.

Von Hippel, E. (1986). Lead users: a source of novel product concepts. Management Science, 32(7), 791-805.

Van der Wiele, T., Hesselink, M., & Iwaarden, J. V. (2005). Mystery shopping: A tool to develop insight into customer service provision. Total Quality Management, 16(4), 529-541.

Wilson, A. M. (1998). The role of mystery shopping in the measurement of service performance. Managing Service Quality, 8(6), 414-420.

Witell, L., Kristensson, P., Gustafsson, A., & Löfgren, M. (2011). Idea generation: customer co-creation versus traditional market research techniques. Journal of Service Management, 22(2), 140-159.

Yin, R.K. (1994). Case study research: design and methods. Sage Publications.

CUSTOMERS' NEW TECHNOLOGY ADOPTION DRIVING A SUPPLIER'S SERVICE INNOVATIONS

MIIA MARTINSUO
SANNAMARI LUKKAROINEN
JUSSI HEIKKILÄ

Abstract

Customers' known and latent needs are important drivers of service innovations in technology-based firms. Business customers may have various needs during new technology adoption, but research has not explicitly linked customers' technology adoption with suppliers' service innovations before. This study seeks an increased understanding on the creation of service innovations based on customer firms' new technology adoption. We employed a qualitative multi-method multiple-case study among three customer firms of a technology supplier, with the focus on how the customers adopted a new automation technology and how it offered possibilities for the supplier to identify service opportunities. The results show that the contexts of technology use appear important, making the technology adoption processes different across the customer companies. A broad range of service opportunities were identified, indicating attractive possibilities for technology suppliers to adapt their service offerings according to customers' processes and phase of technology adoption. Where much of the previous technology adoption research has focused on information technology and single users, the results of this study contribute by revealing the central role of process readiness and multi-user complexity in the company-level use of a new technology, and by linking service innovation opportunities to the phase of technology adoption.

Introduction

Customers' known and latent needs are considered key drivers of service innovations in technology-based firms. Product and service suppliers need knowledge and information about customers' behaviours and preferences at the early phases of service innova-

Note An earlier version of this paper was presented at the International Product Development Management conference, 15–17 June, 2014, Limerick, Ireland

tion (Alam, 2006), in order to decide on the right solutions to develop for the customers. Companies use various activities of customer interactions to reduce the uncertainties inherent in new service development (Alam, 2006), including feedback gathering, concept development and new service piloting jointly with customers. Suppliers need a good understanding on what offers value to the customers (e.g., Woodruff, 1997), and visibility to and matching with customer's processes and practices, to create the right service solutions (e.g., Grönroos, 2008).

Some service-related needs may emerge when customers adopt new technologies into their business processes. In business-to-business contexts, previous research on technology adoption has covered advanced manufacturing technologies (Battisti & Stoneman, 2005; Co et al., 1998; Ghoshal & Nair-Reichert, 2009; Gomez & Vargas, 2012; Small & Yasin 2000), information and communication technology and related applications (e.g., DeSanctis & Poole, 1994; Forman & Lippert, 2005; Hernandez et al., 2009; Orlikowski, 2000), and the use of information technology in supply chain management (Forman & Lippert, 2005; Patterson et al., 2003; Zhang & Dhaliwal, 2009). Such research has discovered, for instance, that a firm's information technology engagement for operations and supply chain management is significantly influenced by institutional factors. Some researchers make a point that it is not necessarily the technology itself, but rather how people use it that can contribute to the benefits of the new technology (e.g., DeSanctis & Poole, 1994; Orlikowski, 2000).

It is apparent that new technologies create pressures in the organisation to modify the routines and practices before they can be fully taken into use. The need to change routines may either enable or restrain the adoption of a new technology (e.g., Edmonson et al., 2001). This depends on several known factors, for example, the benefit that the customer perceives in the short term and the intermediating influence of customer-supplier communication. Frequently, the viewpoint of technology adoption is the adopting firm's only, not its relationship with a supplier. Little is known about business-to-business customers' technology adoption, and particularly how opportunities for service innovations emerge for suppliers during technology adoption.

This study seeks an increased understanding on the creation of service innovations during the customer firms' new technology adoption. The purpose is to explore customers' experiences in new technology adoption, and propose ways in which suppliers can identify service innovation opportunities during the customers' technology adoption. We focus our study on two primary research questions:

1. How do business-to-business customers adapt their processes and practices when adopting a new technology?

2. How and in what kinds of events can the benefits of technology use be enhanced by services during a customer's technology adoption?

This study takes the viewpoint of the customers in the supplier-customer relationship of technology-based firms. The focus is on technical solutions whose use can be remotely monitored, and enhanced and supplemented with various services.

Literature review

Customers' new technology adoption in an inter-organisational context

Technology adoption and diffusion have received a significant amount of attention in earlier research, particularly as radical new technologies have started to modify organisations and their routines. Organisations typically adopt new technologies to become forerunners in their field or to imitate their competitors (e.g., Massini et al., 2005) and, eventually, to increase their chances of success in a changing market environment. The connection between technology adoption and productivity have been studied in the

financial industry (Fuentelsaz et al., 2009), in the pulp and paper industry (Ghoshal & Nair-Reichert, 2009), in manufacturing industries (Battisti & Stoneman, 2005), and in cross-industry settings (Boothby et al., 2010).

New technology adoption has been studied in various contexts in business-to-business settings, particularly concerning advanced manufacturing technologies and information technology for supply chain management. In line with general theories of technology diffusion (Rogers, 1995) and organisational and administrative innovations (Damanpour & Evan, 1984; Kimberly & Evanisko, 1981), many studies associate various firm-level and contextual antecedent factors to the overall degree of adopting a certain technology (e.g., Forman & Lippert, 2005; Fuentelsaz et al., 2003; Patterson et al., 2003; Zhang & Dhaliwal, 2009). Usually, the perspective is that of the technology adopting organisation.

It is clear that different companies adopt new technologies differently, but Leonard-Barton (1988) draws attention to the intra-organisational processes required in taking technologies actively into use (also Battisti & Stoneman, 2005; Forman & Lippert, 2005). Ghoshal and Nair-Reichert (2009) have found that the increase in productivity requires complementing modernisation technology adoption with incremental innovations in practices. The influence of human factors on the technology adoption has been emphasised, featuring team structure, team integrity and project championing (Co et al., 1998), competencies (Co et al., 1998; Gomez & Vargas, 2012), training (Boothby et al., 2010; Co et al., 1998; Small & Yasin, 2000), and team-based planning (Small & Yasin, 2000). Also, the mutual effects of technology use and training on productivity have been considered (Boothby et al., 2010). Many studies of technology adoption rely on questionnaire-based cross-sectional data, and technology adoption is often treated as a holistic concept that is measured through, for example, single respondents' estimates of the company-level experience.

Some micro-level studies of technology adoption take a deeper look into how the actual technology users behave and act in connection with using the new technology. Many such studies have dealt with advanced information technology and related applications (DeSanctis & Poole, 1994; Forman & Lippert, 2005: Hernandez et al., 2009; Orlikowski, 2000). DeSanctis and Poole (1994) propose that technologies create social structures that enable and constrain interaction with the workplace, and that the interplay between technology structures and action structures needs to be considered to understand technology adoption. They also draw attention to the organisational environment in which the use of the technology takes place, as a relevant contingency factor affecting its use. According to Orlikowski (2000), human interaction with technology is a recurrent social practice that produces a particular structure of technology use. This structure may evolve over time, as people may repeatedly shape the rules and resources for technology interaction. The emergent nature of the technology structure helps to understand why new technologies are or are not used in the way they are intended to be used by their designers.

Organisations need internal knowledge resources to interpret and absorb the new technologies. It is claimed that customers actually reject or fail to use new technologies due to various reasons (e.g., Lanzolla & Suarez, 2012; Woodside, 1996). Forman and Lippert (2005) created a framework of 12 factors needed for a company's intent to internalise supply chain IT technology. Hernandez et al. (2009) found that the perceived usefulness and ease of use of the new IT technology were associated with use intensity, and only the perceived usefulness was associated with future intentions of use. Edmonson et al. (2001) studied new technology adoption in cardiac surgery units, and discovered that successful and less successful organisational units underwent quite different collective learning processes when adopting the technology.

Rogers (1995) has proposed and later research has further examined how the innovation type affects innovation adoption (e.g., Garcia, 2002; Tan & Teo, 2000). Innovation-centred factors of relative advantage, compatibility, complexity, trialability and observability have been identified as relevant to the rate of innovation adoption. Frambach (1993) adds uncertainty and fast technology development as relevant factors, and Kimberly and Evanisko (1981) have emphasised that different factors are associated with the adoption of technical versus administrative innovations. Orlikowski (2000) presented examples of technology adoption in the context of using specific IT applications and reported different types of technology enactment: inertia, application and change, and their underlying conditions and consequences. Only a few key people may shape the user-technology interaction and context (referred to as technology-use mediation), thereby promoting technology adoption (Orlikowski et al., 1995).

Technology evolves during its use and it may take time for individuals to use the technology, even if it had been adopted by an organisation and other users earlier (Lanzolla & Suarez, 2012). Tyre and Orlikowski (1994) highlight the window of opportunity that emerges at the time of new technology adoption for the active exploration and modification of the technology. Later, the technology use faces increasing routinisation, and process changes may be more difficult. Also later, episodic changes are possible so that when needed changes are identified, they are also carried out.

To sum up, an abundance of research has been conducted on technology adoption by firms in association with modern manufacturing technologies and information systems. Much of the empirical research focuses on firms adopting a new technology without explicit consideration of the interaction with the technology supplier. However, as technology is tightly linked with organisational routines and individuals as technology users, technology suppliers can have a potential role in enhancing the technology use, for example, through services facilitating the use of the technology. These streams of research, however, have not been discussed in parallel, thus far.

Suppliers' services and service innovations for new technologies

Manufacturing firms have expanded their offerings towards new services to gain a competitive advantage (Vargo & Lusch, 2004) and to maintain revenue streams and profitability in the future (Wise & Baumgartner, 1999). Manufacturers have servitised their operations by consolidating the product-related services, expanding to relationship-based services or to process-centred services (Oliva & Kallenberg, 2003), and also expanding to services for the competitors' products (Raddats & Easingwood, 2010). A core part in innovating services is interacting with customers (Carbonell et al., 2009), and accessing new markets and customers from new areas (Michel et al., 2008; Song et al., 2000).

Much of the recent research attention has dealt with expanding the service offering within the current technologies' scope, for example, through modifying the value constellations through which services are delivered (Kowalkowski et al., 2011). Santamaria et al. (2012) report important differences between manufacturing firms' product and service innovations. With services, manufacturing firms' innovation patterns resemble those of the service sector, as service innovation focuses more on human resources, organisational issues and customer interactions, than R&D and technology partnerships typical to goods-focused innovation. They also report the importance of information technologies as tools for better information gathering, sharing and use as part of the suppliers' service innovation (Santamaria et al., 2012). Some companies may take an entrepreneurial orientation in their service innovation by pursuing new-to-the world services, whereas other companies consider service innovation as an engineering issue, nurturing service concepts new to the firm (Ettlie & Rosenthal, 2012). Ettlie and Rosenthal (2012) discovered

that the different service innovation cultures are founded upon different approaches to service innovation strategies, championing and resources, and both may succeed if matched with the initial conditions and context.

Few studies acknowledge how a customer's new technology adoption can enable and call for service innovations to support the use of the technology. Where service innovation research has largely been restricted to the suppliers' internal processes (Alam, 2006; Johne & Storey, 1998; Scheuing & Johnson, 1989), integration with customers (Alam, 2002; Alam & Perry, 2002: Santamaria et al., 2012), and cooperation with suppliers and other partners (Syson & Perks, 2004), it has not covered customers' technology use as a potential driver of service innovations. Customers with a high degree of technology readiness have been considered key partners when suppliers involve their user customers in service development of the consumer business, i.e. developing technology-based services (Matthing et al. 2006).

Linking service innovations with an advanced new technology can enhance technology use. The previous research on technology adoption has raised the training of users and technical competencies as relevant topics (Boothby et al., 2010; Co et al., 1998; Small & Yasin, 2000). Investments in skill development, such as training, have been associated with higher productivity in new technology use (Boothby et al., 2010), and such issues could be offered as services through the supplier. Reinders et al. (2010) reported an experimental study with consumer durable products that were considered radical innovations, and studied how product bundling was related with the comprehension, evaluation and adoption intention of the innovation. They found that product bundling did not increase the comprehension of the innovation, but enhanced the evaluation and adoption intention of the product.

It has been suggested that the supplier's use of customer information and knowledge in the front end of service innovations can improve customer performance, as well as the supplier's business performance (Rollins et al., 2012). Customer participation has also enabled the discovery of the customers' latent needs (Kristensson et al., 2008), and the innovation of new service ideas among professional service developers (Magnusson, 2003). Some researchers suggest that customers are able to take the initiative to present their needs to the supplier, and they may even have suggestions for fulfilling these needs (e.g., Magnusson, 2003; Tucker 2001). However, some researchers (e.g., Terho et al., 2012; Tuli et al., 2007) claim that customers can suggest only incremental improvements. Moreover, customers' service ideas are less feasible than the new service ideas coming from the technology supplier's own organisation (Magnusson, 2003). On the other hand, customer ideas concerning new services have been considered both more innovative (Matthing et al., 2004) and more valuable (Magnusson, 2003), compared to the new service ideas of professional service developers in the supplier firms.

Although services and service innovations have been studied broadly in business-to-business settings, it is unclear how they could be linked with customers' technology adoption. As the concern in technology adoption is how the customer's personnel take new solutions into use, it is relevant both for customers and for suppliers to understand how technology adoption can be supported with new services.

Research methods

Research design

This research was conducted as a qualitative, multi-method, multiple-case study because of the interest to increase understanding of how industrial customers adapt their processes and practices when adopting a new technology, and how the technology supplier can identify new service innovations during a customer's technology adoption. A qualitative case study approach was chosen to enable analysing technology use in its real-life

context. In particular, we sought a context with active and ongoing technology adoption in the customers' manufacturing processes.

Three companies in the engineering industry were selected as case companies for the study. The three case companies are customers for the same technology supplier, and are named here as Customer A, Customer B and Customer C to maintain anonymity. The companies were selected by the supplier from customers who had recently purchased the new technology, were located in Finland, and were willing to offer their technology contexts as targets of observation. The intent was to cover somewhat different contexts of technology use and experience, and the three cases were considered suitable and sufficient for this study. Customer A offers customised metal-based products to be further assembled into its clients' products. Customer B operates in the field of the mining industry. Similarly to Customer A, Customer B offers both products and product design services for business customers. Additionally, Customer B has a broad selection of other services, comprising over 40% of its net sales. Customer C operates in the engineering works industry. Its products are mainly offered according to a fixed product portfolio, and the company also offers a selection of services related to their products, creating about 40% of their net sales.

Table 4 introduces descriptive characteristics of the three case companies. All the case companies have acquired new devices for their manufacturing process from the same technology supplier, and we had an opportunity to study the companies during their technology adoption. The acquired devices feature new automation technology that had been launched on the market a few years earlier. Besides automation, it enables remote monitoring and a range of novel services, from which customers can choose which ones to use. The technology is new to the industry and even if adoption of automation can be considered an incremental innovation, the use of remote features and other services can be considered radical in the industry. The use of the new features requires adaptation of the customer firm's practices and routines, causing significant changes in the action structures of the organisation.

TABLE 4.
Summary of the descriptive characteristics of the three customer cases

	CUSTOMER A	CUSTOMER B	CUSTOMER C
BUSINESS	Engineering industry	Mining industry	Engineering works industry
NET SALES, EUR	40 million	4,000 million	5,000 million
SCOPE OF TECHNOLOGY USE	Improve safety and increase productivity	Increase productivity	Improve safety of workers
TECHNOLOGY NOVELTY (NEW OR REPLACEMENT)	Novel technology	Novel technology	Technology replacement
TIME ELAPSED FROM TECHNOLOGY INSTALLATION	14 months	11 months	2 months

Data collection and analysis

The data were collected through interviews and observations at selected installation sites after the automation technology was purchased and installed in 2013. Altogether, 22 interviews were conducted using a semi-structured interview protocol. Interview respondents were project managers, supervisors and employees and can be grouped into two types: (1) management respondents and (2) employee respondents. The interviews were carried out using the Finnish language, i.e. the interviewees' native language, and they lasted from 11 minutes to 71 minutes. The average duration of all the interviews was 29 minutes. Table 5 summarises the interview and observation data collected for the study. The interview outline included questions about the interviewee's experiences of using the new device and its new features, perceptions of the value received, experiences with purchasing the technology, and expectations for the future. The interviews were carried out at the case company premises, and they were audio-recorded and fully transcribed.

Thirteen observation days were conducted on the installation sites. A researcher spent a few days at each customer company's site and followed technology use in its real-life context in the production operations of the company. Structured observation was used to identify device usage. Use of the technology was the main observation subject, and particularly, the way the new technology was utilised. The context of the new technology and the routines of usage were observed. Moreover, attitudes towards the new technology were identified through spontaneous discussions with the technology users. Note-taking and a research diary were used to record the observation events. The research diary was used to document ideas and reflections of the researcher. Memos and ideas were written in the diary and stored in a digital format to enable the analysis of observations in a consistent manner.

The interview data were content analysed based on the interview structure and using Orlikowski's (2000) dimensions of practice adaptation (inertia, application, change) and the process phases of technology adoption,

TABLE 5.
Summary of the interview and observation data

	CUSTOMER A	CUSTOMER B	CUSTOMER C
NUMBER OF OBSERVATION AND INTERVIEW DAYS	5	6	2
NUMBER OF INTERVIEWS	8 employees 1 manager	4 employees 3 managers	4 employees 3 managers
AVG. DURATION OF INTERVIEWS	27 min	28 min	31 min

using ATLAS.ti software. Within-case analysis was conducted for each case company using both the interview and observation data. Illustrative quotes from the interviews were used to highlight key findings and, for this purpose, the selected interview excerpts were translated into English and quotations edited to enhance clarity, where needed. The results of the interviews and observations were compared across the companies. To increase the validity of the interview and observation findings, they were presented to the representatives of the customer companies and discussed. A workshop was also arranged with the technology supplier representatives. After the discussions and the workshop, a cross-case analysis was made to synthesise the findings.

Results

Adapting customers' processes and practices in adopting the new technology

We utilised the framework of Orlikowski (2000, p. 422) to map the companies' activities in adapting their processes and practices while adopting the new technology. The results are presented next according to three types of enactment in technology adoption, i.e. inertia, application and change. Orlikowski's (2000) definitions for each category are used with some adaptation, based on the consequences of technology adoption. In this study, *inertia* refers to no evident change in processes or practices; *application* denotes that some change occurs in one or more processes or practices; and change refers to a significant change in one or more of processes or practices.

Inertia. Managers in the case companies had acquired the new technology to increase safety and/or productivity in their companies' manufacturing processes. The adoption of the new technology was found challenging for the employees of Customer A and Customer B because they did not fully understand the reasons for the technology acquisition. Managers had not comprehensively explained why the new technology should be used. For example, the managers of Customer B acquired the new technology to improve productivity through better accuracy provided by the technology. An employee of Customer B commented: *"It [the technology] slows down operations. – This work requires accuracy. However, the accuracy required is not so high that I'd have to use the technology to do the work."* Moreover, technology adoption was delayed in Customer A and Customer B because the technology was acquired for new production lines and there had been problems in ramping-up production in the new lines. Therefore, the attention of employees was mostly drawn to the needed improvements in the core operations of the new production lines. The new automation device did not get much attention: *"We have substantial problems with our manufacturing equipment due to the new production line. Those problems are bigger than any of the problems of the new device. That is why we haven't sunk our teeth into the automation functions yet."* Furthermore, some problems with the new technology delayed its adoption. For example, Customer A found some flaws in the technology with the result that the employees who experienced these had lower trust in the reliability of the technology.

Some negative attitudes towards the new technology were detected among the groups of employees who did not alter their processes or practices. These end users considered the technology unsuitable for them. An end user from Customer A said: *"There is nothing wrong with the technology. However, it is not convenient for us."* When this interviewee was asked in what kinds of situations the new technology would be useful, he confessed: *"Actually, the technology might be suitable for us if I trusted it would work [in an example situation]. I could give it a chance."* It was obvious that he had some concern towards the new technology. Another interviewee from Customer A explained: *"I haven't used those features for a long time and relying on them may be difficult. I find it hard to believe that by pressing a button the new technology does everything that it should do."* Yet another interviewee from Customer A explained: *"In this situa-*

tion, I turn off the automation feature because I believe that I can handle the situation manually better." These employees had little interest in learning the required ways of using the new automated features because they could operate the new technological device with their former manual routines.

Application. When acquiring new technology, the justifications of the acquisition decisions have to be effectively communicated to the employees. This can be achieved, for example, by involving the users of the technology in the procurement process and offering the option to test the technology before the final acquisition decision, as was done by Customer A. We observed that employees who were given the chance to test the technology during the purchasing process were more in favour of adopting and learning the use of the new technology. These employees recommended the technology to their colleagues because they believed in its positive effects. Some end users of Customer B had a chance to test the technology before its installation. These employees were more prone to use the technology than those who did not test it beforehand.

When employees trust that they can benefit from the technology use, they begin to alter their processes. When an interviewee from Customer B was asked why he used the new technology, he responded: *"I'm too lazy to operate manually. I can just press the button and the technology does the task for me."* Thus, he understood that the new technology makes his job easier. Ease of use increases the adoption of the new technology, as explained by one interviewee: *"I use this [automation feature] because I can just use one button without the need to change any settings."*

In Customer A, the misuse of the new technology was minimised by the visualisation of its use. This visualisation eased the use and reduced the number of faults that occurred in the use. Customer B displayed some material that reminds the end users of the technology's existence. Displaying this material seemed to ease the technology adoption as did the visualisation of the technology.

Change. Adoption of the new technology can be facilitated by offering training for users. End users who received more induction and training used the new technology more extensively than others. It was observed that more training may be needed by the employees than just one mandatory training session. Changes in the processes and practices could be noticed from the settings of the automation features. When using the new technology was a preferred choice (instead of not using), practices in the company were changed. This occurred at Customer B and Customer C. Furthermore, the new technology eliminated one work task of Customer C's end users, i.e. made an entire task redundant for the end users. Thereby, their processes were altered remarkably.

The circumstances under which the technology was taken into use also had an effect on the technology adoption. For example, the previously used technology was hazardous compared to the new technology. An employee of Customer C described the situation: *"The old machine was a total disaster. The only available direction was improvement."* Due to the improved safety, the end users of Customer C accepted the technology with practically no resistance. Furthermore, people who had made one or more changes in their processes or practices had a positive attitude towards the technology in most cases.

Table 6 summarises the factors that influenced the adaptation of the processes and practices in the three case companies when adopting the new technology.

Differences in technology adoption. The interviews and observations revealed that Customer A and Customer B had some inertia towards the new technology, whereas Customer C made significantly more changes in their processes and practices than the two other companies. A reason for the inertia of Customer A and Customer B may have been the problems in their core manufacturing processes and, at the same time, the novelty of the new automation technology. Both companies had concentrated mainly on solving the problems in their ongoing

TABLE 6.
Summary of the factors that influenced the adaptation of the processes and practices in the customer companies in adopting the new technology

INERTIA	Function of the technology being achieved manually (negative influence) Managers not supporting the technology use (neg.) Negative attitude of end users towards the technology (neg.)
APPLICATION	Visualising the technology usage (positive influence) Displaying informative material next to the new technology (pos.) Lead users taking the new technology in use and presenting and recommending the technology to (open-minded) end users (pos.)
CHANGE	Managers enabling learning of the new features of the technology by providing repeated coaching (pos.) Technology eliminating an entire work task (pos.) The new technology features being a default setting for use (pos.) End users having a positive attitude towards adoption of the new technology

manufacturing processes and, therefore, they had not focused on the functionalities of the new technology. Customer A found some flaws in the technology, which seemed to increase the inertia, as well. The previous hazardous technology at the site of Customer C possibly enhanced adoption of the new technology. Almost every end user was happy to have the new technology replace the previous one. The amount of training and introducing the technology seemed to have influenced the technology adoption. Those end users who had more training seemed more likely to adopt the technology.

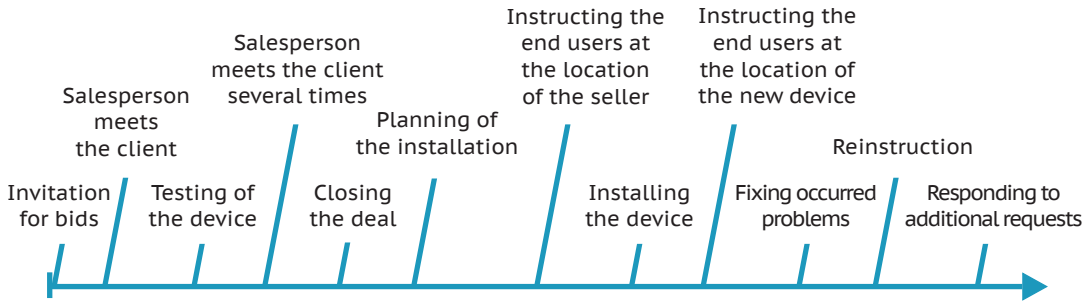
Opportunities for new service innovations

According to the research findings, several service opportunities can be identified during a customer's technology adoption cycle. Typically, service innovations are examined from a very general perspective. Here, we looked at service innovation opportunities from the perspective of episodes and events during the technology adoption timeline. Each event on the timeline is a service opportunity for the selling company, as presented in Figure 5. Every time the supplier company and the

TABLE 7.
Summary of technology adoption in each customer company

	CUSTOMER A	CUSTOMER B	CUSTOMER C
INERTIA	X	X	
APPLICATION	X	X	
CHANGE		X	X

FIGURE 5.
Service innovation opportunities during a technology adoption timeline.



prospective customer company meet, potential service needs of the customer company can emerge. Therefore, new services can be identified from the events during the customer's technology adoption.

The technology adoption processes in all three case companies were largely identical. First, there was an invitation for bids that was followed by several meetings between the supplier's salespeople and the client's personnel. In each case, personnel from the client organisation were invited to the testing facilities of the supplier. The next phase was either closing the deal or planning the installation of the device. After that, the end users of the new technology were offered training at the location of the supplier organisation before installing the new device. After the installation, customers were offered more targeted instructions at the final location of the new technology. The last events in the timeline of technology adoption are fixing the problems that occur, reinstruction after recruiting new technology users, and continuously responding to additional requests.

Differences between the case companies arose in the number of meetings before closing the deal and the degree to which fixing was needed to address problems occurring after the installation. For example, Customer A had often called a mechanic from the supplier to fix the occurring problems, whereas Customer C had not yet identified any flaws. Customer C had not had a reinstruction event due to the short time from installing the technology at the final location.

All the events on the technology adoption timeline can be seen as opportunities for new service innovations. When the technology supplier gets an invitation to bid, it can start identifying service opportunities already from the invitation. For example, the request-to-bid includes information such as installing the device or installing the technology and long-term maintenance. All the details from the invitation must be carefully analysed to recognise new service ideas. During the negotiation phase, several service ideas can emerge. For example, visiting the test facility was offered after a few sales meetings to a customer company's purchasing personnel. The managers found this testing practice superior: those who experimented with the technology use prior to selecting the supplier were more prone to choosing the tested technology than those who did not test it. Therefore, enabling a testing environment

that can be considered a new type of service could promote technology adoption because it plays a significant role in customers' approving and eventually using the technology. The test environment was available, but it was not consistently used during the sales phase; when used, it also made the end users more committed to using the technology after its acquisition.

Closing the deal offers an opportunity to identify services that the customer might need, as well as planning the installation of the device. Salespeople should carefully observe the way of speaking and acting in order to read service opportunities from the customer representatives' behaviour. While planning the installation with the customer, services that would ease the installation process can be innovated and offered for the customer. In fact, the customer company might not need to take care of the installation at all. Instructing the end users about suitable ways of using the technology is a good opportunity to get to know the technology users. End users may express their need for new service ideas in either direct or indirect ways. When installing the device, the supplier's mechanics and technicians gain access to the real surroundings of the technology's end users and they can understand its use in the final location. This is a chance to invent service ideas and target suitable, previously invented services for the customer. Moreover, new service ideas can be invented when fixing the occurring faults. While fixing the problems, employees of the supplier company can observe the technology use of the customer's personnel and offer services such as reinstruction for new employees and maintenance. Later, responding to additional requests offers new service opportunities, as does the renewal of the technology when its lifetime is coming to the end.

The service ideas in this study also contained some options for training. It could be offered at the site of a supplier, at the site of the customer, or at both sites. The most comprehensive training can be achieved by teaching the basics of the technology at the site of the supplier. After that, case-specific instructions are given at the site of the customer while using the new device at the site. After training, ensuring that technology adoption continues is important. In addition to new services for the offering, this allows for developing a training service. We identified that companies differ in how frequently and regularly their employees use the technology, meaning that similar training may not benefit all customers equally. This opens up further service opportunities in the reconfiguration of the technology for customer's process changes during technology use.

Discussion

When companies adopt new technologies, they adopt new routines and practices for their processes. This study started with the realisation that research on customer firms' technology adoption has not been explicitly linked with their technology suppliers' interest towards introducing new services. Although a large amount of research covers service innovations, in general, in technology-based firms and advanced information technologies used in firms' service innovation processes, opportunities for services have not been sought from the customers' technology adoption viewpoint. Therefore, the purpose of this study was to explore customers' experiences of new technology adoption and propose ways in which suppliers can identify new service innovations during the adoption process.

Individuals and social contexts in adopting automation technologies

We built upon earlier research in framing technology adoption as an interplay between technology structures and action structures. Empirical data were collected in three firms undergoing the adoption of an automation-based new technology for their manufacturing processes. In the first research question, we asked how (business) customers adapt their processes and practices when adopting a new technology. We utilised the categorisation of adaptation into inertia, ap-

plication and change, in line with previous research conducted in the context of adopting information technology (Orlikowski 2000).

The adoption of automation technology as part of the customers' manufacturing processes lent support for earlier research in the centrality of key people shaping the user-technology interaction (Orlikowski et al., 1995), various problems in using the new technology (Lanzolla & Suarez, 2012; Woodside, 1996), and the need to give individuals enough time to take the technology into use (Lanzolla & Suarez, 2012). Where earlier research has emphasised the role of top management's innovation champions in the service innovations of technology-based firms (e.g., Ettlie & Rosenthal, 2012) and the "troika" of promotors in technical innovations (Hauschildt & Kirchmann, 2001), this study brings the focus to the technology users as shapers of the technology use and, consequently, the need for service innovations. The cases showed that end users had the opportunity to use the old routines instead of new technology features, which slowed down the technology adoption. In such contexts, it was apparent that the core manufacturing processes were still evolving and did not fully support the use of automation. It is possible that the window of opportunity for technology modification (Tyre & Orlikowski, 1994) was not yet available, as the customers' own manufacturing systems were not fully developed for them to benefit from the automation features. Our study has drawn attention to prospective service opportunities during technology adoption emerging from the technology users' unique interests and technology use profiles, possibly enhancing or restraining the technology use.

Although all were using the same new technology, the cases showed that, indeed, the contexts of technology use were influential, and the learning processes across the companies were different (Edmonson et al., 2001). Employees of companies with problems in their core business processes did not adopt the new technology as fast as employees in the company with fluent operations. Customer A and Customer B had some inertia towards the new technology, whereas Customer C had carried out significantly more changes in their processes and practices. Customers A and B had problems in their core manufacturing processes and, therefore, they did not focus on the new functionalities of the technology, but were rather seeking solutions for their existing problems. In the case of Customer C, the new technology offered clear improvements to the technology that they had used previously, which may be considered a main reason for their enhanced adoption of the technology.

There were differences in technology adoption on the individual level, as well. People who participated in the purchasing of the technology and tested the technology beforehand adopted the technology faster, than employees who did not participate in the purchasing process. These employees became early adopters (Rogers, 1995) who acted as change agents. They should be targeted with new technology when resources are meagre (Agarwal & Prasad, 1998). Moreover, employees who found the new technology useful and understood its benefits were prone to use it. Ease of technology use also influenced the adoption. The easier the technology was considered, the more it was used. Davis (1989) found similar results in his study in the context of information technology. Perceived usefulness correlates with both the self-reported current usage and the self-predicted future usage. He also found that ease of use correlates with the self-reported current and self-predicted future usage. Realism of expectations has a correlation with both self-reported use (Barki & Huff, 1985) and objectively measured use (Ginzberg, 1981). Furthermore, previous research has reported a correlation between performance and information technology use (Robey, 1979).

Much of the previous research concerning technology adoption on the level of individuals has typically focused on user-specific information technology. In contrast, we showed evidence of similar phenomena in the context of automation technology in the manufactur-

ing environment, where the technologies are related to the utilisation of investment goods shared among multiple different users.

Technology adoption as an enabler for service innovations

Although technology-based firms are increasingly concerned with industrial services, little research has associated services with customers' technology adoption. Therefore, the second research question inquired how and in what kinds of events suppliers can enhance the benefits of a customer's technology use by services during technology adoption. We mapped the events of the technology adoption process through the interviews and observations with three customers and revealed multiple interaction points between the supplier and the customer, even before technology acquisition. Where much of the previous industrial service research has centred on services after technology acquisition (e.g., Oliva & Kallenberg, 2003; Raddats & Easingwood, 2010; Wise & Baumgartner, 1999), we pointed out the opportunity for services and service innovations both before and after it.

The ample opportunities for customer interaction during technology adoption revealed that suppliers can utilise technology adoption in driving their service innovations. Selling a new technology and using both supplier's testing environments and the installation episodes as customer contact points will generate an obvious opportunity for the supplier to identify prospective early adopters and detect customers' latent needs by observing the users' activities in using the technology. Earlier research has emphasised the importance of customer participation and involvement with suppliers in developing new services (Kristensson et al., 2008; Magnusson, 2003; Tucker, 2001). The results in this study emphasise that the adoption of technologies for a customer's manufacturing process requires multiple groups of the customer's employees to be considered as prospective target groups for services: buyers, managers and users all have unique needs towards a new technology, possibly to be supported with different kinds of services.

The findings from the three case companies revealed that, although customers may require primarily incremental improvements in their technology use (Terho et al., 2002; Tuli et al. 2007), the suppliers may offer a broader variety of services to enhance the efficiency of the technology. Our observation-based findings revealed the need for multiple forms of pre-sales use testing, training, championing and usage support (also Boothby et al., 2010; Co et al., 1998; Small & Yasin, 2000). Furthermore, more traditional service opportunities arose, such as installation, maintenance, planning the installation of the device and visiting the test facility, either before or after the procurement.

Conclusions

Contributions

This study has explored customers' experiences of new technology adoption and sought an increased understanding on the creation of service innovations during the customer firms' new technology adoption. The results have shown context-specific features in technology adoption, highlighting the relevance of technology novelty, manufacturing process readiness, multi-user complexity and users' early access to technology knowledge in promoting technology adoption. Where much previous technology adoption research has focused on information technology and single users, the results in this study contribute qualitative evidence from automation technology adoption in different contexts and with multiple users, each with different expectations.

The results have shown that customers' new technology adoption is a logical source of ideas at the front end of a supplier's service innovation, which has not yet been studied sufficiently. Practical examples were given on the ways in which suppliers can support technology use with new services originating

from an improved understanding of a customer's process, and show evidence on how service innovation opportunities are linked with the phase of technology adoption. The study has important implications on the front end of creating technology-related on-site and remote monitoring services.

Managerial implications

This study has four major implications for management practices. First, the results call attention to the parallel existence of old and new technologies during technology adoption, and the need for managerial decision-making on the transition between the practices with the old versus new technology. The case study showed that selected key persons or "champions" were needed to guide the adoption of new routines associated with the new technology. Second, the study has highlighted the importance of involving end users of the technology into the purchasing decision of the technology. Those end users who participated in the purchasing had more positive attitudes towards the technology and were more willing to learn new practices and technology features, compared to those employees who had no opportunity to influence the technology procurement.

Third, the study has listed practical opportunities for technology suppliers' managers to engage with customers during technology adoption. The results point out that the transfer of the technology from a supplier to a business customer can enable more thorough contact than just the moments of selling and installing. The results reveal each of the customer contact points as a prospective service opportunity. Fourth, the results indicate that a customer firm's managers and end users have different needs during the technology acquisition process, both of which offer potential service opportunities for the technology supplier.

Limitations and ideas for further research

This study is delimited by the qualitative research design and its choices. The selection of cases restricted the focus of the study to advanced manufacturing-related technologies and the early phase of technology adoption. We made these choices visible and are aware that the generalisability of the findings is limited to such contexts. Three different engineering organisations using the same technology were studied, which has enhanced the validity of the results. Further opportunities for research are apparent in extending the study to later phases of technology adoption, and other types of technologies.

We are aware that the number and duration of the interviews and observations were limited in our data collection. The multi-method design was chosen and multiple informants and observation episodes were used to increase the reliability of the results. Effort was made to validate the findings both in case-specific feedback sessions and the technology-supplier's result workshop. The results confirmed the context-dependence of technology adoption. Therefore, longer observation episodes and repeated interviews could have brought more insights to the study of technology adoption and its associated service opportunities.

Several studies have untangled the issues that drive and restrain technology adoption. This study supports several of them and suggests some new focus areas. There is still a need for broader organisational research settings that would enable studying the technology adoption in an entire customer organisation, identifying issues concerning technology adoption across the different user groups, and assessing the drivers of service purchasing as part of technology adoption. When companies invest significant sums of money in new technologies, effective technology adoption and the use of supportive services bring advantages.

The broad range of identified service opportunities for a technology supplier during the technology adoption timeline will offer further opportunities for research. The combination of the different types of service opportunities connected with the events in the

timeline should be further analysed from the viewpoint of value creation versus value capture. Some of these services are so closely related to the technology supplier's core offering that they mainly serve as sources of information to further develop the offering and the customer's process that it serves. There, the focus is on value creation for the whole process and, thereby, creating a superior offering compared to those of the competitors. Some other service opportunities in the timeline can be offered as additional services to the core offering. Here, the focus is on capturing value for the supplier from serving the existing process.

References

Agarwal, R. & Prasad, J. (1998). A Conceptual and Operational Definition of Personal Innovativeness in the Domain of Information Technology. Information Systems Research, 9(2), 204-215.

Alam, I. (2002). An exploratory investigation of user involvement in new service development. Academy of Marketing Science, 30(3), 250-261.

Alam, I. (2006). Removing the fuzziness from the fuzzy front-end of service innovations through customer interactions. Industrial Marketing Management, 35(4), 468-480.

Alam, I. & Perry, C. (2002). A customer-oriented new service development process. Journal of Services Marketing, 16(6), 515-534.

Barki, H. & Huff, S.L. (1985). Change, Attitude to Change, and Decision Support System Success. Information & Management, 9(5), 261-268.

Battisti, G. & Stoneman, P. (2005). The intra-firm diffusion of new process technologies. Research Policy, 23, 1-22.

Boothby, D., Dufour, A. & Tang, J. (2010). Technology adoption, training and productivity performance. Research Policy, 39, 650-661.

Carbonell, P., Rodríguez-Escudero, A. I., & Pujari, D. (2009). Customer Involvement in New Service Development: An Examination of Antecedents and Outcomes. Journal of Product Innovation Management, 26(5), 536-550.

Co, H.C., Patuwo, B. E. & Hu, M. Y. (1998). The human factor in advanced manufacturing technology adoption. An empirical analysis. International Journal of Operations & Production Management, 18(1), 87-106.

Damanpour, F. & Evan, W.M. (1984). Organizational Innovation and Performance: The Problem of "Organizational Lag". Administrative Science Quarterly, 29(3), 392-409.

Davis, F. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340.

DeSanctis, G. & Poole, M. S. (1994). Capturing the complexity in advanced technology use: adaptive structuration theory. Organization Science, 5(2), 121-147.

Edmonson, A. C., Bohmer, R. M. & Pisano, G. P. (2001). Disrupted routines: team learning and new technology implementation in hospitals. Administrative Science Quarterly, 46(4), 685-716.

Ettlie, J.E. & Rosenthal, S.R. (2012). Service innovation in manufacturing. Journal of Service Management, 23(3), 440-454.

Forman, H. & Lippert, S. K. (2005). Toward the development of an integrated model of technology internalization within the supply chain context. The International Journal of Logistics Management, 16(1), 4-27.

Frambach, R. T. (1993). An integrated model of organizational adoption and diffusion of innovations. European Journal of Marketing, 27(5), 22-41.

Fuentelsaz, L., Gómez, J. & Palomas, S. (2009). The effects of new technologies on productivity: An intrafirm diffusion-based assessment. Research Policy, 38, 1172-1180.

Fuentelsaz, L., Gómez, J. & Polo, Y. (2003). Intrafirm diffusion of new technologies: an empirical application. Research Policy, 32, 533-551.

Garcia, R., & Calantone R. (2002). A critical look at technological innovation typology and innovativeness terminology: a literature review. Journal of Product Innovation Management, 19(2), 110-132.

Ghosal, V. & Nair-Reichert, U. (2009). Investments in modernization, innovation and gains in productivity: Evidence from firms in the global paper industry. Research Policy, 38, 536–547.

Ginzberg, M. (1981). Early Diagnosis of MIS Implementation Failure: Promising Results and Unanswered Questions. Management Science, 27(4), 459-478.

Gómez, J. & Vargas, P. (2012). Intangible resources and technology adoption in manufacturing firms. Research Policy, 41, 1607-1619.

Grönroos, C. (2008). Service logic revisited: who creates value? And who co-creates? European Business Review, 20(4), 298-314.

Hernandez, B., Jimenez, J. & Martin, M. J. (2009). Future use intentions versus intensity of use: An analysis of corporate technology acceptance. Industrial Marketing Management, 38, 338-354.

Kimberly, J. R. & Evanisko, M. J. (1981). Organizational innovation: the influence on individual, organizational and contextual factors of hospital adoption technical and administrative innovations. Academy of Management Journal, 24(4), 689-713.

Kowalkowski C. (2011). Dynamics of value propositions: insights from service-dominant logic. European Journal of Marketing, 45(1/2), 277-294.

Kowalkowski, C., Witell, L. & Gustafsson, A. (2013). Any way goes: Identifying value constellations for service infusion in SMEs. Industrial Marketing Management, 42(1), 18-30.

Kristensson, P., Matthing, J. & Johansson, N. (2008). Key strategies for the successful involvement of customers in the co-creation of new technology-based services. International Journal of Service Industry Management, 19(4), 474-491.

Lanzolla, G. & Suarez, F.F. (2011). Closing the Technology Adoption - Use Divide: The Role of Contiguous User Bandwagon. Journal of Management, 38(3), 836-859.

Leonard-Barton, D. (1988). Implementation as mutual adaptation of technology and organization. Research Policy, 17(5), 251-267.

Magnusson, S. R. (2003). Benefits of involving users in service innovation. European Journal of Innovation Management, 6(4), 228-238.

Magnusson, S. R., Matthing, J. & Kristensson, S. (2003). Managing user involvement in service innovation: experiments with innovating end users. Journal of Service Research, 6(2), 111-124.

Massini, S., Lewin, A.Y. & Greve, H.R. (2005). Innovators and imitators: Organizational reference groups and adoption of organizational routines. Research Policy, 34, 1550–1569.

Matthing, J., Kristensson, P., Gustafsson, A. & Parasuraman, A. (2006). Developing successful technology-based services: the issue of identifying and involving innovative users. Journal of Services Marketing, 20(5), 288-297.

Matthing, J., Sanden, D. & Edvardsson, B. (2004). New service development: Learning from and with customers. International Journal of Service Industry Management, 15(5), 479-498.

Michel, S., Brown, S. W. & Gallan, A. S. (2008). Service-logic innovations: How to innovate customers, not products. California Management Review, 50(3), 49-65.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. International Journal of Service Industry Management, 14(2), 160-172.

Orlikowski, W. (1992). The duality of technology: rethinking the concept of technology in organizations. Organization Science, 3(3), 398-427.

Orlikowski, W. J. (2000). Using technology and constituting structures: a practice lens for studying technology in organizations. Organization Science, 11(4), 404-428.

Patterson, K. A., Grimm, C. M. & Corsi, T. M. (2003). Adopting new technologies for supply chain management. Transportation Research Part E, 39, 95-121.

Raddats, C. & Easingwood, C. (2010). Services growth options for B2B product-centric businesses. Industrial Marketing Management, 39, 1334-1345.

Robey, D. (1979). User attitudes and Management Information system use. Academy of Management Journal, 22(3), 527-538

Rogers, E. M. (1995). Diffusion of innovations. (4th ed.) New York: Free Press. 519 p.

Rollins, M., Bellenger, D.N. & Johnston, W.J. (2012). Does customer information usage improve a firm's performance in business-to-business markets? Industrial Marketing Management, 41(6), 984-994.

Santamaria, L., Nieto, M.J. & Miles, I. (2012). Service innovation in manufacturing firms: evidence from Spain. Tech-

novation 32, 144-155.

Small, M. H. & Yasin, M. (2000). Human factors in the adoption and performance of advanced manufacturing technology in unionized firms. Industrial Management & Data Systems, 100(8), 389-401.

Song, X. M., Di Benedetto, C. A. & Song, L. Z. (2000). Pioneering advantage in new service development: A multi-country study of managerial perceptions. Journal of Product Innovation Management, 17, 378–392.

Syson, F. & Perks, H. (2004). New service development: a network perspective. Journal of Services Marketing, 18(4), 255-266.

Tan, M., & Teo, T. S. H. (2002). Factors influencing the adoption of internet banking. Journal of the AIS, 1(7), 1-42.

Terho, H., Haas, A., Eggert, A. & Ulaga, W. (2012). "It"s almost like taking the sales out of selling' — Towards a conceptualization of value-based selling in business markets. Industrial Marketing Management, 41(1), 174-185.

Tucker, R.B. (2001). Strategy Innovation Takes Imagination. Journal of Business Strategy, 22(3), 23-27.

Tuli, K., Kohli, A. & Bharadwaj, S. (2007). Rethinking customer solutions: from product bundles to relational processes. Journal of Marketing, 71(3), 1-17.

Tyre, M. J. & Orlikowski, W. J. (1994). Windows of opportunity: temporal patterns of technological adaptation in organizations. Organization Science, 5(1), 98-118.

Vargo, S. L. & Lusch, R. F. (2004). Evolving to a new dominant logic for marketing. Journal of Marketing, 68(1), 1-17.

Wise, R., & Baumgartner, P. (1999). Go downstream: The new profit imperative in manufacturing. Harvard Business Review, 77(5), 133–141.

Woodside, A.G. (1996). Theory of rejecting superior, new technologies. The Journal of Business & Industrial Marketing, 11 (3/4), 25-43.

Zhang, C. & Dhaliwal, J. (2009). An investigation of resource-based and institutional theoretic factors in technology adoption for operations and supply chain management. International Journal of Production Economics, 120, 252-269.

Part 2.

Embedding services into operations and supply networks

THE WARRANTY PERIOD AS A SERVICE AND THE EVALUATION POINT OF PROJECT SUCCESS

OLGA PERMINOVA-HARIKOSKI
MAGNUS HELLSTRÖM

Abstract

Traditional manufacturing-oriented industrial suppliers are now beginning to pay more attention to the value and role of services that they offer to their customers. The early post-delivery period of the project, or warranty, is an important step towards successful service provision. However, industrial suppliers often lack understanding of the aspects of warranty management that are critical for project success and securing service operations. This article strives to cover this gap. The results of the study suggest that the warranty phase has importance in terms of influencing the customer relationship and, thus, the customer's satisfaction with the project, which is a valid measure of project success. It also has an influence on securing future business: both customers and suppliers can develop an understanding of each other's capabilities as an equipment operator and a service provider. Further research is needed to establish what kind of warranty activities contribute the most to the development and operations of services. In relation to this, researchers and practitioners need to define the role of the warranty manager as a profession.

Introduction

In an era when services and a solution perspective (Davies, 2004; Galbraith, 2002; Windahl & Lakemond, 2010) are becoming more important, the industrial project delivery phase can be considered the mere beginning of a potentially long and prosperous customer relationship. The service-dominant logic, in fact, suggests through the notion of co-created value that what is good for the customer is good for the supplier (Vargo & Lusch, 2004a, 2004b, 2008), and only then comes a logic emphasising the long-term business success of the supplier itself (Shenhar et al., 2001; Wikström et al., 2010). This line of thinking is supported by the fact that, traditionally, manufacturing-oriented industrial suppliers begin to pay more attention to the value and role of services that they offer to their customers. While products are still to a large extent the core of the solutions, many

strive to lock in their customers with services throughout the life cycle of the solution. We argue that the first steps to this can – and should be – taken at the early post-delivery period of the project, in other words, at warranty. To justify our line of thinking, we investigate several industrial projects of a globally operating industrial supplier to understand how warranty management can support project success both from the supplier and the customer perspectives. At the same time, this study aims to clarify how warranty management can contribute to the service operations of industrial suppliers.

As the operations management literature argues, the supplier has certain obligations towards the customer to guarantee the performance in the project's post-delivery time period – or warranty period (Nazemi & Rashidi Kameh, 2012; Padmanabhan, 1993; Samatli-Paç & Taner, 2009; Wu, Chou, & Chikong, 2009). It has a significant impact on the supplier's image and the customer's satisfaction with the project and the supplier's attractiveness as a service provider. In contrast, project management literature does not pay much attention to the warranty stage, considering it to be a mere practical issue somewhat outside the project. Common business practice suggests otherwise. Often industrial suppliers evaluate a project's financial performance after the warranty period, which means that warranty costs affect the project. However, this is a short-term perspective. As project-based suppliers become more and more focused on securing long-term relationships with customers, successful project execution alone is not enough. Indeed, project researchers have long recognised the insufficiency of traditional project success criteria (Shenhar et al., 2001). In many industries, a certain, and often rather large, segment of customers need continuous support to operate, monitor the condition and maintain their assets. The customers expect the solutions to perform up to 20 years or more, and the suppliers strive to become preferred service providers for them in the long run. A life-cycle view emphasising the ability of the supplier to create value for its customers by offering continuous life cycle support is gaining more and more support from scholars and practitioners alike (Hellström, 2005; Miller et al., 2002; Sawhney, 2006; Stremersch et al., 2001). In this respect, warranty management gives the customer peace of mind not only about the project outcomes, but also about the role of the supplier as a service provider.

In many companies, warranty management is seen as a service and its functions belong to the service department (as is the case with the global industrial supplier discussed in this article). On the other hand, there are industrial companies that recognise the post-delivery stage as part of project activities. Obviously, the warranty appears to have dual features of both project and service stages: the equipment is already operated by the customer, but the supplier is responsible for its performance for a limited period of time. It has an aspect related to learning as well: both customers and suppliers can develop an understanding of each other's capabilities as the equipment operator and the service provider. However, industrial suppliers often lack an understanding of the aspects of warranty management that are critical for project success and securing service operations. This article strives to close this gap.

In this article, we explore the role of the warranty from both a project delivery (as cost minimisation) and a service provision (maximising value creation for the customer). To some extent, this study provides arguments for operational capability building (learning). From a project success perspective, we argue that companies shift attention from the project phase to warranty management not only as a means of improving the financial parameters of an individual project, but also to secure long-term customer collaboration in service operations. In support of our ideas, we present several project cases from the portfolio of a globally operating industrial supplier in the power generation industry.

Literature review

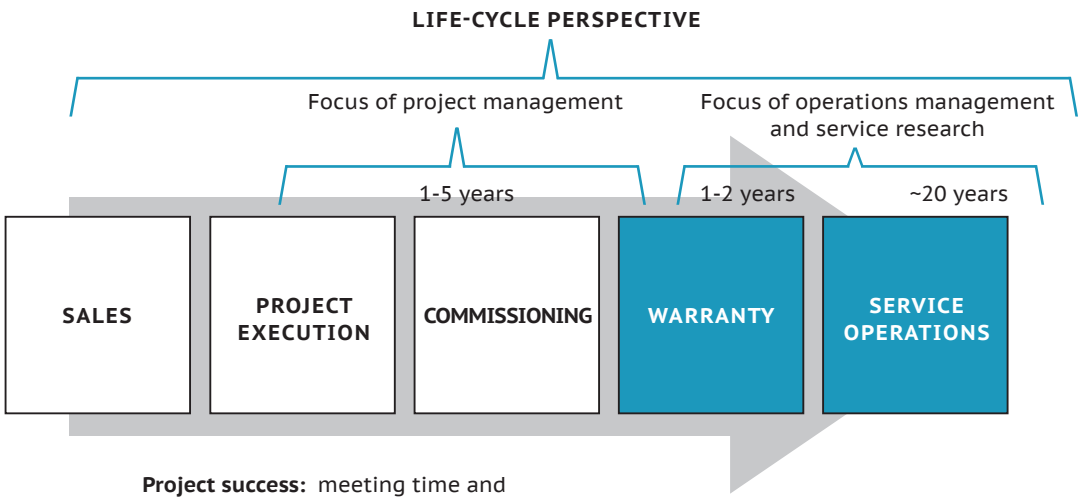
In this chapter, we present different views on the role of the warranty in determining project success as well as its contribution to service operations (see Figure 6). We start by discussing the project, its success factors and its relationship to the warranty as seen in project management literature. Then, we expand the understanding of the role of the warranty by introducing insights from operations management and the literature on services. Finally, we conclude with the implications that the warranty can have for both determining project success and providing value-added services.

Project success and the role of the warranty in it from the supplier and the customer perspectives

The concept of project success and the project success factors are one of the most popular and yet challenging topics in project management literature. The success of a project is traditionally measured by time and budget criteria (e.g., Bakker, Boonstra, & Wortmann, 2010; Shenhar et al., 1997, 2001). These two criteria are considered somewhat universal and are utilised in the majority of studies in the field in a variety of contexts. This approach has been receiving criticism due to the fact that it is based on the supplier point of view (e.g., De Witt, 1988; Turner & Cochrane, 1993).

The recent trend is to expand the number of success variables to address the stakeholder perspective, project environment, project network and way of working among others. Both researchers and practitioners realise the need for taking into consideration stakeholder-related factors, especially the focus on the customer. However, extending the number of relevant success factors or measures leads to overgeneralisations. Shenhar et al. (2001) argue that several common problems to study project success exist, including the assumption that all projects are similar, success measures are weakly

FIGURE 6
Framework of the study.



defined, and a large number of managerial variables are examined. As a result, there is little agreement in the field as to how project success is defined.

Bakker, Boonstra and Wortmann (2010) further argue that much of the project success literature is based on three assumptions:

1. The amount of time, the budget, and the project's requirements can be set at the beginning of the project;
2. The project's success is the same for each project stakeholder; and
3. The project's success can be determined at the moment the project has produced its deliverables.

As to the first point, some researchers assume that setting an exact timeframe and budget limitations and defining the requirements always take place at the start of a project, when uncertainty is at its maximum (Pinto, 2007, in Bakker, Boonstra, & Wortmann, 2010). This statement gives the researchers the ground to argue that it is impossible to define exactly the budget and the timeframe for the project. In our opinion, the goals and plans for any endeavour need to be set at the beginning. However, there needs to be room for flexibility to achieve performance rather than conform to the plan (Dvir & Lechler, 2004; Maylor, 2001). In this perspective, the project management activities and the uncertainty management among them are of high value (Perminova et al., 2008; Perminova, 2011).

The second point highlights the lack of alignment, or even conflict, of beliefs about what constitutes project success among project stakeholders. Agarwal and Rathod (2006) found that project success criteria, as defined by different groups of stakeholders, do not match. Similarly, a study of critical project success factors by Fortune and White (2006) revealed significant differences between individual interpretations of what is assumed by success factors.

As for the third point, there are several approaches to this issue depending on how the "project end" is defined (see Figure 5). Unlike the production economics and operational research literature (Boulding & Kirmani, 1993; Samatli-Paç & Taner, 2009; Wu, Chou & Chikong, 2009), the project management research pays little attention to the post-delivery stage of projects. This is due to the fact that the field is focussed on the actual process of delivery, in other words, the project execution phase. The moment the endeavour enters the warranty phase (sometimes called the hand-over from project execution to the warranty) is seen as the end of the project. If the warranty is considered the supplier's promise to compensate for repairs or replacements in case of early product failure (Cui et al., 2004), or a marketing tool to differentiate from competitors (Wu, Chou, & Chikong, 2009), then its success is in eliminating or minimising the costs of claims and giving the customer peace of mind regarding product quality. At the same time, as shown in the review by Perminova (2011), certain studies in the field suggest that the post-delivery stage is an important reflection point to determine the success of the project (Atkinson 1999) or project efficiency (Shenhar et al., 1997). On the basis of the results from 127 projects, Shenhar et al. (1997) proposed a multidimensional framework for measuring project success. Three of the four criteria chosen for the measurement belong to the post-delivery phase, and one in particular, referring to customer satisfaction, is attributed to early post-delivery within a couple of weeks after implementation. Thus, we can conclude that the role of the warranty extends beyond being a pure guarantee in case of product failures to building customer relationship and supporting success of the project.

At the same time, the warranty appears to be a transition stage from the project delivery to operations when the focus is shifting towards securing value for the customer, for example, in terms of performance guarantees and life-cycle support services. Relations with the customers and other stakeholders are governed by the terms of contract. However, informal, or even moral, obligations and commitments are equally important (Williamson,

1979, 1991). Complex, large-scale long-term projects require commitments from multiple stakeholders. Although a straightforward connection between customer satisfaction and trust in the supplier's ability to perform might be difficult to find (Reen et al., 2011), it comes as no surprise that the customers are looking forward to collaborating on such projects with the suppliers who better understand their business models, market situation and show concern about their needs; in other words, suppliers that recognise their customers' values.

Warranty as part of service operations

In the industrial services literature, the importance of the relationships and their impact on the value of the services are highly emphasised (Anderson & Narus, 1990; Barry & Terry, 2008; Liljander & Roos, 2002; Möller & Törrönen 2003). According to Lusch, Vargo and O'Brien (2007), engaging customers and valuing network partners in co-creation and co-production activities increase a firm's competitive advantage. Several studies show that the provision of services by industrial suppliers can have a positive effect on revenues over the life cycle of the product, and link the increase in service provision to improvements in the supplier firm's profitability (e.g., Reinartz & Ulaga, 2008; Wise & Baumgartner, 1999), although empirical research shows mixed results and suggests that certain conditions are required for fulfilling these statements (Eggert et al., 2011). The relationship between the customer and the supplier determine value creation logic and the necessary competencies for service creation and development (Möller & Rajala, 2007). In addition, the number of satisfactory interactions and increased customer loyalty can be seen as valid indicators of business performance of a supplier firm (Selnes & Hansen, 2001).

This is especially true when we consider that the task of any project-based industrial supplier is to deliver not only stand-alone products or services, but rather combinations of them to meet the customers' specific needs which are referred to as solutions (Davies, 2004; Miller et al., 2002). The scope of services that are included in solutions encompass customer services, services for the installed base, process-oriented services, professional services and operational services (Oliva & Kallenberg, 2003). Suppliers may include services in their deliveries for a variety of reasons, for example, to increase the customer value and/or create a feasible service business for themselves (Artto et al., 2008). The frequently referred to concept of Oliva and Kallenberg (2003) positions the companies along a continuum: at one extreme companies are product manufacturers, generating profits through their core products with services purely as add-ons; on the opposite end, products are an add-on to the services, representing a small part of total value creation. The latter receives more and more emphasis in the strategies of industrial companies from multiple industries. Furthermore, the current literature strives to implement a more detailed view on services rather than presenting them as homogeneously unified (Eggert et al., 2011; Mathieu, 2001). As presented by Mathieu (2001), there is a difference between services supporting the operations of the product or system, such as spare part sales or basic maintenance activities, and more advanced services when a supplier takes the expert role in guiding customer's activities in relation to the delivered project outcomes, e.g. optimisation of operations, asset management, etc. While the warranty falls under the first category of services in Mathieu's (2001) categorisation, we argue that it can provide important input for the provision of advanced services in terms of up-to-date knowledge of, for example, how the customer is using the delivered system, the development in the current business situation, changes in key performance indicators (KPIs) and so on. In this respect, the warranty has a direct connection to advanced life cycle services operations.

Synthesis

In sum, the supplier does not finalise its relationship with the customer after the project

has been commissioned, as much of the literature on projects suggests. In this regard, we argue that the warranty phase, a post-delivery stage of the project, appears to be a "moment of truth" when the results of a project can be evaluated, while the relationship with the customer can still be influenced through services. The warranty becomes a gateway from project execution to service operations. As argued in the literature, the increased focus on delivering services demands development of different capabilities by the suppliers (Ullaga & Reinartz, 2011), as well as a change in strategic thinking and distribution of resources which might come at a price of organisational conflicts (Eggert et al., 2011). One step towards a smoother transition to service-oriented thinking can be found in the adoption of reflective practices, particularly "learning from doing" (Schön, 1983). The value of the reflective approach has been studied for the purpose of uncertainty management, and customer-related uncertainty, in particular, at the warranty stage (Perminova, 2011). For the supplier, the post-delivery stage can be seen as a platform to gather information about customer needs in products and services, about potential obstacles to continuous operations, operators' competencies, etc. It is both an opportunity to establish better communication and an understanding of customers' perspectives towards operations, as well as the possibility to extend the current offerings to provide an additional scope of services, not least through the ability of a supplier to maintain dialogue with the customer to co-create value proposition (see, e.g., Kowalkowski et al., 2012). For the customers, this is an opportunity to obtain expertise and support from the supplier in operations in order to maximise the value for their business (Ala-Risku, 2009). Thus, in the value creation perspective, the adoption of service-oriented logic contributes to project success both for the supplier and the customer.

Research design

This study uses a multi-stage research design using both qualitative and quantitative data. It can best be described as clinical and collaborative management research (Mirvis, 2008; Pasmore et al., 2008; Werr & Greiner, 2008) with a globally operating industrial solution provider. The company provides a variety of products and services for industrial customers from basic stand-alone equipment to complex solutions, as well as basic and advanced services to support the customers during the operations phase. The explorative nature of the study is on the one hand justified with the lack of research looking at the warranty, especially from a service perspective, and on the other, with the practice-bound research questions that call for actionable knowledge.

We raised the following research questions in the introduction:

RQ1: How can warranty management support project success both from the supplier and the customer perspectives?

RQ2: How does warranty management contribute to service operations?

These could be further specified here to include an investigation on:

- how project activities reflect on the warranty in terms of the activities that they trigger at warranty;
- how suppliers can influence customers' perceptions of success during warranty;
- how warranty management, being early operations, enables service operations;
- why warranty should be regarded as both project and service.

As a second step, we undertook an in-depth case study (Yin 2003) of three projects, or their respective warranty periods to be more precise. The three projects were selected from the supplier's project portfolio at warranty based on the following criteria:

1. All projects concern one industry;
2. The warranty stage of the project ended during 2011; or
3. The project was handed over to the customer in 2011; and
4. The number of claims is higher compared

to the average expected number of claims according to the supplier's statistics.

The three chosen projects are presented in the next chapter.

The first criterion helps us to control for possible sector-specific impacts. The next two criteria ensure that the interviewees actually referred to the warranty phase that was actually ongoing or had just ended. By purposefully selecting more challenging cases, the fourth criterion potentially highlights issues from a service perspective, i.e. makes them more observable.

Thirdly, we conducted semi-structured interviews with open–ended qualitative questions with 12 warranty managers and 12 respective project managers to discuss the projects in question and build the case descriptions. The aim was to discuss the warranty, the claims, what has been done to address them, as well as how they could be linked to the project execution phase and future service operations. The respondents were also able to discuss other issues that they found relevant for the project in question. Both the project manager and the warranty manager of the project in question were present at the same time to share their opinions. In addition, we organised two workshops where most of the project and warranty managers were present as well as their superiors who are responsible for reporting to top management to discuss the projects. The aim of the workshops was to outline the role of warranty management in supporting project execution and future service operations, future prospects and current needs. The interviews and workshops were tape-recorded and summarised. Based on this data, we built the project path descriptions and the warranty process. From the descriptions, it was possible to identify the needs of customers and their experience levels in service operations, the level of the dialogue with the customers as well as their attitude towards the supplier's solutions. The customer satisfaction levels have been interpreted in accordance with the industry logic that is relevant for both the supplier and its customers in question.

Fourthly, we simultaneously gathered the data for the projects including financial performance during project execution (development of the margin from as forecasted at sales to as estimated at the end of warranty), as well as the amount and cost of claims in these projects at warranty. This study showed that the largest amount of claims during the warranty period, as well as the most expensive claims for the supplier, comes from the customers within the first six months of the operations of the installations. Because of the fact that the warranty costs usually have an effect on the project's overall financial performance (more warranty costs equal less profit), it made sense to trace the reasons for the claims and, thus, identification of the faults and breakdowns took place.

The following chapters are structured as follows: first, we present three project cases. Second, the achieved results from the empirical study are discussed with the theory forming overall conclusions from the two perspectives. From the project management science perspective, we describe the role of warranty in the evaluation of project success. From the service operations point of view, we argue for the service-related nature of warranty management. Finally, we outline areas for future research.

Case studies

Case 1

These two international power plant construction projects delivered in Middle East Asia have the same customer; however, they are located on two different sites in the same country. The scope of supply is identical: turnkey projects with additional operations and maintenance services provided by the supplier with a performance guarantee. The main source of claims from the customer side during the warranty period was quality issues with the generators provided by the sub-supplier. Originally, the genera-

tors were supposed to be ordered from one and the same preferred sub-supplier, but the company did not have the needed capacity to manufacture the components on time. So, the possibility to introduce another sub-contractor into the project was discussed within the supplier's project team. The quality of the generators by the new vendor was not assessed before the agreement was signed; rather, the contract terms such as fast delivery played a bigger role to confirm that the project milestone was achieved on time. To ensure that the power plants were made identically, which was the original demand from the customer's side, the supplier's team convinced the customer to take all generators from one vendor, and not to engage in two separate contracts with two different companies. Thus, the newly introduced vendor with the unknown quality level of equipment was chosen. Later, this fact was recognised as the main reason for the faults claimed by the customer. The supplier performed the necessary equipment repairs, which generated a cost of less than 1% of the multimillion project margin, on time. As was concluded after the root-cause analysis, the costs could have been avoided if the supplier's engineers had inspected the vendor's equipment before installing it. The quality assurance procedure received more attention in subsequent projects. Ensuring that the vendor takes the responsibility for covering the costs should the problem be associated with the quality of their offering, received the attention of top management. As a result, the development of a new set of agreements was initiated to ensure that a vendor's performance guarantee and/or a special warranty agreement between the supplier and its vendors was in place. According to the interviewed project manager, the quality issue in this project can be seen as somewhat unexpected. However, the existence of a vendor's performance guarantee would minimise the supplier's warranty costs towards its customers, which would, in turn, make the financial performance of the project better from the supplier's point of view. The interviewed project team members, along with the customer satisfaction survey performed with the project customer, have shown that the issue seemed not to affect the customer's perception of the projects as a success. From the supplier's financial point of view, the project margin improved by 2% compared to the original forecast at sales.

Case 2

This limited scope project delivery involved a novel biofuel technology application for the supplier. Shortly after the installation went into operation, a breakdown took place. The root-cause analysis did not reveal any particular problem with the equipment or the way it was operated, since the installation had only been running for a few hours. As the warranty terms covered the repairs, the supplier performed them in due time. As the interviewed project and warranty managers pointed out, faults appearing very shortly after an installation is taken into operation is not an uncommon issue. According to them, tracing back to the causes of the problems are especially difficult if the project involves novel issues, be it the technologies or unfamiliar customers and other stakeholders. To foresee such problems to the best possible extent, the interviewees came to the common conclusion that the project commissioning phase should be well documented, especially when it comes to tailor-made and non-standard equipment. It might be difficult to establish whether installations that deviate from the supplier's standard solutions are potentially less prone to breakdown. It might be the opposite as well. In this respect, continuously following up on such equipment as part of warranty management is needed to be able to secure uninterrupted operations. The interviewees associated these actions with minimising costs at warranty. In the long run, detailed commissioning reports support service operations through, for example, predictive maintenance, better scheduling of maintenance activities, etc. According to the respondents, it has a significant impact on how the installation will be operated and serviced in the future.

Another big issue detected at warranty was associated with the quality of fuel that the customer used for operating the installation. After the equipment testing performed by the classification society, the hard particles found in the installation during the fuel analysis were reported to have a potentially destructive impact on the fuel injection system. The supplier had this information early enough to be able to avoid major problems with the injectors: they were replaced for another model at no cost to the customer. As was noted by the warranty manager for this project, there had been other costs that were attributed to the warranty. They could have been minimised if the equipment had been more rigorously tested at the manufacturing phase. As the budget of this project was rather small compared to Case 1, the total warranty costs summed up to 20% of the project price. In general, the project was evaluated as a success internally despite the costs. This was attributed to the fact that novel projects involving biofuel technologies involve a higher level of uncertainty due to the lack of experience in delivering them.

Case 3

Case 3 was originally a pilot project which had been described as unique by the supplier. It had the aim of combining different fuel technology applications. This endeavour resulted in several millions of euros of warranty claims due to technical failures. Many of them were attributed to: the lack of quality control in the manufacturing process, when critical parts of the equipment were not properly connected; the lack of information about ambient conditions at the design stage, leading to a miscalculation of the needed capacity of the supporting equipment; and the sub-supplier's design quality issue when their equipment could not function in the required conditions. These issues could have been eliminated earlier at the project phase. Still, the supplier managed to minimise the costs by addressing the issues proactively, such as splitting the costs of replacements and repairs with the vendors. However, during the warranty period, the replacements caused downtime, resulting in dissatisfaction with the situation on the customer's part. According to the warranty manager, proactive warranty management in this case would also entail ensuring the availability of skilled technical personnel to deal with the problems in the fastest way possible. While planning the needed capacity of the personnel in a highly novel project is an individual project issue, confirming that the engineers have the needed skills and experience to deal with the complex and novel equipment is rather a supplier's internal organisational issue.

However, perhaps the most confusing issue that the supplier had to face, according to the warranty manager, was the lack of clarification about the responsibilities of the supplier and the customer. While the issues with the technological failures were somewhat explanatory by the fact that the project involves a non-standard solution both for the supplier and the customer, the lack of clearly defined responsibilities in the contract caused greater confusion. Originally, the customs clearance fees and taxes on the equipment were paid by the customer, but when it came to the provision of spare parts and replacements under warranty, it was not obvious to the customer that they were obligated to cover customs clearance fees for warranty-related items as well. The problem was addressed on a higher level, and discussions between the two companies led to a compromise. Eventually, the customer organisation covered the customs costs, while the supplier used their experience with similar issues and assisted with minimising the costs. This agreement provided savings in costs for both the supplier (no cost for the warranty, and ultimately, the project) and the customer (minimal fees). In addition, it helped to improve the relationship between the two organisations. The project is regarded as a unique achievement by both organisations, as the interviewees described. The supplier evaluated it as a success.

Results

The data analysis showed several patterns in the cases which are summarised in Table 8 below.

TABLE 8.
Cross-case summary of the cases

	CASE 1	CASE 2	CASE 3
SCOPE	Turnkey	Equipment delivery, novel technology	Turnkey
ISSUE	Vendor's equipment quality	Equipment breakdown	Multiple issues related to project execution
SUCCESS FACTOR	Project on time	Learned about new type of technology/project	Unique project delivered
ACTION AT WARRANTY	Root-cause analysis, repairs	Root-cause analysis, repairs, communication with project stakeholders	Root-cause analysis, communication to resolve issues
RESULT	Warranty increases overall project costs	Warranty increases overall project costs	Warranty increases overall project costs
LESSONS LEARNED	New set of agreements between the supplier and its vendors is needed	Need to document the project more rigorously, communicate regularly with the customer	Need to improve communication externally and internally, improve certain project activities, contract formulations
CUSTOMER PERCEPTION OF THE PROJECT	Success	Success	Success, although the customer not entirely satisfied
SUPPLIER'S PERCEPTION OF THE PROJECT	Somewhat successful (costs could have been avoided)	Success	Success

According to the researchers studying warranties (e.g., Boulding & Kirmani, 1993; Wu, Chou, & Chikong, 2009), consumers judge the quality of a product not only by its price, but also by the warranty which is seen as a guarantee of the product's reliability, and increases purchasing willingness. From the producer's perspective, the warranty is an obligation, and its costs have an effect on profits and total product price. Similarly, in industrial projects, the warranty has an effect on the project's financial parameters. Furthermore, we can argue that the performance of a project at the warranty stage can be seen as a factor to determine overall project success. Namely, the quality of the project activities can be evaluated through proactive warranty management.

The analysis of the interviews and the cases shows that, from the supplier's point of view, the warranty stage seems to be an indicator of the success, or rather lack of success, of the project activities, not only the product as such. The case studies suggest that especially non-successful activities have an effect on a project's overall cost, due to the claims the supplier receives during warranty. Successful project actions, in turn, should not bring any claims. If the project – and product performance – is evaluated as successful, so is the warranty. This is often associated with interpreting the warranty management function as "wait and see": no claims would mean no contacts with the project's customer. Or rather, the customer would not contact the warranty manager or the project manager, and vice versa. According to the benchmarking study we performed after the interviews, we observed that such opinions have even led to a tradition in the warranty departments of some firms to celebrate the ending of the warranty stage of projects which had no claims – a successful warranty. On one hand, such meetings can be seen as a means of informally sharing experiences, lessons learned and discussions about the best practices. On the other hand, they stress the fact that reactive warranty management when the supplier's organisation does not get involved in the customer's operations is still dominant.

The interviewees pointed out that most contact with the customer takes place when the claim has arrived from the customer. While the traditional interpretation of the claim as an additional cost remains due to a product or component failure, it can be seen as a signal that a particular project activity had not been executed with due quality on behalf of the supplier, as in Case 1 and Case 3. As shown in previous research (Reen et al., 2011), expected and consistent quality nurtures customer satisfaction, but there is no direct link between customer satisfaction and trust in the supplier's ability to perform. This supports the statement that low satisfaction alone does not automatically lead to a loss of trust and commitment. This is somewhat supported by the case studies. Although the customers were not satisfied at certain points with the happenings during warranty, they still were satisfied with the overall project outcomes and valued the role of the supplier (see, e.g., Case 3).

Another reason for a failure might be that the customer is not operating the installation according to the supplier's recommendations, as Case 2 showed. The warranty phase becomes an indicator of not only the success of project activities, but also a point at which the customer's potential need for different services, i.e. training services in this case, becomes explicit for the supplier through analysis of the customer's claim. Claims analysis, as such, can be seen as a reactive way of managing the warranty, as the supplier does not actively get involved in the customer's operations. Still, proactive supplier-initiated communication and collaboration with the customer, supported by the root-cause analysis, might be the key to ensuring customer satisfaction and securing the IBI access needed to improve service operations and develop future offerings. This view stressing the importance of the communication and dialogue is supported in the literature (Ala-Risku, 2009; Kowalkowski et al., 2012). While claims analysis alone provides a short-term view on how the problem can be solved at warranty, proactive communication of the results of the analysis to the project custom-

er externally and the other similar projects internally, encourages the development of a common strategy to solve the current issue at a given moment and in the future. The latter is the long-term strategy aimed at constructing opportunities in service development and operations. This is of special importance as the supplier has to maintain its image as a reliable potential service provider. From the customer's point of view, a proactive warranty whereby the supplier initiates the contact with the customer is perceived as a service and, thus, supports the desired service provider image.

Even though responding to customer enquiries and analysing claims are often the main actions that are performed at warranty, their relevance to project evaluation should not be underestimated. In terms of the project, the warranty provides scope for establishing "learning from doing" practices, in Schön's (1983) words. It can be seen as a moment of reflection on how the project activities were performed and why a negative result (the claim, or in other words, the cost) was incurred. A claim is associated with the negative consequences for both the supplier and the customer in question, such as the cost of repairs or replacements, increased downtime, temporary loss of profit, among others. Still, warranty management practices, especially root-cause analysis of faults based on customer claims, can be seen as reflective learning from doing, and even part of uncertainty management practices (Perminova, 2011). This is especially true when we speak about projects that include novelties, such as Case 1 and even Case 3. In such innovation-driven projects, it is not always possible to predict or foresee how the actions at project execution will affect the project outcomes. Here, warranty management receives information via the experience collection function, which is beneficial for the development of advanced services, per Mathieu's (2001) classification, and supports the supplier's ability to formulate value propositions (Kowalkowski et al., 2012). As the data analysis indicated, warranty management is also seen as having the function of communicating the learned experience to the other departments, especially project- and service- related ones. Thus, the supplier's internal benefit is learning from project to project.

One of the main benefits of proactive warranty management from the supplier's point of view, as the analysis shows, is the ability to influence how the project is perceived by the actors – as a success or not. From the customer's perspective, proactive warranty management increases the trustworthiness of the supplier and purchasing willingness, and ultimately, satisfaction from the project, which is one of the important success parameters. For the supplier, project cost minimisation and increasing competitiveness of the offering are the benefits of proactive warranty management. This is supported by the findings of the operations management literature (Padmanabhan, 1993; Wu, Chou, & Huang 2006,). The empirical cases show that even though there had been issues during the warranty period as a result of issues during project execution, the project customers considered the projects successful.

To summarise, we identified the following main functions of warranty management that support project success and service operations:

1. Establishing the image of a proactive, problem-solving supplier through supplier-initiated communication and cooperation with the customer for the purpose of establishing service operations and a solid relationship overall. This is potentially linked to increasing customer satisfaction;
2. Data collection and further transfer of customer and operations-related information within the supplier's organisation, e.g. through electronic means, for future project and life-cycle service deliveries; and
3. Reflective learning from doing function in the analyses of the successes and failures manifested during the warranty phase from the earlier project phases, and communicating the lessons learned to the other phases, especially project execution and service operations.

Conclusions

As industrial suppliers move from product-centred thinking towards service-oriented thinking, post-delivery stages of projects receive more and more attention from managers. The need to stay competitive and, thus, to expand ways to deliver value to the customers beyond project execution, shifts the focus towards recognising the role of the warranty. Project management literature does not see the warranty as a part of the project, but recognises its impact on the way customers perceive project success (Atkinson, 1999; Shenhar et al., 1997). If warranty management is not seen as merely claim management, but rather as a continuation of the project with the purpose of securing continuous service operations and improving project management practices, the benefits of focusing on it are clear. While competitiveness in the manufacturing industry is high with limited possibilities for development, focusing on services enables capturing several new business areas for industrial companies. An example of such a trend is increasing collaboration between research institutes and industrial firms on national and international levels to develop and implement new business models and processes that support service-oriented thinking (e.g., FIMECC FUTIS research program plan, 2010; FIMECC I&N PBS research project plan, 2008). At the same time, our findings support the previous research in showing that focusing on services demands the establishment of new practices and capabilities (Eggert et al., 2011; Reinartz & Ullaga, 2008; Ullaga & Reinartz, 2011) from the point of view of the warranty.

In this article, we investigated how warranty management can support project success both from the supplier and the customer perspectives, as well as how warranty management contributes to service operations. The following conclusions have been made:

- From a project success perspective, we argue that companies may benefit from shifting attention from mere project execution excellence towards paying more attention to warranty management and its role in service operations;
- The warranty phase has a dual character of serving as an end stage of a project (with the aim to minimise costs) and an operational service (with the aim to maximise value creation for the customer and learning for the supplier). Thus, warranty management can influence the perception of success of both the project phase and potential future service operations;
- The role of warranty management in determining success should be re-defined both from the project management point of view and in terms of service development and operations. It should include not only a short-term perspective such as cost minimisation to benefit an individual project, but also a long-term perspective as a means of value creation both for customers and suppliers through learning from doing.

This article outlines multiple perspectives on how the concept of project success can be defined and influenced by looking at the problem from a different angle, i.e. considering the warranty management and subsequent service operations. The warranty phase appears to have importance in terms of influencing customer relationships and, thus, the customers' satisfaction with the project which is a valid measure of project success. It also has an influence on securing future business and establishing the supplier as a service provider. Further research is needed to establish the kinds of warranty activities that contribute most to the development and operation of services. In relation to this issue, researchers and practitioners need to define the role of the warranty manager as a profession.

References

Ala-Risku, T. (2009). Installed Base Information: Ensuring customer value and profitability after the sale, Doctoral dissertation, Helsinki: Helsinki University of Technology.

Anderson, J. C. & Narus, J. A. (1990). A Model of Distributor Firm and Manufacturer Firm Working Partnerships, Journal of Marketing, 54: 42-58.

Agarwal, N. & Rathod, U. (2006). Defining 'Success' For Software Projects: An exploratory revelation, International Journal of Project Management, 24: 358-370.

Artto, K., Kujala, J., Dietrich, P., Martinsuo, M. (2008). What Is Project Strategy? International Journal of Project Management, 26: 4-12.

Atkinson, R. (1999). Project Management: Cost, time and quality, two best guesses and a phenomenon, it's time to accept other success criteria, International Journal of Project Management, 17: 337—343.

Bakker, de K., Boonstra, A. & Wortmann, H. (2010). Does Risk Management Contribute to IT Project Success? A meta-analysis of empirical evidence, International Journal of Project Management, 28: 493-503.

Barry, J. & Terry, T.S. (2008). Empirical Study of Relationship Value In Industrial Services, Journal of Business & Industrial Marketing, 23: 228 – 241.

Boulding, W. & Kirmani, A. A (1993). Consumer-Side Experimental Examination Of Signaling Theory: Do consumers perceive warranties as signals of quality, Journal of Consumer Research, 20: 111–123.

Cui, Q., Bayraktar, M.E., Hastak, M., and Minkarah, I. (2004). Use of Warranties on Highway Projects: A real option perspective, Journal of Management in Engineering, (July) 118-125.

Davies, A. (2004). Moving Base into High-Value Integrated Solutions: A value stream approach, Industrial and Corporate Change, 13: 727-756.

De Witt, A. (1988). Measurement Of Project Success, International Journal Of Project Management, 6: 164 – 170.

Dvir, D. & Lechler, T. (2004). Plans are Nothing, Changing Plans is Everything: The impact of changes on project success, Research Policy, 1(33): 1—15.

Eggert, A., Hogreve, J., Ulaga, W. & Muenkhoff, E. (2011). Industrial Services, Product Innovations, and Firm Profitability: A multiple-group latent growth curve analysis, Industrial Marketing Management, 40: 661–670.

FIMECC Finnish Metals and Engineering Competence Cluster Future Industrial Services - FUTIS 2010-2015 research program plan (2010), Version 1.3: 29 November.

FIMECC Finnish Metals and Engineering Competence Cluster Innovations and Networks (I&N) Project Business and Services – PBS 2009 – 2012 research project plan (2008): 16 October.

Fortune, J. & White, D. (2006). Framing Of Project Critical Success Factors By A Systems Model, International Journal of Project Management, 24: 53–65.

Galbraith, J.R. (2002). Organizing to Deliver Solutions, Organizational Dynamics, 31(2), 194-207.

Hellström, M. (2005). Business Concepts Based on Modularity – A Clinical Inquiry into the Business of Delivering Projects, Doctoral dissertation, Åbo Akademi Press.

Kowalkowski, C., Ridell, O. P., Röndell, J., & Sörhammar, D. (2012). The Co-Creative Practice of Forming a Value Proposition, Journal of Marketing Management, 28: 1553-1570.

Liljander, V. & Roos, I. (2002). Customer-Relationship Levels – From Spurious to True Relationships, Journal of Services Marketing, 16: 593 – 614.

Lusch, R.F., Vargo, S.L. and O'Brien, M. (2007). Competing through Service: Insights from service-dominant logic, Journal of Retailing, 83: 5–18

Mathieu, V. (2001). Product Services: From a service supporting the product to a service supporting the client. Journal of Business & Industrial Marketing, 36: 39–58.

Maylor, H. (2001) Beyond the Gantt Chart: Project management moving on, European Management Journal, 19(1), 92—100.

Miller, D., Hope, Q., Eisenstat, R., Foote, N., & Galbraith, J. (2002). The Problem Of Solutions: Balancing clients and capabilities. Business Horizons, 45: 3-12.

Mirvis, P. (2008). Academic-Practitioner Learning Forums: A New Model for Interorganizational Research, in Shani, A.B., Albers Mohrman, S., Pasmore, W.A., Stymne, B., & Adler, N. (Eds.) Handbook of Collaborative Management Research, 201-224, Thousand Oaks: Sage.

Möller, K. & Rajala, A. (2007). Rise of Strategic Nets - New Modes Of Value Creation, Industrial Marketing Management, 36: 895-908.

Möller, K.& Törrönen, P. (2003). Business Suppliers' Value Creation Potential - A Capability Based Analysis, Industrial Marketing Management, 32: 109– 118.

Nazemi, J. & Rashidi Kameh, H. (2012). A Cost Model for Warranty Period Determination on Serial Components, International Journal of Industrial Engineering & Production Management, 23: 29-41.

Oliva R. & Kallenberg R. (2003). Managing the Transition From Product To Services, International Journal of Services Industry Management, 14:160-172.

Padmanabhan V. (1993). Warranty Policy And Extended Service Contracts: Theory and an application to automobiles. Marketing Science, 12: 230–48.

Pasmore, W. A., Stymne, B., Shani, A.B., Albers Mohrman, S., & Adler, N. (2008). The Promise of Collaborative Management Research, in Shani, A.B., Albers Mohrman, S., Pasmore, W.A., Stymne, B., & Adler, N. (Eds.) Handbook of Collaborative Management Research, 7-32, Thousand Oaks: Sage.

Perminova, O. (2011). Managing Uncertainty in Projects, Doctoral dissertation, Åbo Akademi Press.

Perminova, O., Gustafsson, M., & Wikström, K. (2008). Defining Uncertainty in Projects — A New Perspective, International Journal of Project Management, 26: 73—79.

Reen, N., Rekola K., & Gustafsson, M. (2011). Service Failure - Disaster or a Golden Opportunity? Conference article presented at the 11th European Academy of Management (EURAM) Annual Conference, Tallinn: June 1-4th, 2011.

Reinartz, W. & Ulaga, W. (2008). How to Sell Services More Profitably, Harvard Business Review, 86: 90–96.

Samatli-Paç, G., & Taner, M.R. (2009). The Role of Repair Strategy in Warranty Cost Minimization: An investigation via quasi-renewal processes. European Journal of Operational Research, 197: 632–641.

Sawhney, M. (2006). Going Beyond the Product: Defining, designing and delivering customer solutions, in Lusch, R.F. & Vargo, S.L. (Eds.) The service-dominant logic of marketing: Dialog, debate and directions, M.E. Sharpe, New York.

Schön, D. (1983). Reflective Practitioner. How Professionals Think in Action. New York: Basic Books.

Selnes, F. & Hansen (2001). The Potential Hazard of Self-Service in Developing Customer Loyalty, Journal of Service Research, 4: 79-90.

Shenar, A.J., Dvir, D., Levy O., and Maltz A. (2001). Project Success, a Multidimensional Strategic Concept, Long Range Planning, 34, 699-725.

Shenhar, A. J, Levy, O., and Dvir, D. (1997). Mapping The Dimensions Of Project Success, Project Management Journal, 28: 5—13.

Stremersch, S., Wuyts, S., Frambach, R.T. (2001). The Purchasing of Full-Service Contracts: An exploratory study within the industrial maintenance market. Industrial Marketing Management, 30: 1-12.

Turner, J. R. & Cochrane, R. A. (1993). Goals-and-Methods Matrix: Coping with projects with ill defined goals and/or methods of achieving them, International Journal of Project Management 11: 93 – 102.

Ulaga, W., & Reinartz, W.J. (2011). Hybrid Offerings: How manufacturing firms combine goods and services successfully, Journal of Marketing, 75: 5-23.

Vargo, S. L., & Lusch, R. F. (2004a). Evolving to a New Dominant Logic for Marketing, Journal of Marketing, 68: 1–17.

Vargo, S. L., & Lusch, R. F. (2004b). The Four Services Marketing Myths: Remnants from a manufacturing model, Jour-

nal of Service Research, 6: 324–335.

Vargo, S. L., & Lusch, R. F. (2008). Service-Dominant Logic: Continuing the evolution. Journal of the Academy of Marketing Science, 36:1–10.

Werr, A., & Greiner, L. (2008). Collaboration and the Production of Management Knowledge in Research, Consulting, and Management Practice", in Shani, A.B., Albers Mohrman, S., Pasmore, W.A., Stymne, B., & Adler, N. (Eds.) Handbook of collaborative management research, 93-118, Thousand Oaks: Sage.

Wikström, K., Artto, K., Kujala, J., & Söderlund, J. (2010). Business Models in Project Business, International Journal of Project Management, 28: 832-841.

Williamson, O. (1979). Transaction-Cost Economics: The governance of contractual relations, Journal of Law and Economics, 22: 233-261.

Williamson, O. (1991). Comparative Economic Organization: The analysis of discrete structural alternatives, Administrative Science Quarterly, 36: 269-296.

Windahl, C. & Lakemond, N. (2010). Integrated Solutions From A Service-Centered Perspective: Applicability and limitations in the capital goods industry, Industrial Marketing Management, 39: 1278-1290.

Wise, R. & Baumgartner, P. (1999). Go Downstream. The new profit imperative in manufacturing. Harvard Business Review, 77: 133–141.

Wu, C-C., Chou, C-Y., and Chikong, H. (2009). Optimal Price, Warranty Length and Production Rate for Free Replacement Policy in the Static Demand Market, Omega, 37: 29-39.

Yin, R. K. (2003). Case Study Research, Design and Methods, 3rd ed. Newbury Park: Sage Publications.

THE ROLE OF CUSTOMER-SUPPLIER RELATIONSHIPS IN DEVELOPING A SERVICE-ORIENTED ORGANISATIONAL CULTURE

MARIA IVANOVA-GONGNE
OLGA PERMINOVA-HARIKOSKI
ANDRÉ NÄSI

Abstract

The changing industry requirements motivate industrial suppliers to move beyond simply providing a product or a service that meets the customers' needs. They have to be able to develop a customer value-driven offering or rather a solution in order to ensure a competitive advantage in the market. Business-to-business relationships with the customers grounded in the profound understanding of their needs and the ability to express them in terms that are relevant to the customers' businesses are at the core of developing an appropriate service offering.

We argue that adapting to the customer's needs and mindset in this case requires development and adoption of a service-oriented organisational culture. The issue of organisational culture has received minor attention in industrial services literature. Furthermore, organisational studies have, to a limited extent, addressed the role of the external actors in the internal organisation of industrial companies. Still, the main driver for change towards a service-oriented organisational culture may originate from the business-to-business relationships with the customer.

This paper explores the triggers for change in organisational culture towards service-orientation, and the possibility for the development of a service-oriented culture through learning and by adapting to business partners' cultural schemas. For this purpose, we conduct an exploratory single case study with the focus on a Finnish global engineering services company in the power generation industry. The main contribution of the study lies in addressing the role of organisational culture in the industrial services literature, and considering the external actors in the process of its development. Furthermore, we introduce some managerial implications on the development of a service-oriented culture by taking into account a customer perspective.

The role of services for industrial suppliers

When it comes to industrial services, the trend towards recognising customers' business needs and providing value to the customers through product-service combinations, is often referred to as solutions (Baines et al., 2009; Davies & Brady, 2000; Kindström & Kowalkowski, 2009; Oliva & Kallenberg, 2003; Ulaga & Reinartz, 2011). This perspective is getting stronger support both in the literature and in practice. As for the industrial manufacturers positioning themselves as service suppliers, offering solutions presents an opportunity to generate better profits by providing value-added life-cycle support for their customers. However, the challenge is whether their customers will recognise them as service providers or look for other sources to obtain the needed support. As noted by Ullaga and Reinartz (2011), delivering services requires different capabilities from the industrial suppliers. In this respect, suppliers need to be able to establish a relationship with their customers that would, on one hand, support the suppliers' orientation towards service provision, and on the other, stress the value of their offering – a solution – to the customers.

Although services have become an integral part of industrial offerings, suppliers are often uncertain how the services they provide add value to their customers' businesses. This stems from the fact that it is difficult for manufacturing-oriented companies to estimate the value of the services for the customers and price them accordingly. For example, it can be hard to calculate the financial benefit of the service and the impact it has on the customer's business. This leads to the fact that the supplier cannot develop or improve its offering, let alone give performance guarantees. Thus, the service becomes an "add-on" to the core product offering: something that is included in the package together with the product, a bonus. We argue that suppliers should develop a customer relationship process that would enable them to establish and maintain the value of their solutions. There is also another reason for uncertainty, which is related to the lack of a service culture within the company striving to provide services. As service provision requires rather different capabilities, manufacturing-oriented companies might even lack the needed understanding and values that support service provision as part of the company culture. An established service-oriented organisational culture, including stable beliefs, values, practices and schemas, will as a consequence improve employees' understanding of a company's aims and bring certainty to a company's employees' actions.

One aspect that emerges from the value creation through services discussion is the ability of a supplier to have a dialogue with the customer to better formulate the value proposition or even to co-create it jointly (see, e.g., Kowalkowski, Ridell, Röndell ,& Sörhammar, 2012). This is in line with the view on value as an interactive and relativistic experience (in Kowalkowski, 2011, referring to Holbrook, 2006). The interactive nature of value creation suggests the possibility that individuals with different cultural backgrounds will participate in this process (c.f. Bolten, 1999). This implies that the perceptions of value among different actors participating in value creation can, and even will, be different, as individuals might impose different cultural meanings on the concept of value.

The service literature suggests looking into customer's key performance indicators and other performance measures to be able to evaluate and objectify the created value (Kowalkowski, 2011; Tuli, Kohli & Bharadwaj, 2007). For the supplier, it means developing and continuously applying a process to monitor the needs of their customers. We argue that this can be done as part of the co-creation activities with the customer and as an internal business process to collect and analyse customer-related information. This information can be utilised to adapt to emerging market requirements. Interacting with the customer and collecting and analysing customer-related information will also enable understanding a partner's organisational culture and adapting to it, by including certain cultural practices and knowledge into

its own organisational culture. Learning and adapting to service-oriented schemas of a partner's culture (see the below sections for further explanation) may be seen as a part of co-creation activities. Co-creation activities, including monitoring customer needs and cultural adaptation, are of relevance not only for the formulation of value propositions, but also for the later evaluation of the supplier's performance in terms of services. The latter can support the supplier to develop its offering. Thus, for instance, understanding and adapting to a partner's culture may support the creation of proper value propositions through proper knowledge about the customer's schemas in relation to services, as well as strengthen business relationship (see Weck & Ivanova, 2013). In turn, a strong business relationship may improve the customer's perception of the supplier's performance and support openness in interactions, which will result in better, more informed development of service offerings. More importantly, joint development of value propositions and adapting to the customer's service-oriented culture may help the supplier company (which, in many cases, is better known to its customers as an equipment manufacturer) to establish itself as a service provider.

The main objectives of this paper are: 1) to explore how the customer-supplier relationship and the customer's needs trigger a change towards a service-oriented organisational culture; and 2) to understand how it is in theory possible to adopt a service-oriented culture through learning and adaptation to elements of the customer's culture. The study contributes to the limited amount of literature on service-oriented organisational culture by taking into account the role of the firm's business partners in its development. Our research also adds to the growing body of literature on cultural adaptation in the business relationships field.

The structure of the paper is as follows. First, we present the concept of a service-oriented organisational culture and provide an overview of the process of cultural adaptation within business relationships. Second, we describe the methods applied in the study, after which we present an illustrative example based on our research, which serves as a tentative illustration of the issue in focus. Finally, we provide some conclusions and managerial implications on the development of a service-oriented culture by taking into account a customer perspective.

Service-oriented organisational culture

During the last decade, service management and marketing studies began to highlight the concept of a service-oriented organisational culture (e.g., Gebauer, Edvardsson & Bjurko, 2008; Nuutinen & Lappalainen, 2012). While the literature on service-oriented cultures is still quite limited (Nuutinen & Lappalainen, 2012), few definitions of it exist. Thus, Gebauer et al. (2008, p. 239) define service-oriented culture as consisting of "the values and behaviors associated with an entrepreneurial orientation, real problem-solving eagerness, innovativeness, and flexibility of service employees". The authors (Gebauer et al., 2008, pp. 240–241) further specify that a service-oriented organisational culture consists of:

1. Service orientation of management values, which "expresses how the potential benefits of services can influence managers' focus";
2. Service orientation of employee values, which "refers to the degree to which employees actively understand the benefits of an extended service business";
3. Service orientation of management behaviour, which "highlights the relevance of coaching and empowering employees, as well as setting up necessary organisational elements such as human resources, organisational structure, and measurement and rewards for the service business"; and
4. Service orientation of employee behaviour, which involves the ability to "develop a learning relationship with customers, solve customer problems collaboratively, and tailor products and services to address individual customer needs".

Although taking into account the customer-centric orientation, the few studies on service-oriented organisational culture do not particularly consider the role of business partners in the development of this type of culture (e.g., Gebauer et al., 2008; Nuutinen & Lappalainen, 2012). Thus, the few studies on service-oriented organisational culture seem to focus on the culture being predominantly shaped by the individuals within the organisation, a view prevailing in most of the research on organisational culture (see Hatch & Schultz, 1997; Ravasi & Schultz, 2006). A similar trend can be witnessed when it comes to the existing body of knowledge on the reflective process. It contributes to the understanding of reflection at the level of the individual (Popper, 1996; Reynolds & Vince, 2008; Weick, 1995). As noted in the previous chapter, differences in value perception or the lack of a service-oriented culture can be a source of uncertainty (the latter can be defined as an individual's lack of knowledge or understanding, in Perminova's [2011] terms). Still, uncertainty at the organisational level is not a sum of individual perceptions; rather, the perception of uncertainty impacts the way the tasks are performed (see also Galbraith, 2002). Thus, following the logic of Gebauer et al. (2008), we conclude that the development of a service-oriented organisational culture can support the management of uncertainty by providing an orientation to values, management behaviour, and not least, a collaborative approach to working with business partners, especially customers.

While the organisational culture of the firm is set internally, its development will, to a certain extent, be based on its operations and relationships with its customers. Nuutinen and Lappalainen (2012) conclude that long-term and close relationships with partners can play a role in changing the company's present organisational culture. By means of constant interaction and collaboration with its partners, the firm is able to learn and adapt to the partner's culture (see Weck & Ivanova, 2013), thus enabling a change in the firm's own organisational culture.

The literature on service-oriented culture seems to focus on the complete change of organisational culture towards service orientation. However, the need for a service-oriented organisational culture may depend on the needs of the specific customer and its organisational culture. In this case, a cultural schema concept is viable, which relates to the view on culture as a system of knowledge (see Ivanova-Gongne, 2015). Cultural schemas comprise knowledge shared by various cultural groups and guide individual behaviour in certain interaction situations (Garro, 2000; Ivanova & Torkkeli, 2013; Ivanova-Gongne, 2015). In other words, cultural schemas serve as a "repository" for cultural knowledge, including values, beliefs and appropriate behaviours in certain situations (Harris, 1994, p. 313). Certain cultural schemas can be applied for interacting with a specific group of customers. Thus the company needs to have the ability to adapt its culture depending on the customer group (for further details, see section below). We particularly focus on how the cultural knowledge, i.e. cultural schemas, of the company's employees corresponds with the service-oriented perspective of specific customer groups.

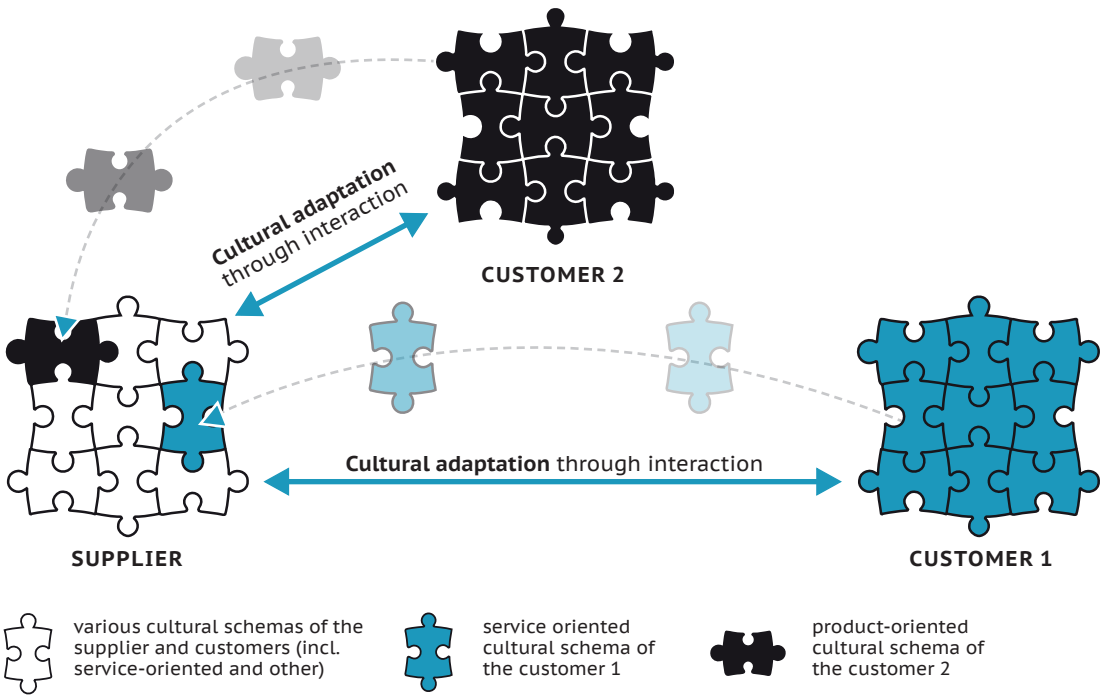
Cultural adaptation in business relationships

Adaptation is one of the core prerequisites for developing long-term and strong business relationships (Brennan, Turnbull & Wilson, 2003; Håkansson, 1982; Hallén et al., 1991). Various types of adaptation have been highlighted in the literature, e.g. product, planning, delivery procedures, administrative procedures, financial procedures (Brennan et al., 2003). Adaptation has also been outlined as one of the methods to manage uncertainty in projects related to the delivery of complex value-added solutions consisting of products and services (see Perminova, 2011 for a review). Scholarly literature on business relationships, however, has given little attention to cultural adaptation between firms (e.g., Pornpitakpan, 1999; Weck & Ivanova, 2013). Still, understanding, learning and adjusting to the way partners do business is a vital

process in case a company wants to develop long-term relationships (Weck & Ivanova, 2013). Cultural adaptation includes companies' activities in order to adjust to the necessary partners' cultural schemas and practices, norms and beliefs (see Ivanova-Gongne, 2015; Weck & Ivanova, 2013). The company is able to adapt to certain cultural schemas, which are relevant for business relationship development with the specific partner by means of interactions. For example, by interacting with a customer whose way of doing business requires increased interpersonal communication, the representatives of the company may incorporate this type of cultural schema in its organisational culture and apply it whenever interacting with this type of customer. As a consequence, the organisational culture may consist of several cultural schemas, which are oriented at different customers, and can comprise both service-oriented elements and product-oriented elements, which will be used depending on the customer (see Figure 7).

Adaptation occurs gradually (Balogun & Johnson, 2004) and, thus, adjusting to the counterpart's cultural schemas requires time. The level of adaptation will depend on the level of cultural knowledge of the partner and willingness to adapt, which in turn depends on the level of dependence on the partner and trust towards the partner itself and its culture (Ivanova-Gongne, 2015). A high level of dependence implies, for instance, that the partner possesses resources that are essential for the company (Hallén et al., 1991). Trust towards a customer's culture involves positive perceptions towards it; in case the perceptions are negative, psychological barriers may inhibit adaptation to the customer's culture (see Ivanova-Gongne, 2015; Selmer, 2004). Therefore, adapting to service-oriented cultural schemas cannot happen overnight, and requires frequent interaction with the customers, high dependence on the customers and openness of the employees towards the customers' cultures. Figure 7 presents the conceptual model based on the foregoing discussion.

FIGURE 7.
Conceptual model on cultural adaptation in supplier-customer relationships.



Method

Due to the limited amount of literature on the research phenomenon, the research is qualitative and exploratory by nature. We conducted a single case study with the focal supplier specializing in engineering services for the power generation sector. The company is multinational and has offices and factories globally. In order to preserve anonymity, here we use a fictional name for the focal firm, Alpha. Crouch and McKenzie (2006) argue that even one case can result in new knowledge if it describes a plausible example of a certain social practice. The variety of used information sources also improves the quality of a case study (c.f. Crouch & McKenzie, 2006; Halinen & Törnroos, 2005). The case was built on information from six internal workshops with Alpha's employees, 82 self-assessments of the employees and 56 phone interviews with Alpha's customers. The phone interviews were conducted with one representative from each customer company, thus resulting in feedback from 56 interviewees and 56 customer companies, accordingly. All the phone interviewees were managers of various kinds, who are in frequent contact with Alpha's representatives concerning their services. As Alpha conducts its operations on a global level, the customers interviewed were from Western, Central and Northern Europe, Australia and North America.

The data for this article were collected and analysed by means of a collaborative inquiry approach (Pasmore, Woodman, & Simmons, 2008; Werr & Greiner, 2008). Collaborative inquiry implies that the researchers are not just observers but rather active participants in the case study delivering an impact on the outcomes and facilitating the understanding and interpretations of the phenomenon by the practitioners. In line with this approach, we alternated data collection and interpretation with workshops and discussions with the company's key personnel.

In order to have a preliminary understanding on how the company has considered service-orientation in their organisational culture over time, we decided to take a look at how the company's website developed through the years of operations. We focus on the corporate website of Alpha, as it is one of the forms of organisational culture manifestation (see Ravasi & Schultz, 2006). We have used the Wayback Machine (https://archive.org/web/) in order to track what Alpha emphasised in its Internet communications previously, and how it communicates its values today. Wayback Machine is a tool of the Internet Archive (https://archive.org), which maintains a digital archive of approximately 435 billion web pages, thus providing the opportunity to investigate changes in websites over time. Some researchers highlight the validity of Wayback Machine and regard it as a "viable research tool" (e.g., Murphy, Hashim, & O'Connor, 2008, p. 71).

The internal workshops with some of the main subsidiaries of Alpha took place during autumn 2013 and winter 2014 in order to get the internal perspective on the attributes that customers might deem important in business relationships with Alpha. The criterion for choosing the specific subsidiaries was their level of knowledge about each specific customer group. The customer groups included distributors, value-added resellers, end customers, manufacturers and system integrators. The topics for discussion during the workshops included building a comprehensive picture of a typical customer belonging to a specific customer group starting from how they first found out about Alpha, through their purchasing and implementation activities, to after-sales support for the equipment they purchased. After rather free-form discussions, the most critical attributes that were discussed during the workshops were summarised. The aim of further self-assessments was for the participants to grade each attribute (on a five-point scale from not important to critically important) from the customer's perspective (for more information on rating scales for understanding customer needs, see Goldstein, 2009). During spring 2014, an external phone survey was conducted with Alpha's customers. We interviewed 10–15 customers per each customer

group. The customers had to evaluate a series of statements, which corresponded to the attributes outlined during the internal phase of the research (on a five-point scale from not important to critically important). We also strived to obtain open comments to the evaluation of the statements, clarifying why the customer deemed a certain attribute important or not important.

The following illustrative example presents the extent to which the company's employees have gained cultural knowledge about the customer, and Alpha's first steps towards implementing service-oriented cultural schemas into its organisational culture. We refer to it as an illustrative example due to the limited amount of rich qualitative data and, thus, the inability to produce an in-depth view of the issue in focus. This example can serve as a basis for further research and provides some managerial implications for further adaptation to the service-oriented cultures of certain customer groups.

Illustrative example and discussion

Initiation of change in Alpha's organisational culture

Alpha started its operations in 1993. Through an investigation of Alpha's website on Wayback Machine, we found that the most recent change of the website occurred in November 2012. Before November 2012, the website contained only a "products" subsection and no subsection concerning services. The services were, to some extent, mentioned in the "product support" subsection, thus suggesting the perception of services as an add-on to the product. The perception of services as an add-on to the product can be related to "the staff's strong belief in the technological product now and in future business" (Nuutinen & Lappalainen, 2012). Therefore, it can be assumed that the company's organisational culture was, to a large extent, product-oriented.

In the new version of the website (starting from November 2012), one can clearly trace a subsection named "services", which includes a description of several services, e.g. engineering services, maintenance, customer support and training. This may indicate the company's increasing awareness of some changes in its customers' organisational cultures, including enhanced importance of services for customers. Further, in autumn 2013, the company started a program oriented at identifying the customers' values with the aim of developing this into a competitive advantage. This can be regarded as an attempt to obtain more knowledge about the customers' way of doing business, i.e. customers' cultural schemas, and incorporate the obtained knowledge into the company's work practices, i.e. company's organisational culture.

Cultural schemas of the main customer groups

The study showed that Alpha has five main customer groups – distributors, value-added resellers, end customers, manufacturers and system integrators – categorised by whether they are end users of the product or distribute it further (by integrating it into their own solution, re-selling it, etc.). In order to understand the general values and appropriate behaviours of the customer groups, we turn to the general definitions of these groups' activities.

The general culture of the manufacturers and system integrators seems to be more product-oriented. Thus, the manufacturers' main aim is to produce goods in large numbers (Cambridge Dictionaries Online, n.d.), which usually includes using components supplied by other companies. Similarly, systems integrators build complete systems from parts supplied by different companies (Cambridge Dictionaries Online, n.d.). The end customers may have both product- and service-orientation in their culture, as their main role is to use a product or service (Cambridge Dictionaries Online, n.d.). The two last customer groups, i.e. value-added resellers and distributors, seem to have a more service-oriented organisational culture and, thus, represent the particular focus for our study. The gen-

eral role of the distributors is to buy products from a manufacturer and sell them for a profit to other businesses, stores or customers, often by transporting the goods to different places (Cambridge Dictionaries Online, n.d.). While the value-added resellers' main aim is also to buy products from a manufacturer and sell them to the customer, which also involves further addition of value to the product (Cambridge Dictionaries Online, n.d.). Therefore, it can be assumed that service-oriented cultural schemas will prevail in the organisational culture of these groups of companies, as their main activities include proper logistics services and value-added services.

During the external phase of the study of Alpha's customer groups, it was found that manufacturers, system integrators and end customers stressed more the importance of product-related aspects, which corresponds with the general understanding of their organisational culture presented above (except for end customers). In the case of end customers, the products might have appeared to be more important due to the still insignificant development of Alpha's services and, thus, the customers' limited knowledge about them. On the contrary, customer groups as distributors and resellers placed a bigger emphasis on services. This also corresponds with the preliminary understanding of their culture presented above. We focus in more detail on the service-oriented factors highlighted as important by distributors and sellers, due to our focus on service-oriented organisational culture.

Resellers' values and related cultural schemas

The **resellers** placed an emphasis on the following service-related aspects:

1. Proper adaptation of user instructions and guidelines to customer's language. Although the customers mentioned that mostly the user instructions and guidelines were good, some emphasised that they were written from Alpha's own engineering perspective. These guidelines need to reflect the application of the product from the customer's point of view in order to constitute a better service value. In order to understand the language of the customer, i.e. terms familiar to the customer, and adapt the instructions, Alpha needs to have a higher level of customer-specific cultural knowledge.
2. Software for the product. The resellers see the software as an inseparable value-adding part of the product that their end customer obtains (even though the product itself might be provided by another supplier).

Both these aspects are related to the reseller's cultural schema of being able to deliver an added-value product to their end customers. In this sense, improved, customised instructions and software services, as well as user-friendly instructions, add extra value to Alpha's own solutions or the products of the other manufacturers that Alpha provides services for.

Distributors' values and related cultural schemas

The **distributors** stressed the importance of the following factors:

1. Training. The training provided by Alpha was highly valued by the distributors. It was stated that it is especially important in the beginning of the business relationship with Alpha, i.e. when taking the role of Alpha's distributor. Therefore, it can be interpreted as a necessity for the distributor to obtain proper base knowledge about Alpha's product in order to be able to deal with its end customer independently and use Alpha's support on a need-to basis.
2. Customer service (in relation to the end customer of the distributor). The distributors stressed that when interacting with their end customers they need to have good communication with Alpha. This is important in case there is a need to solve a customer's problem, which is outside the distributors' area of expertise. Furthermore, in general, when dealing through a distributor, the end customers in the B2B

supply chain often require the possibility to communicate with the supplier, as it is perceived by the end customers as more knowledgeable about the product than the distributor. One solution would be to have meetings with the end customers, where both the distributors and Alpha are present, in order to solve specific problems of the end customer, where the distributors' knowledge is not sufficient.

Both of these aspects are related to the distributors' cultural schema of being able to deliver a high quality service to their end customers. Thus, training serves as a basis of the distributors' knowledge about Alpha's product, while the customer service complements the distributors' lack of knowledge about specific questions related to Alpha's product. Consequently, the distributors are able to provide a service that is based on solid knowledge of the product.

Values crucial for both distributors and resellers and related cultural schemas

Finally, **both distributors and resellers** highlighted the importance of:

1. On-time logistics. Delivery activities have a big effect on both the distributors' and resellers' businesses, which can be also traced from the general descriptions of these groups' cultures. Both groups were satisfied with the logistic services provided by Alpha.
2. Alpha's support in operations. For distributors, Alpha's support is related to the distributors' ability to provide their end customer with a better service in operating the solution. They expect good and timely communication with Alpha and high technical competencies of Alpha's personnel. Apart from technical support, the distributors also would like to have Alpha's support in better promotion of the products towards the end customers. The resellers have put less emphasis on Alpha's support, but it was still of rather high importance and enabled them to have better interaction with their customers. This difference is explained by the lower level of dependency of the resellers from Alpha in terms of knowing Alpha's product better. Thus, resellers need less involvement from Alpha when dealing with their customers. The resellers have a cultural schema of acting independently, and they want their customers to regard them as a separate, independent entity, rather than simply Alpha's reseller.

Service-oriented culture at Alpha: first steps and development paths

Comparing the internal perspectives on the values of the main customer groups with the results of the external survey, it can be concluded that Alpha's employees have a good understanding of the customers' cultural schemas. Already during the internal workshops, it was highlighted that the customer groups differ significantly from each other, and different approaches and support are needed for each customer group. We further provide a more detailed comparison of internal and external evaluations of distributor and reseller customer groups, due to the focus on service-oriented culture.

The internal and external evaluations of the distributor and reseller customer groups mainly corresponded with each other. Thus, two of the most critical attributes for distributors highlighted in the internal evaluation were also customer service and on-time logistics; whereas in the case of the resellers, the internal evaluation also highlighted Alpha's support in operations and software for the product as important. The difference, however, was that the internal evaluation also highlighted fast delivery as important in the case of distributors, and price in the case of resellers; whereas in the external evaluation, these factors did not appear as crucial. This again indicates a more service-oriented culture of distributors and resellers and a concern with the quality of service, rather than more product-oriented issues as price or faster delivery. In turn, some of the specific aspects, such as the importance of user instructions in the resellers' case and train-

ing in the distributors' case, were only highlighted in the external evaluation. Thus, a conclusion can be made that although Alpha has learned and, to some extent, incorporated the general service-oriented cultural schemas, e.g. on-time logistics and support, it still has not been able to properly adapt the customer-specific service cultural schemas into its organisational culture.

The analysis also shows that Alpha in some cases faced customer- related uncertainty due to a lack of understanding of the customers' business demands and organisational culture. This was manifested most in the case of customer service support for distributors and the need to be able to utilise the customers' language in the case of user instructions. In line with the reviewed literature, interaction and adaptation seem to be the most appropriate methods to deal with such uncertainty. By enabling processes supporting regular interaction with the customers, Alpha can gain an in-depth understanding of their business situation and needs. This, in turn, will positively affect the customer value-orientation of their solutions. Adaptation on a company level is important to support understanding and act in line with the customers' organisational culture. Both communication and adaptation promote collaborative practices, such as co-design and co-creation of solutions, as well as enable a positive customer experience.

To conclude, Alpha is on its first steps of transforming towards a service-oriented organisational culture, has some cultural knowledge about the customers, and is in the beginning of the cultural adaptation process. Alpha has so far mostly succeeded in its learning and adaptation processes, which might be due to the openness and trust of the employees towards the customers' cultures, as well as high interdependence between Alpha and its customers. The next steps would be to consider the knowledge obtained during this study, and then proceed with the adaptation process. However, Alpha should not change its organisational culture towards service-orientation completely; it needs to recognise which customers need this change and to what extent they need the implementation of certain service-oriented cultural schemas.

Conclusion, implications and further research

The purpose of this study was to understand how the customer-supplier relationship drives a company towards developing a service-oriented organisational culture. Similar to Nuutinen and Lappalainen (2012), the study has shown that the customer-supplier relationship, along with an improved understanding of customer needs, serves as a crucial stimulus towards the implementation of a more service-oriented organisational culture. Furthermore, learning the customer's culture and adapting to it occurs as a result of close interaction and collaboration between the customer and the company (Weck & Ivanova, 2013). However, in contrast to previous literature (e.g., Nuutinen & Lappalainen, 2012), it should be noted that implementing a service-oriented organisational culture does not mean that a company should abandon product-orientation in its organisational culture completely. The company should implement service-oriented cultural schemas, while at the same time retaining certain product-oriented schemas. The usage of certain cultural schemas will then depend on the interaction situation and on the specific customer with whom the company interacts. Furthermore, by adapting to customers' cultures and increasing their understanding of them, suppliers can manage the level of customer-related uncertainty. In that way, they are better able to create value-added solutions for their customers.

The paper contributes to industrial service literature by being one of the few studies to consider the importance of adapting to customers' service-oriented culture for service-oriented industrial manufacturers (for more information on service-oriented culture, see, e.g., Gebauer et al., 2008; Nuutinen & Lappalainen, 2012). We argue that this sort of cultural adaptation is of particular

importance for manufacturers' improved operations, reduction of uncertainty and improvement of business relationships with customers. Finally, we contribute to the limited business relationships literature on culture (Pornpitakpan, 1999; Weck & Ivanova, 2013) by regarding organisational culture as a "customised" phenomenon, thus consisting of several cultural schemas, which are oriented at interaction with various customers and counterparts. The study also adds to business relationships literature by considering cultural adaptation, which has received little attention in previous studies (see Pornpitakpan, 1999; Weck & Ivanova, 2013).

The article has several managerial implications. First, it draws attention to the need for managers to consider specific customers' cultures for improving collaborative operations and business relationships. In particular, the change towards a service-oriented culture should occur gradually and by means of close interaction and collaboration with customers, in order to reach a proper understanding of customers' cultural schemas. Second, it highlights the importance of establishing a customer-oriented approach by adapting to customers' cultural schemas and, thus, "customising" the company's organisational culture. This promotes better understanding of the customers' business needs that are essential for the development and operation of services. Thus, managers can develop an organisational culture guide, which will include not only internal rules of conduct, but also the rules of behaviour for the company's employees when interacting with certain customers. Trust towards the customer itself and towards its culture are also important factors for enabling cultural adaptation.

In terms of solutions, cultural orientation supports targeting the core problems of customer business, thus making products and services a proper solution to the customer's business problem. The result is gaining a competitive advantage through better satisfying customer needs. As mentioned at the beginning of this study, many customers fail to recognise industrial suppliers with roots in manufacturing as service suppliers. Establishing and promoting a service-oriented organisational culture with the aim of supporting the development and implementation of customer value-added solutions is seen as an important aspect of becoming a service provider. We argue that without addressing cultural aspects of servitisation, industrial companies have low chances of becoming solution providers capable of giving their customers service support on the needed level.

Finally, the study also provides several avenues for further research. First, the current study did not include the national culture factor, which can be of relevance if considering cultural adaptations of a global company. Thus, research is needed in order to conduct a multi-layered cultural analysis, i.e. national culture, organisational culture, of company's adaptation process to its customers' cultures. Second, due to a limited amount of data, the study does not uncover specific processes occurring during cultural adaptation and change towards a service-oriented organisational culture. Therefore, more in-depth, intensive and longitudinal research is needed in order to identify how the company incorporates service-oriented cultural schemas and, in particular, how it is manifested in their further operations and how it impacts their performance.

References

Baines, T.S., Lightfoot, H.W., Peppard, J., Johnson, M., Tiwari, A., Shebab, E. & Swink, M. (2009). The servitisation of manufacturing: A review of literature and reflection on future challenges. Journal of Manufacturing Technology Management, 20(5), 547-567.

Balogun J., & Johnson, G. (2004). Organizational restructuring and middle manager sensemaking. The Academy of Management Journal, 47(4), 523-549.

Brennan, R., Turnbull, P.W., & Wilson, D.T. (2003). Dyadic adaptation in business- to-business markets. European Journal of Marketing, 37(11/12), 1636-1665.

Bolten, J. (1999). Intercultural business communication: An interactive approach. In C.R. Lovitt & D. Goswami (Eds.) Exploring the rhetoric of international professional communication (pp. 139- 156). New York, NY: Baywood.

Crouch, M., & McKenzie, H. (2006). The logic of small samples in interview- based qualitative research. Social Science Information, 45(4), 483-499.

Davies, A., & Brady, T. (2000). Organisational capabilities and learning in complex product systems: towards repeatable solutions. Research Policy, 29(7/8), 931-53.

Distributor (n.d.). In Cambridge Dictionaries Online, Retrieved November 10, 2014, from http://dictionary.cambridge.org/dictionary/business-english/distributor.

End customer (n.d.). In Cambridge Dictionaries Online, Retrieved November 10, 2014, from http://dictionary.cambridge.org/dictionary/business-english/end-user

Galbraith, J. R. (2002). Organizing to deliver solutions. Organizational Dynamics, 31(2), 194—207.

Garro, L.C. (2000). Remembering what one knows and the construction of the past: A comparison of cultural consensus theory and cultural schema theory. Ethos, 28(3), 275-319.

Gebauer, H., Edvardsson, B., & Bjurko, M. (2010). The impact of service orientation in corporate culture on business performance in manufacturing companies. Journal of Service Management, 21(2), 237 – 259.

Goldstein, S. D. (2009). Superior customer satisfaction and loyalty: Engaging customers to drive performance. Milwaukee, WI: ASQ Quality Press.

Halinen, A., & Törnroos, J-Å. (2005). Using case methods in the study of contemporary business networks. Journal of Business Research, 58(9), 1285– 1297.

Hallén, L., Johanson, J., & Seyed-Mohamed, N. (1991). Interfirm adaptation in business relationships. Journal of Marketing, 55(2), 29-37.

Harris, S. G. (1994). Organizational culture and individual sensemaking: A schema-based perspective. Organization Science, 5(3), 309–321.

Hatch, M-J., & Schultz, M. (1997). Relations between organizational culture, identity and image. European Journal of Marketing, 31(5/6), 356-365.

Holbrook, M.B. (2006). ROSEPEKICECIVECI versus CCV: the resource operant, skills exchanging, performance experiencing, knowledge informed, competence enacting, co-producer involved, value emerging, customer interactive view of marketing versus the concept of customer value: 'I can get it for you wholesale'. In R.F. Lusch & S.L. Vargo (Eds.) The service dominant logic of marketing: Dialog, debate and directions, pp. 208-223. Armonk, NY: M.E. Sharpe.

Håkansson, H. (ed.) (1982). International marketing and purchasing of industrial goods. London, UK: John Wiley.

Ivanova, M. & Torkkeli, L. (2013). Managerial sensemaking of interaction within business relationships: A cultural perspective. European Management Journal, 31(6), 717-727.

Ivanova-Gongne (2015). Culture in business relationship interaction: An individual perspective. Journal of Business and Industrial Marketing, 30(5), 608-615.

Kindström, D., & C. Kowalkowski (2009). Development of industrial service offerings – a process framework. Journal of Service Management, 20(2), 156-172.

Kowalkowski, C., Ridell, O. P., Röndell, J., & Sörhammar, D. (2012). The co-creative practice of forming a value proposition. Journal of Marketing Management, 28(13-14), 1553-1570.

Kowalkowski, C., (2011). Dynamics of value propositions: insights from service-dominant logic. European Journal of Marketing, 45(1/2), 277-294.

Nuutinen, M., & Lappalainen, I. (2012). Towards service-oriented organisational culture in manufacturing companies. International Journal of Quality and Service Sciences, 4(2), 137 – 155.

Manufacturer. (n.d.). In Cambridge Dictionaries Online, Retrieved November 10, 2014, from http://dictionary.cambridge.org/dictionary/business-english/manufacturer?q=Manufacturer.

Murphy, J., Hashim, N.H., & O'Connor, P. (2008). Take me back: Validating the Wayback Machine. Journal of Computer-Mediated Communication, 13, 60–75.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. International Journal of Service Industry Management, 14(2), 160-172.

Pasmore, W. A., Woodman, E. W., & Simmons, A. L. (2008). Toward a more rigorous, reflective, and relevant science of collaborative management research. In A.B. Shani, S. Albers Mohrman, W.A. Pasmore, B. Stymne & N. Adler (Eds.), Handbook of collaborative management research, pp. 567-582. Thousand Oaks: Sage.

Perminova, O. (2011). Managing Uncertainty in Projects. Åbo: Åbo Akademi University Press.

Pornpitakpan, C. (1999). The effects of cultural adaptation on business relationships: Americans selling to Japanese and Thais. Journal of International Business Studies, 30(2), 317-337.

Popper, K. R. (1996). En Värld av Benägenheter. Stockholm/Stehag: Brutus Östlings Bokförlag.

Ravasi, D., & Schultz, M. (2006). Responding to organizational identity threats: Exploring the role of organizational culture. Academy of Management Journal, 49(3), 433–458.

Reseller. (n.d.). In Cambridge Dictionaries Online, Retrieved November 10, 2014, from http://dictionary.cambridge.org/dictionary/business-english/reseller.

Reynolds, M., & Vince, R. (2008). Organizing reflection: An introduction. In M. Reynolds & R. Vince (Eds.), Organizing reflection, pp. 1-14. Hampshire, England: Ashgate.

Selmer, J. (2004). Psychological barriers to adjustment of Western business expatriates in China: Newcomers vs long stayers. International Journal of Human Resource Management, 15(4/5), 794-813.

System integrator (n.d.). In Cambridge Dictionaries Online, Retrieved November 10, 2014, from http://dictionary.cambridge.org/dictionary/business-english/system-integrator.

Tuli, K.R., Kohli, A.K., & Bharadwaj, S.G. (2007). Rethinking customer solutions: from product bundles to relational processes. Journal of Marketing, 71(3), 1-17.

Ulaga, W., & Reinartz, W.J. (2011). Hybrid offerings: how manufacturing firms combine goods and services successfully. Journal of Marketing, 75(6), 5-23.

Value-added reseller. (n.d.). In Cambridge Dictionaries Online, Retrieved November 10, 2014, from http://dictionary.cambridge.org/dictionary/business-english/value-added-reseller

Weck, M., & Ivanova, M. (2013). The importance of cultural adaptation for the trust development within business relationships. Journal of Business and Industrial Marketing, 28(3), 210 – 220.

Weick, K. E. (1995). Sensemaking in organizations. London: Sage.

Werr, A., & Greiner, L. (2008). Collaboration and the production of management knowledge in research, consulting, and management practice. In A.B. Shani, S. Albers Mohrman, W.A. Pasmore, B. Stymne & N. Adler (Eds.), Handbook of collaborative management research, pp. 93-117, Thousand Oaks: Sage.

SUPPLIER RELATIONS IN THE EARLY PHASES OF SERVICE BUSINESS TRANSFORMATION

SANNA NENONEN
MIIA MARTINSUO

Abstract

Manufacturing companies are tending more and more to provide services instead of products alone. This transformation may require changing the business logic of the company, as well as renewing supplier relations. Transformation requirements and challenges have previously been studied among manufacturers in fairly advanced and successful service businesses. Less is known about developing supplier relations relative to service businesses in high-volume, low-complexity manufacturing. This paper explores the requirements and challenges of supplier relations in the early phases of service business transformation through a qualitative multiple-case study. This study focuses on high-volume, low-complexity manufacturing, and shows that transforming a business into a more service-oriented business requires integrating the manufacturing company with suppliers to ensure service quality, fulfil service promises, and maintain a good company image. Establishing new partnerships as well as developing current ones, involves challenges with image, responsibility and readiness for change that need to be taken into account in order for the firm to successfully transform into a service business.

Introduction

Service business in manufacturing

Over the past few years, manufacturing companies have started to develop and offer services in addition to products to provide customised solutions that better respond to customer needs (Oliva & Kallenberg, 2003). A considerable proportion of manufacturing companies are already offering products with accompanying services, but the focus is shifting towards a greater service-oriented direction (Brax, 2005). The rationale for the interest towards services is the expectation of possible benefits such as a new approach to compensate for decreased profitability (Nordin, 2004), differentiation in integrated markets (Baines et al., 2009; Gebauer et al., 2010; Oliva & Kallenberg, 2003; Robinson et al., 2002), es-

tablishing closer customer relationships (Nordin, 2004), and responding to the changing needs of the customers (Brax, 2005; Oliva & Kallenberg, 2003).

Adding services to a firm's offerings may imply a change in the entire business logic of the firm. According to previous studies, transforming a manufacturing organisation into service provision requires, among others, changes in organisational structures (Gebauer et al., 2010), adjustment of the business model of the firm (Kindström, 2010), new capabilities (Oliva & Kallenberg, 2003), as well as a shift of performance from transaction-based to a more relationship-based business (e.g., Alam & Perry, 2002; Edvardsson et al., 2008; Kindström, 2010; Oliva & Kallenberg, 2003). In addition, a broader understanding of the business network is needed due to interactions with different partners (Syson & Perks, 2004). Companies focusing on their core competencies are reliant on their stakeholders, including customers, suppliers and alliance partners, as well as intra-organisational business units (Gulati & Kletter, 2005).

While products are manufactured by one company alone, services are usually provided in cooperation with external parties (Cohen et al., 2006). Thus, service business transformation requires changes in the focal company, but also in its supplier network. Enhanced cooperation with partners is needed to ensure that the transformation is successful. Establishing strong external relationships is essential (Åhlström & Nordin, 2006), for example, to acquire complementary competencies and know-how in the services area (Lockett et al., 2011), enable provision of services at the right time (Bikfalvi, 2012), and obtain better insights into customers' operations and ways to solve their problems (Martinez et al., 2010). The benefits of closer supplier relationships include sharing responsibilities with suppliers, gaining a competitive advantage, and cost moderation of the transformation (Mathieu, 2001b).

However, costs, challenges, and risks are also involved in realising closer relationships with supplier organisations (Martinez et al., 2010; Åhlström & Nordin, 2006). Many challenges stem from the divergent nature of service compared to products (Fitzsimmons & Fitzsimmons, 2008) as well as differences between supply networks for the provision of products and services (Johnson & Mena, 2008). Possible problems of supplier relationships during service business transformation involve, for example, insufficiencies in transferring processes to suppliers and inappropriate communication, which may lead to misunderstandings (Åhlström & Nordin, 2006).

Supplier relations have been studied extensively in the context of product manufacturing; however, this topic has been neglected in service business transformation (Lockett et al., 2011). Previous research regarding the transformation and relations with external parties has primarily focused on the changes in customer cooperation, and companies delivering unique and complex equipment and systems becoming part of the customer's value creation process. Although the importance of well-functioning supplier relations has been recognised, its developmental needs and problems at the beginning of the service business transformation have not been adequately discussed (Martinsuo & Lähdeaho, 2011). Particularly, no studies have researched the relationship between high-volume, low-complexity product manufacturers and suppliers during the service business transformation. Therefore, a better understanding of the supplier relationships and network is required, especially in the high-volume product manufacturers' business context. There is particular interest in the early phases of service business transformation when the need for developing existing relationships and establishing new ones emerges.

Objectives

This paper discusses supplier relations in the early phases of service business transformation. The focus is on manufacturing companies that mainly provide products and systems, but have recently started seeking

growth through a new service business. Their customers are often systems and solutions providers whose service business transformation requires development throughout the supply chain. The viewpoint is limited to service suppliers who serve as partners and who help co-create additional product-related services for the customers. Through this study, we intend to contribute to the growing body of research that seeks solutions to improve supplier relations when manufacturing firms engage in service business transformation.

The main objective of this study is to better understand the development of supplier relations when manufacturing companies begin to move towards a more service-oriented business. In particular, we intend to identify the drivers of successful supplier cooperation during the early phases of service business transformation. This paper focuses on the following research questions:

1) What types of services do manufacturing companies procure from suppliers in the early phases of service business transformation?
2) What are the requirements of service business transformation for supplier relations?
3) What are the challenges involved in supplier relations in the early phases of service business transformation?

In this study, the term 'supplier' is defined as contractors who provide services that form a part of the company's offerings to the end customers. Raw material suppliers and other service providers, e.g. facility maintenance, have been excluded from this consideration.

Literature review

Service business transformation

Service business transformation (also called servitisation and service infusion) has become a viable strategic option for manufacturing firms that seek growth and profitability in a turbulent business environment. Companies may approach service-oriented businesses by adding new services to their offering (Oliva & Kallenberg, 2003), modifying the role the services play in the firm (Mathieu, 2001a), or adopting a more holistic view of integrated solution delivery (Windahl & Lakemond, 2010). Manufacturing firms in the process of expanding their service-oriented business have been viewed as moving along a continuum from pure product manufacturer to service provider. Consequently, the relative importance of products decreases and the importance of services increases as a manufacturing firm moves towards a service-oriented business (Oliva & Kallenberg, 2003).

Service business transformation has previously been covered primarily as a marketing challenge, taking the form of adopting a service-dominant logic and engaging in a more customer-oriented way of working. According to service-dominant logic, value is defined by and co-created with the customer, rather than embedded in the output (Vargo & Lusch, 2002). Service-dominant logic also facilitates involvement with the value creation processes of the company's customers (Grönroos, 2008). Increased customer orientation has been presented as a proactive way to identify customer expectations (Matthyssens & Vandenbempt, 2008) and offer customer-centric solutions (Salonen, 2011). Thus, customer involvement is considered necessary for the success of service development (Alam & Perry, 2002; Carbonell et al., 2009; de Brentani, 1995; Edvardsson et al., 2008). However, companies at the front end of service business transformation may need to adopt a completely new way to approach customer interactions (Salonen, 2011), transforming their customer relationships from transactional to relational in order to develop services that are more responsive to customer needs (Turunen & Toivonen, 2011).

Currently, increasing attention is being directed at the implications of service business transformation with regards to these firms' operations and supply relations. Since companies often utilise external partners to provide services (Kowalkowski et al., 2011),

and such outsourcing may generate internal resistance, threats to established customer relationships, and unanticipated competition (Nordin, 2004, 2006), it is necessary to understand supplier relations as part of service business transformation.

Requirements for supplier relations in service business transformation

Supplier relations play a significant role in service business transformation (Gulati & Kletter, 2005; Nordin, 2004; Oliva & Kallenberg, 2003; Åhlström & Nordin, 2006) because suppliers have competencies that are integral to a manufacturing company's success in offering services (Gulati & Kletter, 2005). Partnering with their suppliers facilitates acquisition of this know-how and creation of value for the customer (Lockett et al., 2011). Thus, many companies that aim to become more service-oriented do so by developing their supplier relations. Bikfalvi et al. (2012) discussed the impact of servitisation on networking in manufacturing industries. In their study, more than 40% of manufacturing companies providing advanced services have established service cooperation with suppliers, whereas among traditional manufacturers with restricted service offerings, this percentage is less than 20%. Ackerman and Martinsuo (2012) suggested that manufacturing companies should align their network involvements with their service strategy. They also reported that such involvement appears to be more active in service operations than innovations. In all, the previous literature shows that new supplier relations are a necessity for servitising companies, and servitisation requires development in supplier relations. However, earlier research has not specifically explored the early stages of service business transformation.

Previous empirical research involving manufacturing companies moving towards solutions in their service business has emphasised the need for integration between the manufacturing firm and its suppliers during the process of service business transformation. Johnson and Mena (2008) studied supply chain management in organisations providing servitised products, and stated that supplier networks providing services need, for example, to be more responsive and agile. It has also been reported that supplier organisations should be more involved in service innovation and development (Gulati & Kletter, 2005; Paton & McLaughlin, 2008). Gulati and Kletter (2005) investigated relationship strategies in successful relationship-centred organisations, and demonstrated that manufacturing companies must have increased communication and tighter computer network linkages with suppliers. Åhlström and Nordin (2006) studied problems in establishing service supply relationships by a manufacturing company selling high-technology products and services to business customers. Their findings suggested that clearly defined processes are essential for service business transformation if the manufacturing firm is to enjoy successful relationships with suppliers. Furthermore, service business transformation and the delivery of product-service offerings require good synchronisation of product and service supply chains (Johnson & Mena, 2008). The ability to coordinate the activities of different performers is an important competence factor in a manufacturing company pursuing service business transformation (Quinn et al., 1990). These examples indicate that the focus of previous literature has been on companies that are advanced and successful in servitising their business.

Gulati and Kletter (2005) presented a model that demonstrated how well-performing companies develop relationships with suppliers. They posited that the developmental process consists of four levels, ranging from arm's-length relationships to strategic partnering. At the lowest level, the relationship is based on transactions alone, and products/services are purchased as isolated entities. Communication at this level may be restricted to electronic transactions. At the second level, termed "bundling", multiple products and/or services are purchased as integrated combinations. Communication at this level is richer and deals with, for instance, objectives and offering development. At the third

level, namely, the "integration" level, manufacturing firms and suppliers reciprocally share expertise and resources. Suppliers are leveraged directly into operations and their employees work as part of a team. At the most advanced level, termed "strategic partnering", the company hands some of its activities over to the suppliers who are given the responsibility to conduct these activities, but are also held accountable for the success of the business. Manufacturers and suppliers may share different types of relationships and, consequently, they are likely to operate at several levels at the same time (Gulati & Kletter, 2005).

Previous studies have demonstrated that cooperation and closer relationships with suppliers are required to ensure responsiveness to customer needs when transforming towards services. Although several requirements have been presented for relations between suppliers and manufacturing companies that aim to adopt a more service-oriented business, a comprehensive picture of these requirements is still lacking. Furthermore, previous literature has concentrated on companies that are already fairly advanced in the service-oriented business and tend to focus on servicing the customer-specific installed base. Research on companies taking the first steps to achieve this transformation remains limited. Studying companies at these initial levels of servitisation is important because, as previous research has shown (Benedettini & Neely, 2010; Gebauer et al., 2005), servitisation attempts often fail. Because material and component manufacturers play an important role in the supply chains of solution providers, they need to involve their suppliers in the service business transformation process during its early stages. The question is, "How?".

Challenges regarding the development of supplier relations

Several studies have indicated that it is more challenging to establish supplier relations and manage the supplier network in the case of industrial services than in traditional manufacturing offerings (Auramo & Ala-Risku, 2005; Martinez et al., 2010). New risks and challenges emerge, for example, from a new kind of network comprised of different relationships (Oliva & Kallenberg, 2003). Service business transformation requires the integration of many functions and factors, and coordinating this process can be complicated (Johnson & Mena, 2008). Furthermore, the different characteristics of the services compared with products have been shown to pose challenges for companies pursuing this transformation (Fitzsimmons & Fitzsimmons, 2008). As a provider of services, it is not sufficient merely to have the product at the right time at the right location; rather, it is also important to manage the right people and competencies (Auramo & Ala-Risku, 2005; Åhlström & Nordin, 2006). Differences between product and service businesses may make it difficult to conceive and internalise the requirements of servitisation in companies with a purely manufacturing background. Companies initiating service business transformation need to understand the unique ways in which supplier relations should be developed from the new service-oriented perspective and not only from a product-centric perspective.

Previous studies have discussed several challenges concerning the relationships with suppliers and networks during the service business transformation process. For example, many challenges relate to quality, know-how, communication, maturity of relationships, divergent views and benefits. Åhlström and Nordin (2006) pointed out that it is difficult for manufacturing companies to ensure adequate quality in the service delivery process and they expect this performance from the supplier. Challenges regarding know-how relate to the possibility of losing both competencies and customers to suppliers if those suppliers later decide to start competing with the manufacturing company (Nordin, 2004; Åhlström and Nordin, 2006). Martinez et al. (2010) focused on the challenges of servitisation in a manufacturing organisation advanced in service provision. They reported that communication with suppliers can be

so severely limited that it poses problems for both parties. Furthermore, insufficient maturity of relationships causes challenges in service business transformation. For example, the transactional nature of supplier relations can inhibit effective participation of suppliers in the innovation process (Martinez et al., 2010). Additionally, collaboration with suppliers can be problematic if the expected benefits of partnering are not consistently reached (Åhlström & Nordin, 2006).

Åhlström and Nordin (2006) summarised the challenges associated with establishing collaboration between companies in general, noting that certain factors may jeopardise the establishment of supply relationships. These factors include insufficient communication leading to misunderstandings, conflicts between the partners undermining relationship benefits, a lack of trust causing tension between partner companies, cultural differences leading to misunderstandings and miscommunication, and resistance of the company to adopt a service strategy, thereby hindering its implementation. (Åhlström & Nordin, 2006) On the basis of their own study, Åhlström and Nordin (2006) added three items to the previous list. These are: writing legal agreements for service exchanges, specifying service processes to be transferred to suppliers, and handing over service delivery to suppliers. To sum up, the previous literature has highlighted several challenges regarding service business transformation from the perspective of companies advanced in their service and solution business. Therefore, further knowledge is needed on the challenges in supplier relations identified as occurring during the first phases of service business transformation.

Earlier studies indicate that the transactional nature of relationships and the divergent views of the transformation process between the manufacturing company and its suppliers may hinder cooperative interactions with suppliers. In addition, operation-related challenges emerge. Therefore, especially in the very early phases of service business transformation, manufacturing companies should be aware of and continually manage the potential risks encountered in supplier relations in order to better facilitate the transformation.

Methodology

Case companies

We employed a qualitative multiple-case study design to investigate perceptions regarding supplier relations in companies in the early phases of service business transformation. We sought exemplary cases that would operate in business-to-business industries in networked settings, have a fairly similar industrial context, and represent the early phase of service business transformation. Most previous studies have focused on services oriented towards a customer-specific installed base and companies successful and mature in their service business. We sought to recruit companies that deliver low-complexity, high-volume products as components in the customer's value creation process.

With this background in mind, we selected three companies from within the engineering and construction industry. Their products are high-quality, material-based intermediary (heavy) components offered to industrial clients that further assemble and engineer those components in their processes. These case companies focus strongly on products and systems and have recently started seeking growth by offering new services. All the companies were starting to servitise their business. They had, for example, included service business-related objectives in their strategy, realised service development projects and piloted new services with some of their customers. Service offerings in the case companies are still scarce, but some services supporting the use of the product are already offered, such as product support, custom packaging, training, storage and design. To maintain anonymity of the cases, we will refer to them as Companies A, B and C. All three companies are in the early phases of service business transformation, but the progress of each company differs slightly in that

Company C offers somewhat more advanced systems compared to A and B, but all are still considered primarily product manufacturers.

The selected case companies are currently associated with local supply partners, mainly in product upgrading tasks. The most common operations carried out by the supplier companies are surface handling, e.g. painting and grinding, cutting, welding and special machining, but some other operations, such as storage and assembly, are also procured from suppliers, although on a small scale. The extent of their use of suppliers varies among the companies and ranges from small-scale procurement to a more significant role in the business. Many suppliers act as independent operators within the supply chain, but some contracted tasks are integrated into the case companies' own production processes. Subcontracted services consist mainly of tasks the manufacturing companies are not able or willing to accomplish themselves, e.g. producing a small product series. The case companies mainly cooperated with only a few (a maximum of 20) local supplier companies. They were eager to cooperate with larger suppliers, but small operators with only a couple of employees were also used in some cases, such as to even out occasional workloads. Table 9 presents the background information of the case companies and their current supplier relations.

TABLE 9.
Background information on the case companies

	COMPANY A	COMPANY B	COMPANY C
COMPANY POSITION	Business unit of a foreign corporation	Local business segment of a global corporation	Business unit of a local company
INDUSTRY	Construction	Engineering and construction	Engineering and construction
TURNOVER	<100 MEUR	>1,600 MEUR	<100 MEUR
NO. OF PERSONNEL	150	5,300	120
CASE UNIT(S)	Manufacturing site with sales	Three service centres and one sales office	Manufacturing site with sales
MAIN PRODUCT CATEGORIES	Construction board	Metal for structures	Metal for structures
EXAMPLES OF CURRENT SERVICE OFFERINGS	Product support and packaging	Training, product support and design	Product support, storage and delivery
EXAMPLES OF POTENTIAL SERVICES	Installation and design	Assembly and storage	Assembly and design
NUMBER OF SUPPLIER PARTNERS	A few	From two to ~20 per unit	About five partners
EXAMPLES OF OPERATIONS PROCURED FROM SUPPLIERS	Product upgrading	Product upgrading and storage	Product upgrading and assembly

Data collection

The research approach is qualitative, and the data were collected from the three companies through interviews and workshops. In Company B, the interviews were carried out in four different units (three service units and one sales unit). In Company C, the interviewees represented a manufacturing site and a service subsidiary. Using a semi-structured interview protocol, a total of 38 interviews were conducted. The interviewees represented personnel from sales, manufacturing, product planning, quality, production and procurement. The interviews were held face-to-face at each person's job location, and they were conducted as individual meetings, except for one interview at Company A, which was conducted with two individuals together. The interviews ranged in length from 30 to 81 minutes, with an average duration of 54 minutes. The interviews were audio-recorded and fully transcribed. Background information on the interviewees is presented in Table 10.

The interview outline included questions related to the following themes: current status of the company's service business, readiness for change within the company, and interactions between the customers and suppliers. In addition, the interview included questions regarding the interviewee and his or her job. As this paper is focused on the theme of supplier interaction, the questions within this theme included: the use of supplier services at the time of the interviews; the requirements of service business transformation for supplier relationships; and challenges regarding supplier relations in service business transformation.

Apart from the main interviews, site visits and manager interviews were carried out to understand the context in which the business takes place. Furthermore, the results of the interviews were discussed in the company workshops, and the workshop results were used as secondary data to increase the validity of our study.

TABLE 10.
Background information on the case companies

	COMPANY A	COMPANY B	COMPANY C
NO. OF INTERVIEWEES	8	19	11
YEARS OF EXPERIENCE IN THE COMPANY	1–9 years (mean, 5 years)	3–32 years (mean, 10 years)	5–16 years (mean, 9 years)
EXAMPLES OF INTERVIEWEES' WORK ASSIGNMENTS	Foreman, production planner, purchasing officer, sales manager	Quality manager, production manager, purchasing officer, sales manager	Managing director, marketing director, purchasing officer, sales agent
DURATION OF THE INTERVIEWS	30–69 min (mean, 45 min)	30–71 min, (mean, 53 min)	50–81 min, (mean, 67 min)

Data analysis

The interview data were content analysed, and the responses were compared across the companies. During the analysis, the transcribed interview data were systematically explored by seeking references (words and sentences) related to the research topics to separate essential information and form a coherent whole. Similar references on the nature of current relationships with the supplier and challenges in the transformation of the business were then classified into descriptive categories to obtain a clear and uniform view of the interview data.

The Results section uses excerpts from the interviews to highlight some key issues, and the findings are discussed on the basis of the themes that emerged from the data, in light of previous literature. The excerpts have been translated from the original language as accurately as possible to maintain the nature of the statements.

Results

Current supplier relationships

At the time of the interviews, the case companies utilised supplier services mainly for upgrading the products they manufactured. The most common operations carried out by the supplier companies were surface handling, e.g. painting and grinding, cutting, welding and special machining. Other subcontracted operations included maintenance and property maintenance. The companies did not procure more advanced services from the suppliers at the time of the interviews. This status of service supplier cooperation is in line with the assumption that the companies were still in the early stages of transformation towards a more service-oriented business.

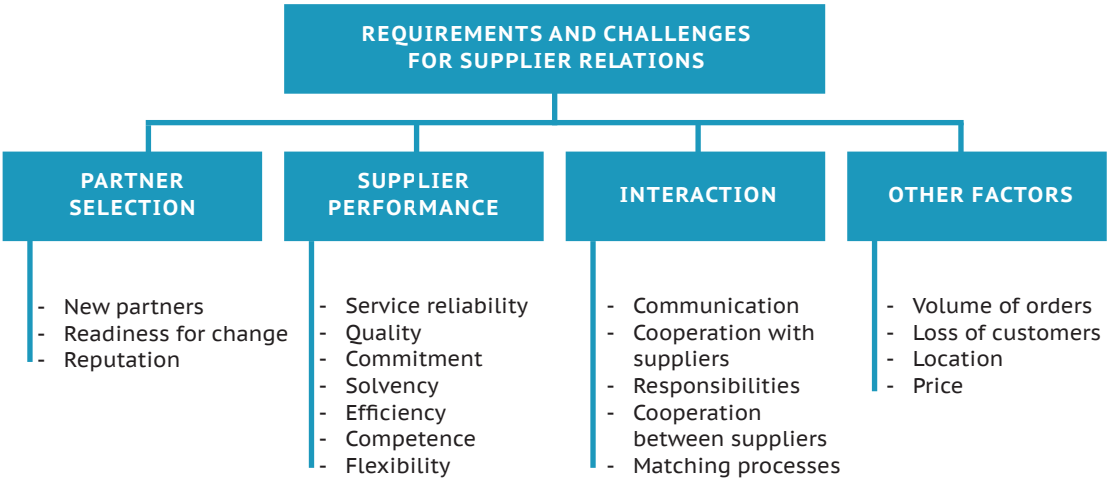
The subcontracted services were mainly tasks that the manufacturing companies were not able or willing to accomplish themselves. For instance, an interviewee from Company C stated: *'It is not profitable to do everything by ourselves, but it is better to acquire know-how where it is available, neither is it profitable to invest in all possible equipment'*. An interviewee from Company B justified subcontracting as follows: *'Subcontractors are used in order to obtain the best solution for the customer in the most beneficial way for the company'*. It was perceived that producing small product batches was not of interest to the company.

The scale of subcontracting varied between the case companies from a few procured operations to the significant role of subcontracting in the company's business. For example, in Company C, a part of the subcontracted operations were considered so important that they were integrated into the company's own production process and realised within the company's premises. However, in the other companies, subcontractors commonly operated as independent players and had a weaker association with the company for production. In Company B, for example, additional product features procured from the suppliers were not marketed extensively due to the limitations in their information system.

The companies mainly cooperated with only a few local supplier companies. The unit of Company B that was said to purchase external services extensively cooperated with approximately 20 suppliers operating in the nearby area. In another unit of the same company, cooperation was implemented only with a couple of local suppliers. The case companies were keener to cooperate with larger suppliers, but small operators with only a couple of employees were also used in some cases, such as to even out occasional workloads.

Interviewees in the case companies characterised various requirements and challenges in dealing with supplier relations at the early phase of service business transformation. A summary of these is illustrated in Figure 8, and key findings are elaborated below.

FIGURE 8.
Requirements and challenges relating to supplier relations.



Requirements of service business transformation for supplier relations

According to the interviewees, supplier relations played a significant role in service business transformation. Wider-scale service provision and cost-effectiveness were seen to require the procurement of operations from suppliers. For example, an interviewee from Company C mentioned that *'. . . if we want some kind of a new method or new service it is pointless to start doing it by ourselves. . .or then the scale needs to be really large'*.

Moving towards a service-oriented business was seen to necessitate companies developing their current supplier relations and supplier performance. Most interviewees also considered that acquiring new suppliers apart from the existing ones would be necessary. An interviewee from Company B clarified the need for new partners by explaining that the current suppliers provided basic upgrades, such as grinding, and would not be able to execute additional services, such as adding hydraulics or electricity to the product. Therefore, changes and developments in the current supplier relationships were considered essential to ensure the ability of the suppliers to fulfil service promises, mutual commitment to cooperation, and expected level of performance with and between different suppliers.

In all three case companies, meeting service promises such as timely delivery, reliability, and quality were considered essential for supplier companies when moving towards a more service-oriented business. An interviewee from Company C rationalised this with the following explanation: *'It is really important, those reliable partners, it is our name on the top after all, and we cannot explain that [supplier X] is late, it is [Company C] that is late, and we need to trust those partners and also demand that they develop their own processes. . .because they are part of these service concepts'*. Interviewees from Companies A and B also shared this opinion and indicated that supplier companies needed to be trust-

worthy and have a good image, since poor performance of the suppliers can ruin the reputation of their company. Customers see the products they have ordered only as the focal company's deliverables.

Interviewees from Companies B and C perceived that the suppliers' commitment to preserving cooperation is required to enable the transformation towards extensive service provision. In addition to long-term relationships, the possibility of responding to the focal company's requests and sufficient production capacity were considered essential. In these two companies, it was also acknowledged that supplier operations needed to be interwoven into the focal company's business, and it was expected that the suppliers understood their role in the production process. An interviewee from Company B described this as follows: *'If we promise a certain schedule for a project, then the supplier needs to be in the same train. That it kind of understands that it is like a car assembly line, that if one part is missing in the middle, then the task is not really progressing there'*.

Furthermore, Companies A and C highlighted fluent cooperation and communication with their suppliers. In addition to working, daily communication and basic information from the suppliers seemed to be lacking. An interviewee representing Company B stated: *'Well, maybe we should get better information on what they are able to do and what services they can provide, and what services we can supply forward'*. Interviewees in these two companies also perceived that working communication channels between the different suppliers, independent of the focal company, are needed. An interviewee representing Company C cited the following reason for this supplier-supplier communication: *'They need to start communicating with each other; it can be that one component goes through several suppliers, and agreeing all the logistics and schedules. . .they need to network with each other more'*. In addition to working communication and cooperation, interviewees from Companies A and C said that the possibility to operate in a wide geographical area was considered important for suppliers when moving towards a more service-oriented business. An interviewee from Company A perceived that suppliers needed to be able to provide services throughout the country while an interviewee from Company C thought that the supplier should also operate internationally in primary market areas.

The interviewees perceived that supplier readiness for wider scale service provision and closer cooperation could be increased, for example, by more open communication and better knowledge of the performance of different operators. It was suggested that closer cooperation could be achieved by integrating operations and reciprocal company visits. However, the most important prerequisite was to obtain a better understanding about the business objectives within their own company. As stated by an interviewee from company B: *'This whole thing would actually start from that we should construct a strategy of what we want to do here. And what we want to do by ourselves and what we want to do with others. It actually is the first step in it; it's not worthwhile to think about a large supplier network if we haven't clearly identified what the need is'*.

Challenges of supplier relations in service business transformation

Transformation towards a service-oriented business was not considered to be trouble-free from the supplier relations viewpoint. The interviewees mentioned several challenges in the development of supplier relations and networks. The main challenges identified were related to quality, delivery reliability, commitment, service ability, communication, responsibility issues and readiness for change towards services.

In all three case companies, sufficient performance quality and delivery reliability in supplier companies were considered remarkable challenges related to supplier relations. The interviewees perceived that finding high-quality, reliable suppliers is essential for a disturbance-free performance and a

positive company image, among other things. This task was considered problematic and, consequently, the number of qualified suppliers was low according to the interviewees. One interviewee from Company C expanded on this by adding that suppliers are commonly smaller companies that are usually not very reliable with product quality and performance, or in terms of keeping their commitments, as compared to larger companies. Furthermore, companies cannot supervise the performance quality of all their suppliers, but they should be able to trust that the performance of the suppliers fulfils the end users' demands. An interviewee representing Company C concluded the quality and reliability challenges by stating: *'Well, always when you sell a product or service under your [company brand] name and other operators also participate, then you are responsible for the suppliers' actions. And there are always risks involved. It is easier to take responsibility for your own work than of operations realised by other companies.'* This interviewee continued: *'Another risk is finding competent suppliers. . .it's quite challenging to find such [supplier] companies whose quality issues and quality systems are at such a level that you can cooperate with them. Frankly speaking, the supplier industry in [our country] is more like small workshop activities'.*

All the case companies also considered supplier commitment important, but they also considered this to be a factor involving uncertainty. Variance in capacity need was seen as a particular problem. In the case of great variance, it is very difficult to cooperate in such a way that commitment for fast delivery times is possible, and that cooperation satisfies both partners. As an interviewee from Company B mentioned: *'. . . of course the [supplier] company that we deal with, it would like to get some kind of a promise how we are going to utilise them because they should reserve capacity for us. And if we don't know it even ourselves, it poses a challenge for sales forecasting'*. The relationships with such suppliers whose services were utilised only occasionally were seen to remain superficial. Furthermore, it was stated that with some suppliers, solvency issues need to be carefully accounted for to avoid problems from potential bankruptcy. Another problematic feature of the turnover of supplier companies is that it causes additional work for customers; thus, they need to audit potential suppliers and induct the selected suppliers into the company's work practices.

Interviewees from all three case companies highlighted challenges regarding the vulnerability of the company's performance due to their dependency on suppliers' service ability. An interviewee from Company C described this problem as follows: *'The greatest risks are these capacity issues. So, will some problems emerge in terms of delivery times? It will have a direct effect then, the system is really sensitive. The more intermediaries or operators involved in the chain, the magnitude [of the problems] multiplies; if everyone comes up with a one-week delay, then the situation suddenly becomes unbearable'*. An interviewee representing Company B also mentioned problems regarding service availability due to customer prioritisation by the supplier companies. Suppliers cooperate with several customers, and they may fill their capacity with other customers' orders, causing problems with the manufacturing companies they are associated with.

In Companies B and C, establishing working communication practices was seen to pose a challenge. A particular problem that emerged was communication between supplier companies, especially if they operated in the same business area. An interviewee from Company B wondered whether cooperation in such situations would be genuine or become slanderous. A solution proposed for enhancing general communication was a shared and compatible information system. However, achieving this was considered problematic, particularly in the case of small supplier companies. A problem that was considered significant when pursuing more open communication was the possibility of draining know-how. An interviewee representing Company C said that *'when cooperating with externals. . .draining out of know-how, competence, and customer contacts. You always have*

to hand over a company's intellectual capital to these externals and there's always the risk that it will be misused'.

Interviewees from Companies A and C considered that issues concerning responsibility can cause problems when dealing with services suppliers. An interviewee from Company A discussed suppliers' attitudes by saying: *'. . . how they are working in conflict situations, are they blaming products or installation. . .they aren't on our payroll anyway. . .there is a risk in these warranty issues about who is responsible; if problems emerge, who is responsible'.*

In Companies A and B, challenges about the suppliers' willingness towards changes in services were highlighted. An interviewee from Company C also touched upon this issue by responding that some suppliers were not willing to develop services when they have proposed some enhancements or investments as a customer company, although these changes would have resulted in improvements such as shorter production times and better sales.

Other problems derived from the transformation towards a more service-oriented business and related to supplier relations included: offending other operators by becoming their competitors, ensuring that logistics are functional, international service delivery, uncertainty regarding pricing, management of supply chain and ensuring reciprocal benefits.

Discussion

Alternative viewpoints to initiating the development of supplier relations

In this study, all three case companies were product manufacturers in the early stages of service business transformation, even though Company C offered slightly more advanced systems than the other two companies. Regardless of their similar progress levels in servitisation, the case companies' perceptions of the initiation of supplier relations differed to a certain degree. For example, interviewees from Company B indicated more commonly than the other companies' interviewees that new partners, or at least changes in the current partners' performance, are required. On the other hand, interviewees from Company C highlighted more commonly than the others the importance of interactions with and between supplier partners. The companies, however, did not really differ in terms of how challenging these issues were perceived by the interviewees. Additionally, interviewees from Company A highlighted the suppliers' operation area more commonly and the need for new partners less commonly than interviewees from the other two companies.

Differences in the perceptions among the case companies can be explained by the companies' varying standpoints regarding service offerings and objectives for service business transformation. For example, in Company C, servitisation and current supplier cooperation are already at a slightly more advanced level, for example, by integrating some suppliers' tasks into the manufacturing company's operations and offering more advanced systems than those of the other case companies. On the other hand, Company B interviewees' perceptions may reflect the company's current effort to expand the service business by upgrading operations. Therefore, initiating supplier relationships can be seen as strongly bounded by the individual companies' situation, mindset and objectives.

However, expressions and stories of the interviewees in all three case companies reflected more or less the front end of servitisation and strong product orientation. The companies' two main worries were locating partners with which to cooperate and the service providers' performance during service delivery. More complex and cooperative issues were rarely mentioned. For example, shared objectives, cooperation in service innovation and development, and cultural fit of the different performers, which are considered important in service provision (e.g., Gulati & Kletter, 2005; Åhlström & Nordin, 2006) were hardly discussed during the interviews.

Overall, this study indicates that companies in the early stages of servitisation still view supplier relationships from the product viewpoint, and compare them with past experiences with suppliers who have participated in product manufacturing or delivery. It seems that more global and comprehensive consideration of different factors involved in successful supplier relationships may require companies to be more advanced in the service business transformation process.

Re-assessing the supplier base to enable service business

According to previous studies, transformation into a service-oriented business requires new types of capabilities to support the customers' actions (Oliva & Kallenberg, 2003; Salonen, 2011). The importance of partner networks increases because it is difficult for the manufacturing company to acquire required new competencies by itself (Kosonen, 2004). In addition, successful service networks have been shown to be significant contributors to customer satisfaction and loyalty (Zähringer et al., 2011).

Interviewees at the case companies perceived that service business transformation would require procurement of additional competencies from suppliers because they lacked know-how or resources. Furthermore, extending service provisions to thoroughly cover the domestic market area or even global markets was perceived to require establishing new supplier relationships and building a wider supplier network. The results of this study indicate that the central requirement for supplier relationships in service business transformation is for the existing relationships to be re-evaluated and possibly modified. The suitability of the established product-centric supplier partners for a service-based business must be assessed and either developed to fit the needs of the new business, or discarded. In the latter case, new suppliers must be invited to tender specifically from the service viewpoint.

Supplier assessment and selection is considered a key factor in integrating suppliers with product development (Hartley et al., 1997; Petersen et al., 2005), which is important to the successful performance of joint projects (Koufteros et al., 2007; Ragatz et al., 2002). However, previous studies have indicated that purchasing service activities differs from that for manufacturing activities, e.g. due to higher uncertainty regarding service outcomes and competencies of potential service providers (Gallouj, 1996). Day and Barksdale (1992) identified four dimensions critical in selecting providers for professional services: perceived provider's experience, expertise and competence; provider's understanding of customer's needs and interests; provider's relationship and communication skills; and provider's likelihood to conform to contractual and administrative requirements. However, Day and Barksdale (1994) state that buyers inexperienced in service buying use slightly different criteria with even unrealistic expectations than experienced buyers when selecting service providers. This study supports this statement by revealing the beginners' selection criteria as centred on suppliers' service reliability and other performance-related issues, forming a narrower viewpoint compared with the previously presented criteria.

Furthermore, while the previous research on servitisation of manufacturing is encouraging regarding the development of supplier relationships, our results have contributed by identifying new research opportunities in supplier base assessments and modifications that are needed to achieve the network's readiness to support the new service business. As new kinds of capabilities are needed from suppliers in the service business, new kinds of supplier assessment models, criteria and methods should also be developed.

Systems for monitoring and controlling service-centric supplier performance

This study shows that servitising manufacturing companies share common worries about their suppliers' ability to operate in line with the manufacturing firm's service promises, and the effect of their performance

quality on the manufacturing company's image. The situation is very complicated for the manufacturing company because a more service-oriented business calls for new competencies and profitability and, therefore, requires cooperation with suppliers; however, poor supplier performance may end up causing the loss of some customer relationships. The three cases in this study revealed evidence of this potential dilemma in supplier network development.

If the suppliers' reliability is considered challenging for the transformation into a service business, as indicated by the findings of this study, by necessity, attention is drawn to the manufacturing firm's own processes and systems for monitoring and controlling the service-oriented supply relationship. In product-centric supply relationships, such monitoring and control takes place as part of the procurement routine as components are inspected and received. The performance and reliability of services, however, cannot be monitored using similar transaction-based routines.

Our findings suggest that development of service-oriented supplier relationships requires that the supplier monitoring and control effort be focused on the service relationship, which requires completely new frameworks, processes and routines. Although various frameworks of service performance exist (e.g., Parasuraman, 2002), few studies detail the way manufacturing firms monitor their suppliers' service performance to enhance their own service capability. Further research to investigate such processes is needed, particularly to learn from the more mature service-oriented manufacturing contexts.

Conclusions

Theoretical contributions

This paper contributes to research on service business transformations and supplier relationships by increasing the available knowledge about the requirements and challenges associated with supplier relations and network development in the early phases of service business transformation. Previous research has revealed that close relationships with suppliers are essential for success in this transformation, for example, due to competencies and resources that are integral for service provision by the manufacturer. However, previous research on service business transformation has focused primarily on the installed base and companies that have already achieved advances in service business. This study focused on companies that deliver low-complexity, high-volume products as components of their customers' value creation process. The topic was approached via an exploratory study carried out by interviewing representatives of three manufacturing companies currently beginning to adopt a more service-oriented business. The themes of this paper have been discussed in previous literature only briefly.

According to the results, transformation into a more service-oriented business requires changes in a manufacturing company's own performance, as well as in its supplier relationships and networks. Supplier development is necessary to obtain competencies and resources required for service provision. The interviewees believed that developing supplier performance is possible with several of the suppliers currently partnered with the company, but both parties must be ready for this process. However, extension of the service business into domains significantly different from the companies' current operations would require a reassessment of the supplier base, possible modification of product-centric supplier relationships towards service-orientation, and the establishment of new supplier contacts. Innovation in both offerings and operations is required from suppliers integrated into the service business, including the ability to fulfil service promises, commitment, flexibility, and adherence to the manufacturing firm's image requirements. Establishing new partnerships as well as developing current ones involves multiple challenges that need to be considered in order to successfully adopt service business transformation. These challenges deal with the same types of topics as the requirements

for supplier relationships, i.e. service reliability, service quality, communication, responsibilities and readiness for change.

A specific contribution of this research is the viewpoint of high-volume manufacturing, instead of the more ordinary service application area of customer-specific installed base solutions. Because high-volume manufacturing may also generate opportunities for high-volume services, its challenges to the resources and capacity of the manufacturing firms is more apparent. Therefore, in such a context, supplier relations and network development are of the utmost importance.

Managerial implications

Supplier relations have been acknowledged as an important part of successfully adopting a service-dominant logic in manufacturing firms. This study encourages managers to activate the development of supplier relationships, in terms of resource sharing, integrative practices, joint processes and shared ways of working, quite early in the service business transformation process. In particular, this study revealed the important role played by the supplier in influencing how manufacturing firms can deliver their service promise, operate flexibly to serve customers' needs and maintain their high-quality image. In the early phase of service business transformation, the manufacturing firm's dependency on the supplier's performance and quality may generate significant risks to customer satisfaction and business benefit. Therefore, in order to avoid common pitfalls, manufacturing firms should pay attention to the suppliers' flexibility and image coherence when establishing new service supply relationships and creating a supplier network.

Limitations and ideas for further research

This study was conducted as a case study based on information gathered from three manufacturing companies in the early stages of service business transformation. Due to the limited number of case companies, the study's results cannot be broadly generalised to other manufacturing companies involved in service business transformation. None of the companies were remarkably more advanced in the transformation process than the others; therefore, it was impossible to assess the influence of progress level on supplier relations and network development properly. Thus, a study involving a larger sample size of companies representing different maturity levels in the service business transformation process would provide more generalizable information and indicate the evolution of perceptions on the topic during the transformation process.

This study focused only on the viewpoint of the manufacturing company and its personnel who were in some way associated with service provision. The interviewees selected for this study were deliberately sought out in an effort to obtain good coverage within each firm and to ensure reliability of the analysis. In order to understand how the suppliers perceive service business transformation of the manufacturing company and its effects on their operations, the viewpoint of the suppliers should also be studied. As previous studies have indicated, due to the divergence between the perceptions of manufacturing companies and suppliers, particularly in more advanced service-oriented manufacturing companies, this type of comparison would be beneficial within companies in the early stages of service business transformation.

References

Ackerman, E., & Martinsuo, M. (2012). Aligning network involvement with service strategy in service operations and innovations. 19th EUROMA European Operations Management Association Conference, 1-5 July, Amsterdam, the Netherlands.

Alam, I., & Perry, C. (2002). A customer-oriented new service development process. Journal of Services Marketing, 16(6), 515-534.

Auramo, J., & Ala-Risku, T. (2005). Challenges for Going Downstream. International Journal of Logistics, 8(4), 333-345.

Baines, T. S., Lightfoot, H. W., Benedettini, O., & Kay, J. M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. Journal of Manufacturing Technology Management, 20(5), 547-567.

Benedettini, O., & Neely, A. (2010). Why do servitized firms fail? 17th EurOMA European Operations Management Association Conference, 6-9 June, Porto, Portugal.

Bikfalvi, A., Lay, G., Maloca, S., & Waser, B. R. (2012). Servitization and networking: large-scale survey findings on product-related services. Service Business, available online, DOI: 10.1007/s11628-012-0145-y.

Brax, S. (2005). A manufacturer becoming service provider – challenges and a paradox. Managing Service Quality, 15(2), 142-155.

Carbonell, P., Rodriguez-Escudero, A. I., & Pujari, D. (2009). Customer involvement in new service development: An examination of antecedents and outcomes. Journal of Product Innovation Management, 26(5), 536-550.

Cohen, M. A., Agrawal, N., & Agrawal, V. (2006). Winning in the aftermarket. Harvard Business Review, 84(5), 129-138.

Day, E., Barksdale, H. C. Jr. (1992). How firms select professional services. Industrial Marketing Management, 21(2), 85-91.

Day, E., & Barksdale, H. C. (1994). Organisational Purchasing of Professional Services: The Process of Selecting Providers. Journal of Business & Industrial Marketing, 9(3), 44-51.

de Brentani, U. (2001). Innovative versus incremental new business services: Different keys for achieving success. Journal of Product Innovation Management, 18(3), 169-187.

Edvardsson, B., Holmlund, M., & Strandvik, T. (2008). Initiation of business relationships in service-dominant settings. Industrial Marketing Management, 37(3), 339-350.

Fitzsimmons, J. A., & Fitzsimmons, M. J. (2008). Service management: operations, strategy, information technology. New York: McGraw-Hill/Irwin.

Gallouj, C. (1997). Asymmetry of information and the service relationship: selection and evaluation of the service provider. International Journal of Service Industry Management, 8(1), 42-64.

Gebauer, H., Edvardsson, B., & Bjurko, M. (2010). The impact of service orientation in corporate culture on business performance in manufacturing companies. Journal of Service Management, 21(2), 237-259.

Gebauer, H., Fleisch, E., & Friedli, T. (2005). Overcoming the service paradox in manufacturing companies. European Management Journal, 23(1), 14-26.

Grönroos, C. (2008). Service logic revisited: Who creates value? And who co-creates? European Business Review, 20(4), 298-314.

Gulati, R. & Kletter, D. (2005). Shrinking core, expanding periphery: The relational architecture of high-performing organisations. California Management Review, 47(3), 77-104.

Hartley, J.L., Zirger, B.J. & Kamath, R.R. (1997). Managing the buyer–supplier interface for on-time performance in product development. Journal of Operations Management, 15, 57–70.

Johnson, M. & Mena, C. (2008). Supply chain management for servitised products: A multi-industry case study. International Journal of Production Economics, 114(1), 27-39.

Kindström, D. (2010). Towards a service-based business model – Key aspects for future competitive advantage. European Management Journal, 28(6), 479-490.

Kosonen, V. (2004). BestServ. Industrial Service Business Strategy. Generic Framework and Case Examples. Helsinki: Technology Industries of Finland.

Koufteros, X.A., Cheng, T.C.E. & Lai, K.H. (2007). ‘‘Black-box” and ‘‘gray-box” supplier integration in product development: antecedents, consequences and the moderating role of firm size. Journal of Operations Management, 25, 847–870.

Kowalkowski, C., Kindström, D., & Witell, L. (2011). Internalisation or externalisation?: Examining organisational arrangements for industrial services. Managing Service Quality, 21(4), 373-391.

Lockett, H., Johnson, M., Evans, S., & Bastl, M. (2011). Product Service Systems and supply network relationships: an exploratory case study. Journal of Manufacturing Technology Management, 22(3), 293-313.

Martinez, V., Bastl, M., Kingston, J., & Evans, S. (2010). Challenges in transforming manufacturing organisations into product-service providers. Journal of Manufacturing Technology Management, 21(4), 449-469.

Martinsuo, M., & Lähdeaho, M. (2011). Industrial companies moving towards service-oriented business: requirements to the supply network. 27th EGOS, European Group for Organisation Studies Colloquium, 7-9 July, Gothenburg, Sweden.

Mathieu, V. (2001a). Product services: from a service supporting the product to a service supporting the client. Journal of Business & Industrial Marketing, 16(1), 39-58.

Mathieu, V. (2001b). Service strategies within the manufacturing sector: benefits, costs and partnership. International Journal of Service Industry Management, 12(5), 451-475.

Matthyssens, P., & Vandenbempt, K. (2008). Moving from basic offerings to value-added solutions: Strategies, barriers and alignment. Industrial Marketing Management, 37(3), 316-328.

Nordin, F. (2004). Managing the process of adopting service logic in collaboration with suppliers. Journal of Change Management, 4(4), 339-350.

Nordin, F. (2006). Outsourcing services in turbulent contexts: Lessons from a multinational systems provider. Leadership & Organisation Development Journal, 27(4), 296-315.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. International Journal of Service Industry Management, 14(2), 160-172.

Parasuraman, A. (2002). Service quality and productivity: a synergistic perspective. Managing Service Quality, 12(1), 6-9.

Paton, R. A., & McLaughlin, S. (2008). Services innovation: Knowledge transfer and the supply chain. European Management Journal, 26(2), 77-83.

Petersen, K.J., Handfield, R.B. & Ragatz, G.L. (2005). Supplier integration into new product development: coordinating product, process, and supply chain design. Journal of Operations Management 23, 371–388.

Quinn, J. B., Doorley, T. L., & Paquette, P. C. (1990). Beyond products: Services-based strategy. Harvard Business Review, 68(2), 58-67.

Ragatz, G.L., Handfield, R.B. & Petersen, K.J. (2002). Benefits associated with supplier integration into new product development under conditions of technology uncertainty. Journal of Business Research, 55, 389-400.

Robinson, T., Clarke-Hill, C. M., & Clarkson, R. (2002). Differentiation through Service: A Perspective from the Commodity Chemicals Sector. Service Industries Journal, 22(3), 149-166.

Salonen, A. (2011). Service transition strategies of industrial manufacturers. Industrial Marketing Management, 40(5), 683-690.

Syson, F., & Perks, H. (2004). New service development: a network perspective. Journal of Services Marketing, 18(4), 255-266.

Turunen, T., & Toivonen, M. (2011). Organising customer-oriented service business in manufacturing. Operations Management Research, 4(1-2), 74-84.

Vargo, S. L., & Lusch, R. F. (2002). Evolving to a new dominant logic for marketing. Journal of Marketing, 68(1), 1-17.

Windahl, C., & Lakemond, N. (2010). Integrated solutions from a service-centered perspective. Applicability and limitations in the capital goods industry. Industrial Marketing Management, 39(8), 1278-1290.

Zähringer, D., Niederberger, J., Blind, K., & Schletz, A. (2011). Revenue creation: business models for product-related services in international markets – the case of Zwick GmbH & Co. KG. Service Industries Journal, 31(4), 629-641.

Åhlström, P., & Nordin, F. (2006). Problems of establishing service supply relationships: Evidence from a high-tech manufacturing company. Journal of Purchasing & Supply Management, 12(2), 75-89.

Part 3.

Servitisation as a strategic transformation

GHOSTS FROM THE PAST: PATH-DEPENDENT EFFECTS ON SERVITISATION

MAX FINNE
SAARA BRAX
MARI TANSKANEN

Abstract

This paper focuses on analysing the causes of challenges companies encounter when trying to servitise. We present a comparative case study of an investment goods manufacturer and a financial solutions provider aiming to broaden their technology-based offerings with value-added services. The literature has described difficulties related to servitisation, but their causes have not been fully explained. Our empirical research on the companies' historical paths revealed challenges that the current servitisation literature could not explain. We utilise the path-dependence approach to identify the development patterns that led the companies to states of operational rigidities, thereby hindering the effective implementation of a servitisation strategy. Our findings show a clear resemblance between the development paths. In lock-in, however, different factors hinder adopting the alternatives. Our conclusion is that early success and very few competitive pressures can impede a service-oriented culture, which together with weakened contact with end users and the lack of established service development processes not only hinder servitisation but can cause a lock-in. Thus, we conclude that the ability of the case companies to undergo the transition depends on their historical paths that have led to focusing on efficient operations, rather than the flexibility required in servitisation. We argue that the path-dependence approach can provide crucial assistance in discovering the causes of operational rigidities, impeding companies' abilities to servitise. Our empirical research provides the structure and an example for the execution of this kind of analysis in studies on servitisation.

Introduction

Servitisation literature discusses manufacturers' transition towards increasing service dominance (Baines et al., 2009; Oliva & Kallenberg, 2003; Wise & Baumgartner, 1999). Adding services that increase the value of the offering is seen as a beneficial way

to differentiate from competitors, to increase sales and margins, and to lower the environmental burden. Broadening the offering is viewed as involving certain benefits, challenges and risks common to companies undergoing the transition. Research on the financial implications of servitisation strategy has shown that manufacturers find it difficult to realise the potential financial benefits services could provide (Gebauer & Friedli, 2005; Neely, 2008). However, the factors causing this have not been fully explained in the literature.

We aim to address the possible causes behind the identified difficulties in realizing the financial benefits from a servitisation strategy by studying structural rigidities in companies. We utilise the path-dependence approach (Arthur, 1989; Sydow et al., 2009) in analysing the causes of organisational rigidities hindering the effective implementation of servitisation strategy. Path dependence is the outcome of a dynamic process illustrating how initial events can lead into a long-term predominance (David, 1985). The path becomes more inflexible over time, thus restricting future choices. While this approach is widely used in other areas of study, its use to understand servitisation is novel. We study empirically the servitisation processes of two case companies by analysing their historical development paths. Through this research, we expect to obtain a better understanding of why some companies find challenges in transitioning towards increasing service dominance. Based on the findings, we develop five propositions on how companies can become bound on a flexibility-restricting path and how this path can hinder their abilities to servitise. Our research question is: How can the historical path of the servitising company partly explain the challenges faced in servitisation?

In this empirical research, we discover causes of challenges in the servitisation process that the current servitisation literature cannot explain. Interviews and discussions with the two case companies emphasise that the prevalent organisational culture and the company's historical developments are key factors in explaining these challenges. Therefore, we have chosen to apply the path-dependence approach in our analysis. Through the empirical analysis, we aim to show how the path-dependence approach can be utilised to discover factors related to companies' historical developments, causing challenges in their current servitisation.

We present a comparative case study of a manufacturer, TechnoCo, and a financial solutions provider, FinanceCo (the names are pseudonyms), both of which have had an offering relying heavily on technology, but due to increasing competitive pressures, have decided to add more advanced services into their offerings. This is partly a novel approach to servitisation, as the current literature discusses broadening the offering mostly from a manufacturer's point of view. However, as FinanceCo's offering is based on IT systems and related high technology, we see that its servitisation can be compared to a manufacturer's.

The case companies became selected for this research because they both face challenges in servitisation induced by their historical development paths. The companies are currently facing pressures to seek new ways to create value for their customers and, hence, are striving to introduce new value-added services. TechnoCo's investment goods industry is experiencing fierce price competition because of an increasing number of competitors and maturing technology. FinanceCo's previously strong market position is endangered by new competitors entering the market as a result of deregulation and other changes in the regulation of the financial services industry. However, both companies are finding broadening their offerings very difficult, and the reasons behind this are linked to the operational rigidities stemming from their previous development paths, established organisational cultures and industry structures (cf. Fixson & Park, 2008).

The paper starts with a literature review on the servitisation of manufacturers. Second,

the literature on path dependence is reviewed. Third, the research methodology of the empirical case study is described. Fourth, the empirical results are presented, starting with case descriptions of both companies and ending with a cross-case analysis. Fifth, the relevance of this empirical research is discussed as well as its limitations, and suggestions for further research given. We conclude the paper by summarising the main contributions and managerial implications.

Literature review

In this section, we analyse the literature streams of the servitisation phenomenon and path-dependence approach to present the body of knowledge. Through our empirical research, we aim to contribute to the former, while the latter is utilised in our analysis as a theoretical approach.

Servitisation of manufacturing companies

The study of the increasing service activities in manufacturing companies began in the late 1980s (Morris & Fuller, 1989; Sanderson et al., 1989; Vandermerwe & Rada, 1988). While at first the focus was on the new types of offerings manufacturers were providing, an early finding was that entering new service areas beyond the traditional repair and spare parts challenged firms with new kinds of requirements (Martin & Horne, 1992; Matthyssens & Vandenbempt, 1998). The shift towards a greater relative amount of services in the total offering and the associated organisational transformation, often referred to as "servitisation" after Vandermerwe and Rada (1988), has become a research stream on its own. While many different terms are used, and not everybody is fond of this term, we use "servitisation" in this sense as a concept because of brevity.

Three main drivers behind the transition to services have been identified: economic rationales, customer needs and differentiation from competitors (Baines et al., 2009; Neely, 2008; Oliva & Kallenberg, 2003). It is argued that services have higher margins than product sales (Anderson et al., 1997) and provide resilience against economic cycles due to stable revenue streams (Cohen et al., 2006). Services are also viewed as increasing the possibilities for differentiation, because they are difficult to imitate, they are less capital intensive, and they enable manufacturers to escape the burden of commoditised product markets (Davies et al., 2006; Davies, 2004; Wise & Baumgartner, 1999). Oliva and Kallenberg (2003) stress the manufacturers' unique competitive advantage in offering installed base (IB) services: lower customer acquisition costs, lower knowledge acquisition costs and lower capital requirements. These are respectively due to the manufacturers' existing customer relationships, acquired knowledge of their own products, and existing equipment and resources needed in servicing the IB of their products.

Servitisation literature generally views broadening the manufacturer's offering by adding services as a reasonable competitive strategy, but related challenges are also identified. In particular, larger manufacturers have realised higher revenues but lower profits when applying this strategy (Gebauer & Friedli, 2005; Neely, 2008). This phenomenon is termed "service paradox in manufacturing companies" (Gebauer et al., 2005). The reasons given for the challenges in the transition are, among others, differing opinions within the company on the economic potential of services and the lack of qualified resources for service provision. In addition, weaknesses in strategic decision-making may lead manufacturers to hesitate in broadening the offering. However, the reasons have not been fully explained, and we argue that further research into this topic is needed.

The challenges in practical execution of servitisation strategy have been analysed in recent literature (e.g., He & Lai, 2012; Kurata & Nam, 2010).The manufacturer needs to be able to motivate its customers for service co-production, manage information effectively and in new ways, change management's thinking, understand customers'

business context, motivate customers to the relationship and alter the organisational culture (Brax, 2005). Correspondingly, Neely (2008) sees that manufacturers who increase the proportion of services in their offerings should also focus on shifting the mindset, transforming relationships from transactional to relational and developing service offerings meeting customer needs. The manufacturers need to be able to differentiate between their manufacturing and service operations while still developing an integrated approach towards their customers (Johansson & Olhager, 2004, 2006). As servitisation increases the complexity of the offering, manufacturers have to be able to manage complex networks of product and service suppliers (Johnson & Mena, 2008; Saccani et al., 2007). Thus, supply chain integration capabilities become essential (Droge et al., 2012). Operational integration is especially valuable in the provision of product-related services and strategic integration in providing services supporting customer actions (He & Lai, 2012). Manufacturers may be relatively slow and cautious in executing the transition, because they have doubts about the economic potential services can provide, or view service business as extending beyond the scope of their competencies (Oliva & Kallenberg, 2003).

Due to the managerial focus of prevalent servitisation literature, the transition to services is presented as involving certain benefits, challenges and risks, common to manufacturers undergoing the process. Research on servitisation needs further consideration of the context of the servitising manufacturer. Some recent studies have moved the focus towards analysing the influence of the organisational environment on servitisation (cf. Finne & Soinio, 2010; Finne & Turunen 2011; Gebauer, 2008; Neu & Brown, 2005). Nevertheless, there is a dearth of research describing the influence of the company's historical context, namely its development paths, on its servitisation process. Heikkilä and Brax (2010) concluded that when studying the phenomenon within a service provider, the concept of path dependence may be useful in understanding the barriers companies face in this process. While they focused on exploring Mathieu's (2001) service manoeuvres, the emphasis of this paper is on exploring the effects of the historical development paths on servitisation.

Organisational adaptation and path dependence

Literature on path dependence (Arthur, 1989; David, 1985; Sydow et al., 2009) discusses dynamic historical development processes, and the events that occur and the decisions that are made shape the outcomes of these processes. Usually, the focus lies within the competition between different technologies (e.g., Hellström et al., 2013; Tripsas & Gavetti, 2000), but some authors (e.g., Li et al., 2010; Sarkis et al., 2011) analyse industry and organisational development paths that are in the area of interest in this paper. The path-dependence view posits that a firm's future directions depend on its current position and possibilities ahead. The current position more or less depends on the paths the company has travelled previously (Teece et al., 1997).

The path-dependence concept and the notion that history matters refer to dynamic evolutionary processes that are contingent and non-reversible (David, 2001). A path-dependent sequence of events is one in which the outcome or major parts of it can be explained by early temporally separate changes shaped by chance (Arthur, 1989; Arthur et al., 1987; David, 1985). Furthermore, the equilibrium of the process may be driven to a state with inferior long-run potential (Arthur, 1989). These kinds of dynamic processes are called non-ergodic and do not converge simultaneously to a fixed point distribution of outcomes (David 1985). They are historical by nature. Arthur et al. (1987) studied self-reinforcing path-dependent systems with multiple asymptotic outcomes and showed that these kinds of systems do settle down. Noteworthy is that the equilibrium of these systems will be non-flexible; other states of equilibrium are locked out (Arthur, 1989).

Path-dependent processes have four key characteristics: They are non-predictable, non-flexible and non-ergodic, and the path is inefficient. A process is predictable if the outcome can be predetermined and flexible if influencing the incentives always affects future choices (Arthur, 1989). According to Arthur (1989), if different sequences of historical events always lead to the same outcome, a process is ergodic; i.e. history does not matter. Path efficiency means that equal amounts of development efforts directed alternatively would not have led to a better outcome (Arthur, 1989). As an example of path dependency, a management initiative decision may have been based on just an intuition in the first place, but its implementation might lead the company to become locked-in, which further encourages additional investments directed towards enforcing the aims of the initiative (Sarkis et al., 2011). These kinds of developments are typical of technologies with increasing returns (Arthur, 1989; Teece et al., 1997), because they tend to lead to self-reinforcing market dominance.

Under what kinds of circumstances are organisations path dependent? Historical events limit the future choices of institutions, because experiencing history together gives rise to common expectations of the future, efficiency requirements cause information channels and information-processing structures to become rigid, and pressures to maintain consistency within large and complex human organisations result in constraints of choices through established routines (David, 1994; Henderson & Clarke, 1990). Path-dependent processes require, for example, technological interrelatedness, scale economics or irreversibilities caused by learning and habituation (David, 1985). Growth and profitability will lead to augmented resources in an organisation and success in a path-dependent evolvement path. Routines are developed to sustain continuity of the success (Teece et al., 1997). In addition, organisations are more rigid and less able to adapt to changing conditions than technologies (David, 1994). On the other hand, Sydow et al. (2009) suggest that it is more the characteristics of the industry than those of the organisation that bring about path dependence and lock-in (cf. also Teece et al., 1997).

Path dependence develops gradually. According to Sydow et al. (2009), the development of an organisational path has three phases: In phase I, the Pre-formation phase, possible choices are abundant and actions cover a broad scope. The outcomes of actions are unpredictable and they may lead to a self-reinforcing process. The start of this process after a critical event ends the first phase. In phase II, the Formation phase, the dynamics of the self-reinforcing process likely bring up a dominant action pattern and the whole process becomes more and more irreversible. The range of choices narrows, but decision processes do not yet fully converge into a fixed point distribution. When the dominant decision patterns become fixed and deterministic, the process becomes bound to a path. The process is now transitioned to phase III, Lock-in. The flexibility is lost, which makes adopting better alternatives practically impossible. This is due to high switching costs, sunk costs, escalating commitment, structural inertia, etc. Noteworthy is that historical developments shape possible directions also in the Pre-formation phase (Sydow et al., 2009).

Crouch and Farrell (2004, p. 6) address the key shortcoming of path dependence by arguing that it "cannot strictly speaking be used to address actors coping with changes to their environment, because it does not explicitly model that possibility." They argue that to cope with situations in which actors are able to search for alternative paths with a real chance of success, the ways in which trajectories interact with exogenous change need to be considered, as such possibilities do occur in practice. We agree with this view, assuming a moderate viewpoint in which a lock-in is considered the most unfavourable and costly to resolve the situation for an organisation; however, such a turn is possible to carry out. For instance, it seems that, by

allying with Microsoft, the mobile communications manufacturer, Nokia, has found a way out from a lock-in situation by abandoning its earlier technical platform choices of Symbian and its successor, MeeGo, for the Windows platform in its smartphones. However, this resolution has been extremely expensive for Nokia, and its success remains to be seen in the future. In this research, we utilise the division of path dependence by Sydow et al. (2009) to present how the path dependencies came about in the cases of TechnoCo and FinanceCo. Accordingly, the developments in the cases are structured into Pre-formation, Formation, and Lock-in phases. Next, we will present the methodology of the empirical case study.

Methodology

Research design and case selection

This research is designed as a comparative case study of two companies. TechnoCo is an original equipment manufacturer with an extensive service portfolio. Its core product studied here is an investment good used in various industrial applications from transportation to pumps and paper mills to improve their operational efficiency. FinanceCo provides its institutional clients with integrated solutions consisting of a payment instrument as the core product and supporting services bundled into the offering that relies heavily on IT systems. Despite the fact that the finance sector is considered a service industry, this company has been characterised as product-centric in focusing on the developed technical systems. Thus, we consider that FinanceCo is also undergoing a major shift towards service dominance in its business logic, a shift identical to those servitisation processes normally seen in manufacturing companies.

The two case companies have been facing increasing competitive pressures and try to respond by offering more services that assist customers in increasing the benefits that the core offering provides. Case research is particularly suitable for studying issues that concern company strategy and when the nature of the study is theory building or persuasive, rather than theory testing (Beach et al., 2001; Eisenhardt, 1989; Yin, 1994), which is the situation in this research.

We aimed to study companies operating in different kinds of environments, but having similarities in development patterns regarding possible path dependencies. These two companies became part of this research after being first studied as part of different research projects concerning servitisation (primary analysis round), and later compared for the current study (secondary analysis round). These primary round research projects sought ways to facilitate servitisation, and the primary single-case analyses studied: a) the feasibility of improving the service supply chain of TechnoCo; and b) the organisational prerequisites for extending the current service portfolio of FinanceCo. In these analyses, the companies were diagnosed as suffering from severe challenges in attempting further servitisation. The second author identified these as possible signs of strategic persistency or organisational rigidity, noting the linkage with the work by Sydow et al. (2009), and introduced the idea of utilising path dependence as a theoretical framework for secondary analysis. Therefore, in contrast to typical theoretical sampling in which research design directs case selection criteria (cf. Corbin & Strauss, 2008; Miles & Hubermann, 1984; Yin, 1994), the sampling method was abductive (cf. Niiniluoto, 1999) and "purposeful" in the sense that initial case findings pointed towards the current research problem. The flexibility of case studies allows this kind of change and pursuing alternative research topics other than those originally planned, as well as reusing and combining data sets originally gathered for another purpose (Beach et al., 2001).

This paper focuses on the secondary analysis round only, as the primary round single-case analyses have been reported elsewhere. The research design is a retrospective cross-sectional study (cf. Voss et al., 2002), i.e. 'paths' were traced based on comparisons between the information provided by the interviewed company staff

and the available documents and materials, first within, then between cases.

Data collection

Both cases focused on the main offering of the companies. TechnoCo's main product and related services were studied from their introduction in the 1970s until the present. FinanceCo developed the first product in the 1960s. Because the two data sets were gathered independently from each other, there are some differences in the data gathering protocols. Still, the comparative analysis presented in this paper is based on an in-depth analysis of rich qualitative data sets; thus, these differences are not likely to influence the conclusions. Moreover, the data in both cases was collected, and the primary analysis conducted without prior assumptions of path dependence in TechnoCo by the first author and in FinanceCo by the third author.

Altogether, 27 thematic interviews lasting 30 to 120 minutes were conducted at TechnoCo and its four customers, of which 16 were recorded. At FinanceCo, 22 interviews lasting 60 to 120 minutes were done; all were recorded, all business units were represented and no customers were interviewed. Management, experts and other key persons were chosen as informants with the help of the companies in both cases. After each interview, the researcher wrote a summary report that was used as material for further analyses. Overviews of the TechnoCo interviews were sent to the interviewees to validate the contents. While interviewing, the researcher at TechnoCo also spent eight months in total observing the business unit on-site. Both companies provided internal documents and presentation materials. These and public information, such as annual reports, press releases and the company websites, were utilised to triangulate data whenever possible.

Structuring the process-tracing analysis

The comparative analysis of the two data sets was based on the generic principles of pattern-matching, explanation-building and program-logic modelling following Yin (1994). The analysis of the organisational paths within both cases was carried out as suggested by Sydow et al. (2009): the analysis involves three parts that cover the path-dependent process in a reverse order. First, a strategic persistence or operational rigidity within the organisation is identified. This has to negatively affect the organisation in the long run. Second, the self-reinforcing mechanism is identified and reconstructed. Third, the triggering event that started the process is identified, as well as the point (critical juncture) in which the self-reinforcing developments started (Sydow et al., 2009). This sequential structure owing to path dependence theory, i.e. that a triggering event that leads to a self-reinforcing mechanism generates a strategic persistence, is the program logic that the patterns and explanations were compared against.

For the sake of clarity and readability, the findings are not reported in the same reverse order as the analysis, but in chronological order. To compare the cases, we use a cross-case analysis to search for similarities and differences in the case companies' historical paths (cf. Miles & Huberman, 1984). By contrasting the cases with process-tracing (George & Bennet, 2005), we identify the significant steps and the prevailing conditions in the historical development processes. In the next section, the development paths are reconstructed using the three phases by Sydow et al. (1999) - Pre-formation, Formation, and Lock-in – first for each case company separately and then comparing the cases. To see the formation of path dependence in the cases is crucial to understanding the current challenges the companies are facing in servitisation.

Case TechnoCo: Investment goods manufacturer's path to lock-in

This section describes the developments that led the investment goods manufacturer, TechnoCo, to a situation in which it has great difficulties in servitising and is, thereby, locked-in on a path that has indeed brought

great success, but currently is hindering the company's abilities to respond to a changing competitive situation.

Pre-formation phase

In the early 1970s, TechnoCo started manufacturing investment goods used in various industrial processes to control the processes and improve their efficiency. The products were based on new innovative technology. At that time, the competition was very limited; there were only two or three manufacturers globally who could deliver products of similar technology. TechnoCo manufactured the products for each project separately instead of using mass production. The project deliveries contained various kinds of services to enable the proper functioning of the devices as well as optimizing end users' production efficiency. The biggest customer segments in the beginning were the transportation sector and paper and pulp industry.

A vast gap existed in understanding the new technology between TechnoCo and its possible customers in the early years. Accordingly, the company soon developed advanced service operations to enable its customers to integrate the products into their processes, fully utilise the potential of the new technology and maximise the uptime. The company started giving end-user service engineers training lasting several days on how to service the products. There were no external service providers in the market, simply because no other company had enough expertise and knowledge about the technology on which the products were based.

At this phase, possible choices for future actions were abundant for TechnoCo, which was to change due to management's decision to transform the operational model. During the first few years, the demand for the new products experienced strong growth, and the production volumes increased exponentially. Therefore, TechnoCo changed its manufacturing operations from project-based to mass production by the end of 1970s, which enabled the company to rapidly increase production and, thereby, business.

Formation phase

The production volumes and revenues of TechnoCo grew rapidly: from 1986 to 1996, the production volumes quadrupled and the sales in 2000 were 50 times the number in 1981. Efficient production was emphasised and development efforts were concentrated on product features. Accordingly, the personnel assumed a product-centric culture. Service provision was viewed as ancillary to the product sales and manufacturing.

In 1985, product family Generation3 (the name is a pseudonym) was introduced, which represented a major shift in product design. Generation3 included a shift from analogue to digital technology, and it involved a processor that took care of all of the control functions. Regarding TechnoCo's future developments, the most significant change was the product's modular structure. The modularity made it possible to move many of the service tasks from onsite to back-office, which later became an enabler for a supply chain structure change.

Further development of the product technology enabled TechnoCo's products to become smaller in size and significantly less expensive. At the same time, end users and other downstream parties in the market gained a greater understanding of the technology, its potential benefits, and the possibility of using it in their own processes. Some end users started to view TechnoCo's products more as commodities, and required the products to become integrated into more strategic equipment provided by other companies acting as systems integrators. In these situations, the delivery channel of TechnoCo was changed from direct to indirect.

TechnoCo was at this phase firmly on a track in which success in main business areas was affecting the company's future decisions and, hence, the firm's possible choices started to become limited. The systems integrators and

other customers in the indirect delivery channel provided TechnoCo with more constant orders and predictable business, as the customers were themselves manufacturing in mass production mode. After carefully designing which subassemblies to use, the systems integrators usually made long contracts with their suppliers, including TechnoCo. This made systems integrator customers attractive to the company. The increasing importance of the indirect channel also contributed to the growth of TechnoCo's development efforts directed at the indirect channel. Market dynamics together with TechnoCo's development efforts led to the further increase in importance of the indirect delivery channel.

Lock-in

The importance of the indirect delivery channel for TechnoCo has increased significantly. Currently, approximately 80% of its product sales go through indirect channels. In indirect channels, TechnoCo is transitioned upstream in the supply chain, causing it to lose direct contact with end users and visibility of the IB of its products. This has posed significant challenges for TechnoCo in trying to effectively manage the services related to its products and has forced the service operations from a proactive mode to mostly reacting to service orders.

Some integrators in the indirect channel are reluctant to share IB information with TechnoCo, which makes it practically impossible for the company to proactively service its IB in indirect channels. This is because the integrators usually see the firm as a competitor in service operations, as the company is renowned for its advanced service operations in the end user segment. Because of the aforementioned reasons, the company has found servitising extremely challenging in the current situation with indirect channels.

Case FinanceCo: Financial solutions provider's path to lock-in

This section details the phases of the process leading the financial solutions provider, FinanceCo, to a lock-in situation, in which its abilities to servitise are significantly hindered by operational and organisational rigidities caused by the process.

Pre-formation phase

FinanceCo started its business in the 1960s by bringing an innovative payment solution to the market. The owners of the organisation were significant players in the financial industry, which enabled the company to identify emerging customer needs. The payment solution addressed the needs of banks and business owners to centralise payment operations for operational efficiency and the convenience of end users. It was based on new technology enabling efficient information management and verification. The solution consisted of a payment instrument as the core product and various supporting services enabling business owners, banks and end users to capture the total value of the core technology. From early on, the customers emphasised the service provider's reliability, risk management capabilities and cost efficient operations.

FinanceCo's offering proved to provide significant value in the financial services market as the business grew rapidly and customers began to ask the company for even more efficient payment services. In its key market areas, the newborn organisation could establish a very strong market position.

Most of the services were system-intensive by nature and required continuous development of the information systems. At the start, they centred on reliability and risk management; for example, FinanceCo offered services for monitoring payments. The decision to tightly integrate services with the core offering started to push FinanceCo onto a course on which its possibilities to decide on future actions were slowly starting to decline.

Formation phase

Other payment instruments were added to the company's portfolio in the 1970s and

1980s. They included instruments targeted towards corporate users, instruments for restaurant and cafeteria payments, as well as instruments for widely applicable cross-border payments. These instruments can be viewed as variants of the original product, since they relied on the same IT infrastructure, operation logic and similar physical good; only the purpose of use was slightly different. Efficiency providing scale economics and reliable operations were still the key success factors of the market.

During these decades, the market remained particularly favourable to FinanceCo with only a few competitors achieving minor market shares in payment solutions in the main markets. Therefore, FinanceCo concentrated on this business area, building on its existing strengths and successful products. The company had achieved strong capabilities in relation to the core technologies, which were also utilised to provide encompassing services, such as issuing the payment instrument, management and verification of financial transactions, credit monitoring, billing, customer and technical support, and various kinds of reporting services. These services were bundled into the offering in addition to the physical good, and the company offered its clients a full-service package. This further reinforced the developments, limiting the company's possibilities to decide otherwise, for instance, to unbundle the offering.

The stable situation with moderate competitive pressures favoured designing comprehensive service packages to fulfil different aspects of customer needs. With its innovative solutions, FinanceCo was able to offer a wide range of competitive payment services, corresponding to customers' service requirements.

Lock-in

Offering services as an integrated solution type of bundle directed FinanceCo's investments to develop the offering as a whole. From the 1990s onward, the business environment changed: new specialist competitors entered the market with offerings targeted at narrower customer needs compared to the broader offering of FinanceCo. In addition, the customers realised the potential of taking care of the core service themselves: they got more accessibility to end-customer information but also responsibility. Finally, the regulation of the industry faced a major change. The main market areas of FinanceCo transitioned between 2008 and 2010 to the Single European Payments Area (SEPA), which aimed to improve the overall financial efficiency by creating a market with unified regulations.

FinanceCo currently experiences challenges in the productisation of its services, and its strategy does not entirely support the intensification of the service culture. In particular, the integrated nature of the company's offering significantly hinders the possibilities to offer additional services as value-added elements to the core offering. As a result of the challenges, proactive service operations are difficult to manage in this changing market situation. This undermines FinanceCo's attempt to react to the changed competitive situation by introducing new services, thereby servitising.

In 2006, FinanceCo bought a company with a promising payment solution targeted at corporate customers. The supply chain regarding this product is similar to FinanceCo's supply chain earlier: it has direct contact with customers, whereas currently it is mainly operating as a supplier of banks who control customer contact. Currently, resources to develop this product are lacking because the focus is on other products. A possible spinoff has been discussed.

We summarise the findings from the path-dependent processes of both TechnoCo and FinanceCo in Table 11. These processes are structured as follows. The Pre-formation phase ends after a critical event that starts the Formation phase. Self-reinforcing processes enforce path-dependent developments in the Formation phase. The companies find servitising very difficult in the Lock-in phase

TABLE 11.
Summary of case findings: the development of the organisational paths

	TECHNOCO	FINANCECO
CORE OFFERING	**INVESTMENT GOODS**	**FINANCIAL SOLUTIONS**
Phase I: Pre-formation	• Integrated project deliveries • Very little competition • The company's superior product technology • High demand for the innovative products • Rapid growth of production volumes	• Need for centralised payment solutions • Very little competition • Company able to offer innovative services • Increasing demand for payment services
Critical event	Move into mass production	Focusing on payment instrument as core offering
Phase II: Formation	• Success in product sales • Development efforts concentrated on products • Personnel assume product-centric view • Products become modular, smaller and less expensive • Customers require products to be integrated into more strategic equipment • Indirect delivery channel formed	• Customers require integrated service bundles • Aim for full-service portfolio designed around the payment instrument • Success in innovative payment methods and operations • Cost-effective service package
Self-reinforcing process	a) Sales through indirect delivery channel grow -> the channel becomes more attractive -> more investments to develop the channel b) Product sales grow -> product sales become more attractive -> more development concentrated on products -> product-centric culture	Services offered as a service bundle -> investments to develop the offering as a whole -> internal operations fostered while customer-centric culture undeveloped -> difficulty adding separate services to the offering according to customer needs
Phase III: Lock-in	• Majority of product sales through indirect channels • Visibility to installed base lost • Reactive service operations • Product-centric culture	• Services sold mainly as integrated offerings • Reactive service operations • Organisational culture not particularly service-oriented
Adopting better alternatives hindered by	• End user contacts controlled by integrators • Integrators reluctant to share information • Personnel's assumed product-centric view	• Undeveloped internal structures to support service productisation and unbundling the offering • More competitors offering parts of the service offering • Customers able to carry out core services themselves

because of certain circumstances that hinder their possibilities of success.

Cross-case analysis

In this section, we compare the development paths of the two empirical cases. The paths that led TechnoCo and FinanceCo to Lock-in resemble each other with minor differences. However, the factors hindering the adoption of better alternatives in Lock-in are clearly different. Our results show that both companies were forced to start with an integrated offering built around an innovative core. At the Pre-formation phase, very few competitive pressures were present, and there was high demand for the companies' offerings (see Table 11). This was because TechnoCo offered products with very advanced technology in an oligopoly market, whereas FinanceCo had a particularly favourable situation in important market areas with its innovative payment solution. TechnoCo's production volumes grew rapidly, and the company decided to move into mass production, which ended the Pre-formation phase. Respectively, FinanceCo's decision to focus on the payment instrument as the core offering acted as the critical event ending the Pre-formation.

Therefore, we propose:

Proposition 1: In conditions characterised by a lack of competitive pressures and success in technology-based offerings, servitised firms become prone to making focused decisions that can become critical events and lead to the formation of a self-reinforcing process.

In the Formation phase, the companies concentrated on developing their core offerings, which led the companies to paths of self-reinforcing processes. FinanceCo's customers required integrated service bundles, and the company began developing a service portfolio around the payment instrument. It focused on developing the service package as a whole to become more cost-effective. TechnoCo's developments were concentrated on the investment good, and as a result, the personnel started to view the company's offering from a product-centric viewpoint. The development of product technology and the change in customer requirements gave birth to the indirect delivery channel. Both companies continued experiencing success with their offerings.

The self-reinforcing processes TechnoCo and FinanceCo went through led them to situations in which future choices were limited. As TechnoCo's sales volumes through the indirect delivery channel grew, the channel gained importance and the company invested more resources to develop this channel, which led to a further increase in indirect sales. A similar pattern took place in product sales. Selling products became more attractive in respect to offering services, when sales grew rapidly. Development efforts were concentrated more on products, and the personnel assumed a product-centric view; hence, product sales were seen as even more attractive. FinanceCo offered its system-intensive services as a bundle and developed the offering as a whole. The focus was more on internal operations at the expense of customer-centricity. Accordingly, the company experienced challenges in trying to offer customers separate services according to their needs, which further strengthened the orientation to offer bundled services. Based on the above-described logic, we argue:

Proposition 2a: The success of servitised companies in the Formation phase drives optimisation based on current conditions and prevents awareness of lost flexibility.

Proposition 2b: Emphasis on the technical core of the offering and a focus on internal efficiency may lead to organisational conditions or supply chain structures not supporting servitisation.

In the Lock-in phase, the companies are facing increasing pressures to react to the changing conditions with tightening competition. They are trying to differentiate themselves through servitising, which appears rather difficult. In this phase, most of TechnoCo's sales go through indirect channels, which means that the visibility to the installed base in these channels is lost and the company is in reac-

tive service operations. FinanceCo for its part is delivering mainly integrated offerings, and its service operations are reactive as well. In addition, the prevailing culture of both companies is not particularly service-oriented. Both companies experience broadening the offering with more advanced services as rather challenging. For TechnoCo, this is due to the integrators controlling end-user contacts and unwilling to share information with the company, as well as due to personnel's product-centric view. For FinanceCo, the main hindrances are internal structures not optimally supporting new service development and productisation, in addition to increasing competition by competitors offering parts of the total offering and customers carrying out services by themselves. As a result of the situation that TechnoCo and FinanceCo are in, in the Lock-in phase, the companies find servitisation costly and requiring profound changes in organisational capabilities. Accordingly, we develop the final propositions:

Proposition 3: Companies realise they are trapped in lock-in only after changing conditions introduce pressures to alter strategy, e.g. to servitise, which is hindered by lost flexibility.

Proposition 4: A product-centric culture, weakened contact with end users and a lack of established service development processes restrict companies' alternatives to pursue a servitisation strategy and can cause a lock-in.

Discussion

Our research shows that when analysing servitisation, utilising the path-dependence approach (David, 1985; Sydow et al., 2009; Teece et al., 1997) can increase our understanding on the possible challenges stemming from the historical developments the companies have gone through. In addition, the historical development paths can be a major source of rigidities hindering successful servitisation. The study used the three-phase analysis of process-tracing suggested by Sydow et al. (2009). Following the abductive logic of reasoning, this retrospective analysis first identifies the effect and traces back to identify the best explanation (Niiniluoto, 1999). These three phases, Pre-formation, Formation and Lock-in, revealed the past critical events and associated reinforcing mechanisms of the studied companies, and the resulting conditions hindering the adoption of better alternatives and escaping lock-in.

In implementing a servitisation strategy, companies add services to broaden their total offering (cf. Baines et al., 2009; Oliva & Kallenberg, 2003; Wise & Baumgartner, 1999). This study demonstrates that historical paths strongly influence the ability of companies to servitise. Their early success and relative lack of competition were critically shaping the prevailing culture in both of our case companies (cf. proposition 1), and at the same time, their success prevented the companies from seeing the loss of flexibility (cf. proposition 2a). This, together with developing product technology in the case of TechnoCo, and customers' requiring integrated offerings in the case of FinanceCo, caused the companies to go through a self-reinforcing process that ended up in a lock-in situation (cf. Arthur, 1989; Sydow et al., 2009), in which possible future choices regarding servitisation were very limited. Accordingly, the apparent challenges of the companies to broaden their offerings with more advanced services can be explained through their historical development paths and the associated lock-in, which is novel to the servitisation literature.

Our findings reflect the relative controversy between highly efficient operations and organisational flexibility. In the Formation phase, TechnoCo concentrated on improving the efficiency of its manufacturing, while FinanceCo fostered internal operations to enhance the cost efficiency of its core offering. When made, these decisions seemed purely operational (cf. proposition 2a), even though they had strategic implications in the long run. Namely, emphasising efficiency was the major cause of operational and organisational rigidities (cf. proposition 2b). The resultant challenges were realised only when the companies faced changing market conditions, requiring them to change their strategies to

incorporate value-added services (cf. proposition 3). The developments can be contrasted with those of the earlier mentioned mobile phone manufacturer, Nokia. The company dominated the mobile phone industry for years with efficiency-focused operations, but ended up struggling with adapting to new market situations introduced by the rival platforms, Apple and Android. As servitisation strategy directly implies changed offerings and, thus, the requirement for organisational flexibility, our findings indicate that servitisation might better suit companies leaning more towards flexibility than efficiency. This could partly explain the greater challenges of larger manufacturers compared to smaller ones in realising the financial benefits of servitisation (Neely, 2008).

The case of TechnoCo also shows how changing the product's architecture can shape industry and supply chain structures. Hence, our study adds to the findings of Fixson and Park (2008), who studied the links between product architecture, innovation and horizontal industry structure without considering the vertical structure. The changes in the integrators' equipment included TechnoCo's product, transforming the company from a partial competitor to a supplier of the integrators. Our findings show how the changes in the integrators' equipment contributed to the development of structural rigidities, decreasing TechnoCo's abilities to provide services. To overcome these effects, TechnoCo would need to better integrate into the supply chain with the integrators (cf. He & Lai, 2012) who are reluctant to do so, because they do not see any attached benefits for their business.

In addition to the lost contact with end users, a product-centric culture and the lack of established service development processes not only hinder servitisation but can cause lock-in (cf. proposition 4). When broadening the offering by adding more services, we foresee that the cultural effects and prevailing mindset induced by the historical development paths need to be considered. In addition, the case of FinanceCo demonstrates the importance of developing internal structures supporting service productisation. However, we encourage further empirical research to explicitly understand the effects of the above-mentioned factors on servitisation in different circumstances.

As this research is based on two company cases with one manufacturer and one financial service provider, generalisations to other industries and operational environments should be avoided. Accordingly, we encourage further research on how path dependencies affect the servitisation of companies in different countries and industries. Despite this limitation, we see that this in-depth research gives new insights into how companies' historical development paths can affect the attempts to broaden the offering to incorporate more value-added services.

Conclusion

Servitisation strategy is pursued by many companies in developed economies as a response to changing market dynamics, such as the increasing cost competition from Asian competitors. Despite a growing knowledge base, the challenges faced by servitising companies have not been fully explained. We have discovered challenges stemming from the historical development paths in our empirical research covering two companies that offer high-technology-based offerings. Based on our findings, we have developed five propositions on how companies can become bound on a path restricting flexibility and how this path can hinder their servitisation attempts. Early success and the relative lack of competition have led the companies on a path of focusing on internal aspects such as cost-efficient operations. These paths have shaped the companies' organisational cultures, eventually ending in lock-in situations for both, in which servitisation is difficult and costly because of various organisational rigidities.

Our results are of value for managers of companies aiming to broaden their offerings with services. Understanding the role of opera-

tional rigidities is crucial when considering the possible hindrances of pursuing a servitisation strategy. Managers need to evaluate whether it is possible and profitable to aim for removing these kinds of barriers in order to servitise, or if it would be better for the company to choose a different kind of strategy. In addition, it is essential to understand the origins and development mechanisms of the operational rigidities to avoid leading their companies into such situations.

Our study shows how utilising the path-dependence approach can increase our understanding of the challenges of servitising companies. Sometimes, successful development paths can cause companies to lose the flexibility needed for strategic changes such as servitisation, which eventually will undermine their capabilities to adapt to changes in the marketplace. Therefore, extended phases of success and the seemingly operational decisions to focus on efficiency may be the initial root cause of failure in such situations. In addition, our case of the investment goods manufacturer illustrates the effects that changing the product architecture can have on the supply chain structure. As the other case involves a financial solutions provider, we encourage further research on the effects of path-dependent processes on servitisation in other industries and environments.

References

Anderson, E.W., Fornell, C. &Rust, R.T. (1997). Customer satisfaction, productivity, and profitability: Differences between goods and services. Marketing Science, 16 (2), 129-145.

Arthur, W.B. (1989). Competing technologies, increasing returns, and lock-in by historical events. The Economic Journal, 99 (March), 116-131.

Arthur, W.B., Ermoliev, Yu.M. & Kaniovski, Yu.M. (1987). Path-dependent processes and the emergence of macro-structure. European Journal of Operational Research, 30 (3), 294-303.

Baines, T.S., Lightfoot, H.W., Benedettini, O. & Kay, J.M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. Journal of Manufacturing Technology Management, 20 (5), 547-567.

Beach, R., Muhlemann, A. P., Price, D. H. R., Paterson A. & Sharp, J. A. (2001). The role of qualitative methods in production management research. International Journal of Production Economics, 74(1-3), 201-212.

Brax, S. (2005). A manufacturer becoming service provider—challenges and a paradox. Managing Service Quality, 15 (2), 142-155.

Cohen, M.A., Agrawal, N. & Agrawal, V. (2006). Winning in the aftermarket. Harvard Business Review, 84 (5), 129-138.

Corbin, J. & Strauss, A. (2008). Basics of Qualitative Research: techniques and procedures for developing grounded theory. 3rd edition. Thousand Oaks, CA: Sage.

Crouch, C. & Farrell, H. (2004). Breaking the Path of Institutional Development? Alternatives to the New Determinism. Rationality and Society, 16 (1), 5-43.

David, P.A. (1985). Clio and the Economics of QWERTY. The American Economic Review, 75 (2), 332-337.

David, P.A. (1994). Why are institutions the 'Carriers of history'?: Path dependence and the evolution of conventions, organizations and institutions. Structural Change and Economic Dynamics, 5 (2), 205-220.

David, P.A. (2001). Path dependence, its critics and the quest for 'historical economics'. In: P. Garrouste/S. Ioannides (Eds.). Evolution and Path Dependence in Economic Ideas: Past and Present. Cheltenham: Elgar.

Davies, A. (2004). Moving base into high-value integrated solutions: a value stream approach. Industrial and Corporate Change, 13 (5), 727-756.

Davies, A., Brady, T. & Hobday, M. (2006). Charting a Path Toward Integrated Solutions. MIT Sloan Management Review, 47 (3), 39-48.

Droge, C., Vickery, S.K. & Jacobs, M.A. (2012). Does supply chain integration mediate the relationships between product/process strategy and service performance? An empirical study. International Journal of Production Economics, 137(2), 250-262.

Eisenhardt, K.M. (1989). Building theories from case study research. Academy of Management Review, 14 (4), 532-550.

Finne, M. & Soinio, J. (2010). Servitization: Which way the journey goes? Proceedings of 20th International RESER conference, Gothenburg, Sweden.

Finne, M. & Turunen, T. (2011). Organizational environment impacting servitization of manufacturing. Presented in the Academy of Management 71st Annual Meeting, San Antonio, U.S.

Fixson, S.K. & Park, J.K. (2008). The power of integrality: Linkages between product architecture, innovation, and industry structure. Research Policy, 37(8), 1296-1316.

Gebauer, H., 2008. Identifying service strategies in product manufacturing companies by exploring environment–strategy configurations. Industrial Marketing Management, 37 (3), 278-291.

Gebauer, H., Fleisch, E. & Friedli, T. (2005). Overcoming the service paradox in manufacturing companies. European Management Journal, 23 (1), 14-26.

Gebauer, H. & Friedli, T. (2005). Behavioral implications of the transition process from products to services. The Journal of Business and Industrial Marketing, 20 (2), 70-78.

George, A.L. & Bennett, A. (2005). Case Studies and Theory Development in the Social Sciences. Cambridge, MA: MIT Press.

Henderson, R. & Clark, K. (1990). Architectural Innovation: The Reconfiguration of Existing Product Technologies and the Failure of Established Firms. Administrative Science Quarterly, 35, 9-31.

Heikkilä, M. & Brax, S. (2010). Servitization within a services firm? The case of payment solutions provider. Proceedings of 20th International RESER conference, Gothenburg, Sweden.

Hellström, M., Ruuska, I., Wikström, K. & Jåfs, D. (2013). Project governance and path creation in the early stages of Finnish nuclear power projects. International Journal of Project Management, 31 (5), 712-723.

He, Y. & Lai, K.L. (2012). Supply chain integration and service oriented transformation: Evidence from Chinese equipment manufacturers. International Journal of Production Economics, 135 (2), 791-799.

Johansson, P. & Olhager, J. (2004). Industrial service profiling: matching service offerings and processes. International Journal of Production Economics, 89 (3), 309-320.

Johansson, P. & Olhager, J. (2006). Linking product-process matrices for manufacturing and service operations. International Journal of Production Economics, 104 (2), 615-624.

Johnson, M. & Mena, C. (2008). Supply chain management for servitised products: a multi-industry case study. International Journal of Production Economics, 114 (1), 27-39.

Kurata H. & Nam, S.H. (2010). After-sales service competition in a supply chain: Optimization of customer satisfaction level or profit or both? International Journal of Production Economics, 127 (1), 136-146.

Li, G., Yang, H.J., Sun, L.Y., Ji, P. & Feng, L. (2010). The evolutionary complexity of complex adaptive supply networks: A simulation and case study. International Journal of Production Economics, 124(2), 310-330.

Mathieu, V. (2001). Service Strategies within the Manufacturing Sector: Benefits, Costs and Partnership. International Journal of Service Industry Management, 12 (5), 451-475.

Matthyssens, P. & Vandenbempt, K. (1998). Creating Competitive Advantage in Industrial Services. Journal of Business & Industrial Marketing, 13 (4), 339-355.

Martin, C.R. & Horne, D.A. (1992). Restructuring towards a service orientation: the strategic challenges. Journal of Service Management, 3(1), 25-38.

Miles, M. B. & Huberman, A.M. (1984). Qualitative Data Analysis: A Sourcebook of New Methods. Sage Publications.

Morris, M.H. & Fuller, D.A. (1989). Pricing an Industrial Service. Industrial Marketing Management, 18(2), 139-146.

Neely, A. (2008). Exploring the financial consequences of the servitization of manufacturing. Operations Management Research, 1 (2), 103-118.

Neu, W.A. & Brown, S.W. (2005). Forming Successful Business-to-Business Services in Goods-Dominant Firms. Journal of Service Research, 8 (1), 3-17.

Niiniluoto, I. (1999). Defending abduction. Philosophy of Science, 66, 436-451

Oliva, R. & Kallenberg, R. (2003). Managing transition from products to services. International Journal of Service Industry Management, 14 (2), 160-172.

Saccani, N., Johansson, P. & Perona, M. (2007). Configuring the after-sales service supply chain: A multiple case study. International Journal of Production Economics, 110 (1-2), 52-69.

Sanderson, R.H.B., Roderick, J. & Woodside, A.G. (1989). Measuring Channel Sensitivities to New Industrial Service Designs: Managerial Implications. European Journal of Marketing, 23(4), 50-59.

Sarkis, J., Zhu, Q. & Lai, K.-h. (2011). An organizational theoretic review of green supply chain management literature. International Journal of Production Economics, 130(1), 1-15.

Siggelkow, N. (2007). Persuasion with Case Studies. Academy of Management Journal. 50(1), 20-24.

Sydow, J., Schreyögg, G. & Koch, J. (2009). Organizational path dependence: Opening the black box. Academy of Management Review, 34 (4), 689-709.

Teece, D.J., Pisano, G. & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. Strategic Management Journal, 18 (7), 509-533.

Tripsas, M. & Gavetti, G. (2000). Capabilities, cognition, and inertia: Evidence from Digital Imaging. Strategic Management Journal, 21 (10/11), 1147-1161.

Vandermerwe, S. & Rada, J. (1988). Servitization of business: Adding value by adding services. European Management Journal, 6 (4), 314–324.

Voss, C.A., Tsikriktsis, N. & Frohlich, M.T. (2002). Case research in operations management. International Journal of Operations & Production Management, 22(2), 195-219.

Wise, R. & Baumgartner, P. (1999). Go downstream: the new imperative in manufacturing. Harvard Business Review, 77 (5), 133-141.

Yin, R.K. (1994). Case study Research. Design and Methods. 2nd edition. Applied social methods series, Volume 5. Thousand Oaks, CA: Sage.

FACTORS PREVENTING THE SERVITISATION OF MANUFACTURING COMPANIES

EIJA VAITTINEN
LAURI VUORINEN

Abstract

The current literature commonly suggests that manufacturers should add services to their offerings and move towards a more servitised business. Still, there are many challenges in the process and not all companies can use a similar approach to change. This study seeks to provide information on the servitisation challenges of companies that are just starting to add services to their developed product offerings. This study was conducted as a qualitative multiple-case research and data were collected using semi-structured interviews in two interview rounds. The results of this study show that there are two types of challenges facing companies when initiating their servitisation efforts: issues of managing the servitisation change and prerequisites for servitisation. First, general change management issues, such as the lack of management's commitment and other simultaneous change efforts, can harm the servitisation initiative. Secondly, factors such as production maturity may act as prerequisites for the change. The contribution of this study relates to the challenges of the early phases of servitisation. The factors identified in this study are encountered in the early phases of servitisation, before many of the factors usually covered in the existing literature become relevant.

Introduction

The transformation of a manufacturer from being solely a product provider into a producer of services in addition to goods and integrated with goods has been studied broadly. The benefits of this transformation, also called servitisation, have received considerable attention. For instance, differentiating from the competition, environmental benefits and cost reductions have been associated with servitisation and, thus, many authors have suggested that product manufacturers should move towards providing services (Aurich et al., 2010; Baines et al., 2007). Many studies do not take a stand on when or what kind of companies should engage in this transformation, but rather blindly suggest

that the transformation should be happening (Johnstone et al., 2008). Furthermore, in the current literature, authors do not usually comment on the level of servitisation in their studies (e.g., Gebauer & Friedli, 2005). Often it seems that the case companies are not just starting to add services to their offering, but are more often already offering several services or solutions (e.g., Baines et al., 2009b; Brax, 2005; Martinez et al., 2010).

In the existing literature, some studies focus on the challenges in the servitisation process (Baines et al., 2009b; Kuo et al., 2010; Martinez et al., 2010). Still, very few of these articles report studying unsuccessful servitisation efforts. One of the few studies explicitly considering unsuccessful servitisation processes is the one by Gebauer and Friedli (2005). However, they do not explain how they define unsuccessful servitisation; that is, whether their case companies, after the struggle, made the change towards services or continued with previous practices (Gebauer & Friedli, 2005). Therefore, it seems that the current literature focuses more on the challenges occurring during the change and hindering the servitisation, but which is still eventually implemented.

Our research seeks to contribute to the current literature by shedding light on the factors hindering or even preventing the servitisation process in manufacturing companies, which are taking their first steps into the service business. It intends to do so by studying the challenges in two companies that were willing to start adding services to their offerings consisting mostly of products. However, after a few years, they were rather unsuccessful in their efforts to advance servitisation. Furthermore, our study seeks to provide managers with information about the pitfalls that may be remarkable enough to prevent servitisation in its early stages and, thus, need to be considered before deciding to pursue the change.

Therefore, the main objective of this article is to develop new knowledge in the area of the servitisation of manufacturing companies. We seek to provide a better understanding about what goes wrong when a manufacturing company fails to progress in its servitisation, despite the company's enthusiasm to move towards a service business. This is considered especially in the case of companies that are just starting to move into the service business. In order to achieve the objectives described earlier, the following research question was formed:

- What factors are perceived as hindering or even preventing the servitisation of a manufacturing company in the beginning of the servitisation process by its employees?

Challenges and requirements in servitisation

Servitisation was first discussed in the late 1980s by Vandermerwe and Rada (1988), and it has been broadly studied since that time. It is commonly known as the process of adding services to products and creating value through this (Baines et al., 2009a). The challenges related to servitisation have also received significant attention (Baines et al., 2009b; Brax, 2005; Martinez et al., 2010).

Frequently, the studies on servitisation challenges do not explicitly discuss the covered phase of servitisation (e.g., Baines & Shi, 2014; Martin & Horne, 1992). Furthermore, in many studies, the servitisation is not in its very early phase. For example, in the study by Oliva and Kallenberg (2002), they interviewed leaders of the service divisions in each company, which indicates that service divisions already exist in these companies. Similarly, Brax (2005) notes that their case company has offered technical field service for a long time. From the articles used in the following section on servitisation challenges, six out of 15 probably did not study the early phase of the servitisation and five were literature reviews. This leaves four articles that may have specifically addressed the early phase of servitisation; however, even those do not express this fact explicitly. The division of the analysed articles is presented in table 12.

TABLE 12.
Used literature and whether or not it considers the early phase of the servitisation.

LITERATURE REVIEWS	ARTICLES THAT DO NOT SEEM TO STUDY THE EARLY PHASE OF SERVITISATION	ARTICLES POSSIBLY CONSIDERING THE EARLY PHASE OF SERVITISATION
Baines et al., 2009a; Hou & Neely, 2013; Kuo et al., 2010; Mont, 2002; Sakao et al., 2009	Baines et al., 2009b; Brax, 2005; Gebauer & Friedli, 2005; Kindström, 2010; Martinez et al., 2010; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003	Baines & Guang Shi, 2014; Cook et al., 2006; Goplani, 2010; Martin & Horne, 1992
5	6	4

Furthermore, most of these studies do not explicitly describe whether the examined servitisation processes have, despite the challenges, continued or stopped, which are usually the literature reviews (e.g., Baines et al., 2009a; Kuo et al., 2010), but also other studies such as Oliva and Kallenberg (2003) and Martin and Horne (1992). When comments on the progress of the studied servitisation processes have been made, they have usually been expressed in the context of successful cases (e.g., Baines & Shi, 2014; Baines et al., 2009b; Martinez et al., 2010). One of the few exceptions explicitly discussing unsuccessful servitisation efforts is the one by Gebauer and Friedli (2005), and even they do not describe how these efforts were unsuccessful. Furthermore, as presented in Table 13, five out of the 15 articles used in the following section on servitisation challenges may have studied these unsuccessful servitisation efforts. This is because they are not literature reviews and did not include a clear indication that they studied successful servitisation efforts. However, among these five articles, some had interviewed, for example, 80 executives from companies that do offer at least some kind of services (Martin & Horne, 1992), which probably indicates that these are somewhat successfully servitised. As we cannot be sure about this, these are still counted as though they can be about unsuccessful ones as well.

TABLE 13.
Used literature and whether or not it seems to consider unsuccessful servitisation efforts.

LITERATURE REVIEWS	ARTICLES NOT/PROBABLY NOT STUDYING UNSUCCESFUL SERVITISATION	ARTICLES THAT MIGHT CONSIDER UNSUCCESSFUL SERVITISATION
Baines et al., 2009a; Hou & Neely, 2013; Kuo et al., 2010; Mont, 2002; Sakao et al., 2009	Baines & Guang Shi, 2014; Baines et al., 2009b; Brax, 2005; Kindström, 2010; Martinez et al., 2010	Cook et al., 2006; Goplani, 2010; Martin & Horne, 1992; Matthyssens & Vandenbempt, 2008; Oliva & Kallenberg, 2003
5	5	5

Although different opinions exist (Burnes, 2011), in general, change management literature often argues that a clear majority of change efforts fail (e.g., Hughes, 2011). Because of this, many research studies have focused on identifying common determinants of change success or failure (e.g., Whelan-Berry & Somerville, 2010). Often, the identified factors are discussed as, for example, change drivers and, respectively, the lack of those factors as reasons for failure. Typical change drivers identified in the general change management literature are a common change vision, leadership and management commitment, communication and participation (e.g., Armenakis & Bedeian, 1999; Whelan-Berry et al., 2003; Whelan-Berry & Somerville, 2010). However, these factors are very general in nature, which is why in the literature review of this study, we have focused on discussing the more servitisation-specific factors.

In our literature review, we sought articles that specifically focused on the challenges of servitisation, but also broadened this literature with some articles that considered the servitisation more holistically. From the literature, several factors hindering the servitisation process are identified. Based on a literature analysis, covering both servitisation and the closely related transition towards product-service systems (PSSs), we have identified five groups of hindering factors: organisational culture; customer relationship; solution selling, design and delivery; supply network; and structure and strategy of the organisation. Next, we briefly describe each of these categories.

Organisational culture

One of the most commonly mentioned factors hindering servitisation is the manufacturing culture (e.g., Baines & Shi, 2014; Brax, 2005; Hou & Neely, 2013; Mont, 2002). For instance, Martinez et al. (2010) have found that the strong manufacturing culture hinders the transformation, as employees still see that what is offered to the customer is mainly the product. According to Kuo et al. (2010), internal rejection of the servitisation can be one of the barriers challenging the transformation. Furthermore, Hou and Neely (2013) noted that servitisation-related changes can cause conflicts between different sectors within the company.

Oliva and Kallenberg (2003) note that, in manufacturing firms, services seem to be seen as an add-on and they are even given away for free when negotiating the trade. Similarly, Gebauer and Friedli (2005) have stressed the need to change the attitude from the "services as add-ons" perspective to "services as value-adding activities", at both the employee and managerial levels. Thus, there is a need to change the perception throughout the whole organisation (Baines et al., 2009a; Brax, 2005), even though this is difficult (Hou & Neely, 2013). Furthermore, there is a similar need to develop pride and trust in the company's services, as there is with its products (Sakao et al., 2009). To achieve this, employees need to be instructed on service culture (Martinez et al., 2010). In addition, a lack of education and information can be one of the main factors preventing servitisation (Kuo et al., 2010).

Customer relationship

Closely related to culture changes are also the changes related to customer relationship. First, many authors have stressed the need to change the type of customer relationship. Manufacturing companies are often used to having clearly transactional customer interactions, but with servitisation, there is a need to move towards relationship-based logic (Brax, 2005; Martinez et al., 2010). Furthermore, there is a need to see the customer as a co-producer of the service (Brax, 2005; Martin & Horne, 1992). It is even suggested that the challenges with the organisational culture may be derived from these changes in customer interactions and value creation (Martinez et al., 2010).

Customer acceptance of the new offering is also not obvious (Hou & Neely, 2013). For example, Mont (2002) has noted that consumers might not be ready to accept combi-

nations of products and services. According to Mont (2002), there is a lack of research on competitiveness and profitability of these offerings for consumers. Also, Brax (2005) and Martinez et al. (2010) have noted that, even though the company might see how the offering can provide additional value for the customer, the customers themselves cannot perceive this. Therefore, this new offering requires educating customers (Matthyssens & Vandenbempt, 2008) and motivating them towards service co-production and to co-operation throughout the relationship (Brax, 2005).

Solution selling, design and delivery

As mentioned in the previous section, customers may not be willing to purchase with value criterion, especially in businesses that are used to buying based on price and where competitive biddings are commonly used (Matthyssens, & Vandenbempt, 2008). Still, in addition to advising and motivating customers, also changes in selling methods are needed. As the economics of the product market differ from the service market, it can be difficult for sales organisations to turn to promoting a service offering, which they may feel is small compared to the products (Oliva & Kallenberg, 2003). Gebauer and Friedli (2005) emphasise the need to change the mental model from selling products into providing services. Oliva and Kallenberg (2003) have an enlightening example of this; when a company starts selling a condition monitoring service, the product itself does not provide benefits for the customer, but the value is provided with the service that offers higher equipment availability. Thus, the seller needs to illustrate the value to the customer, instead of listing the product's features. Furthermore, Kindström (2010) has explained that communicating the value provided by combined product-service offerings can be challenging for a company and requires creativity. To succeed in this task, the company also needs a deeper understanding of its customers and the real value the service can provide to them (Baines et al., 2009b).

Also, solution design and delivery have been noted to cause challenges in servitisation (e.g., Brax, 2005; Hou & Neely, 2013). In the design process, both product and service features need to be considered, as both of these affect how the solution performs throughout its life (Baines et al., 2009b). Furthermore, Brax (2005) sees that services need to be adjusted to the customer's culture and designed so that the customer's operations and goals are supported. Also, to succeed here, understanding the customer's business is essential. Additionally, a lack of research on how to design the services, the informal processes of developing new service offerings (Martin & Horne, 1992) and the risks from taking tasks that have previously belonged to the customer (Baines et al., 2009a) have been found to hinder servitisation.

Structure and strategy of the organisation

Due to the required new ways to interact with customers and the mental models in the organisation, the need to acquire new capabilities and change processes in the organisation and in the structure of organisation arise. Kuo et al. (2010) have found missing capabilities to be one of the barriers for servitisation. Similarly, Baines and Shi (2014) have mentioned this, and Baines et al. (2009a) have emphasised the importance of finding the right people for the service dimension. Additionally, the internal processes need to be aligned to support both product and service design and delivery (Martinez et al., 2010). Baines et al. (2009b) also mention that the design processes need to include both products and services when incorporating changes. The changes in processes and customer relations also increase the number of people in contact with the customer company, and keeping these customer touch-points aligned is found to be challenging but critical (Martinez et al., 2010).

Organisations also need to adjust the way results are measured. Martinez et al. (2010) have emphasised the necessity for companies to be able to accurately assess internal

capabilities, and also the need to shift the metrics of measurement from product-oriented to a method that is more suitable for a solution-oriented company. Also, Baines et al. (2009b) have noted a need to include both transactional and relationship elements to performance measuring as clearly defined and communicated measures.

Also needed is changing the organisation's structure to match the offered product-service combinations (Baines et al., 2009a; Sakao et al., 2009). Cook et al. (2006) have recommended horizontal or matrix types of structures, instead of hierarchical ones. They saw that these types of organisations enable more efficient problem-solving routines over the blurred boundaries of areas. Mont (2002) has also mentioned that moving into providing combinations of products and services extends the role of the marketing division due to closer co-operation with customers.

Challenges are also related to the needed adjustments in an organisation's strategy (Baines et al., 2009a; Kuo et al., 2010). Cook et al. (2006) have found that companies using combined products and services, which support the firm's strategic intent, are more receptive to the transformation. They have also noted that strategy should not be focused on cost reduction but on differentiation, as the former was found to hinder the willingness to adopt solutions consisting of products and services (Cook et al., 2006). Also according to Baines et al. (2009a), changes in strategy are challenging but needed to support the customer loyalty that is required for solution deliveries. Furthermore, Goplani (2010) states that in order to achieve success in development and adoption of combined product and service solutions, strategic alignment is needed.

Supply network

According to Mont (2002), there may be a need for new networks in order to develop an offering based on combined services and products. Oliva and Kallenberg (2003), on the other hand, have noted that there is a need for a global service infrastructure when also products are sold globally. They feel that the company needs to be able to locally meet the needs of their installed base (Oliva & Kallenberg, 2003). Furthermore, Mont (2002) emphasises the need for the infrastructure to be accepting and supporting towards services.

On the other hand, Baines et al. (2009b) have noted that considerable tensions may arise in the supply chain when delivering products and services simultaneously. Similarly, Matthyssens and Vandenbempt (2008) have found that challenges may be caused by the many parties in a fragmented chain and the lack of trust between the parties. These challenges need good management and integrated delivery in which knowledge and resources are used efficiently and effectively (Baines et al., 2009b). Also, Oliva and Kallenberg (2003) found that new abilities in moving knowledge throughout the network and managing service personnel are needed. Therefore, servitisation calls for increased cooperation between the company and its network partners (Martinez et al., 2010).

Conclusions of the literature review

In Table 14, the factors identified in the literature review are summarised. Many other factors have also been identified in the literature; for example, Hou and Neely (2013) mentioned the financial concerns and Cook et al. (2006) noted laws and regulations. Therefore, this listing is not exhaustive but presents the challenges most commonly covered in the literature on servitisation challenges. Furthermore, as can be seen above, these factors are highly entwined and even overlap. Therefore, there is a need to consider these rather holistically. In addition, Cook et al. (2006) have noted that, more than any single factor, it is the interplay and the combinations of different factors that cause challenges in the servitisation process and tackling some of these challenges beforehand can make the transformation easier.

TABLE 14.
Summary of challenges and their requirements found in the literature review

	NEEDED CHANGES THAT CAUSE CHALLENGES IN SERVITISATION
ORGANISATIONAL CULTURE	Servitisation requires changing the old product-oriented culture and creating appreciation of services
CUSTOMER RELATIONSHIP	Servitisation requires changing from transactional towards more relationship-based logic; furthermore, customer acceptance is not obvious for the changed offering
SOLUTION SELLING, DESIGN & DELIVERY	Servitisation requires combining product and service knowledge throughout the process; earlier product-focused methods are no longer suitable
STRUCTURE & STRATEGY OF ORGANISATION	Servitisation requires bringing services to the level of strategy and also changes in functions in the organisation to enable efficient problem solving and solution design
SUPPLY NETWORK	Providing services requires manufacturers to have more and often different partners than before; complex solutions can rarely be produced by a single company

Research methodology

Research approach, data collection and analysis

This study was conducted using a qualitative multiple-case research strategy. Change situations are highly context-dependent, meaning that the boundaries between the studied phenomenon and its context are not clear and, thus, favour a case study approach (Yin, 2009). We sought manufacturing companies that had expressed a desire to move towards a service business earlier. As part of a larger research program, we gained access to two suitable cases. Studying more than one case increases the generalisability of the results and decreases the problems related to a unique case (Yin, 2009).

The empirical data were collected using semi-structured interviews. There were two interview rounds. The first round was conducted three years before the second round, and it focused on the current state of companies' service businesses, and the changes required by moving towards services. It covered themes such as services and their role in the company, readiness for change towards servitisation and relationships with customers and the network. This round was mostly used as comparison material and to determine the progress of servitisation in each case. In the second round, the questions focused on the perceived service-related changes within the last few years. The interviews were designed and planned to cover services and their role in the company and the change towards services: initiation, key moments in the change and factors advancing and hindering the change. However, during the first interviews, it was found that the servitisation had not clearly progressed in either of the cases. Thus, the interview structure was altered to cover more precisely the factors preventing the servitisation. In addition, some other areas of interest such as future views on services were charted.

In both interview rounds, key informants from the companies recognised relevant interviewees for the round. Also in both interview rounds, all of the interviews were recorded and then transcribed to assure that no mistakes were made due to incorrect recollections or inadequate notes. General information regarding the data collection is illustrated in Table 15.

TABLE 15.
General information regarding the data collection

	CASE A		CASE B	
	Interview round 1	Interview round 2	Interview round 1	Interview round 2
NUMBER OF INTERVIEWS CONDUCTED	6 one-to-one interviews at the business unit level	5 one-to-one interviews at the business unit level, 4 one-to-one interviews with company-level sales personnel	6 one-to-one interviews, 1 group interview (two persons)	9 one-to-one interviews
ROLES OF THE INTERVIEWEES	Manufacturing, inventory and managerial level persons	Manufacturing, inventory and managerial level persons + sales persons at the company level	Manufacturing, sales & marketing, procurement and managerial level persons	Manufacturing, sales & marketing, procurement and managerial level persons
AVERAGE INTERVIEW DURATION	57 min (min 45', max 65')	55 min (min 40', max 65')	45 min (min 30', max 70')	44 min (min 30', max 60')

The transcribed interviews were coded and analysed. When the interviews were analysed the first time, it was found that the factors identified in the literature review did not sufficiently cover the factors arising from the interviews. Thus, coding was made inductively, based on the factors arising from the interviews. These factors were managerial commitment, production maturity, ability to sell services, constant changes and attitude towards these changes, and macroeconomic and industrial environment. Because of the inductive nature of data analysis, the results section follows this division instead of the structure of the literature review. For this article, the written quotations were anonymised and translated into English, retaining the meaning and main content.

Description of the cases

The first case, Case A, is one business unit of a relatively large manufacturing company. The company provides raw materials, systems and solutions for its customers. This business unit is responsible for specific types of materials and systems. The intention to move towards services had been expressed at the company level, and changes related to this intended servitisation were then studied in this business unit.

The second case company, Case B, is also a business unit of a relatively large manufacturing company. The company offers both products and solutions for its customers. This business unit is also responsible for specific types of products and services. In Case B, the servitisation intention had been expressed at the business unit level, and was also studied in the business unit level.

During the initial interviews, both cases were very manufacturing oriented. Few services were offered and mostly those were similar to product features. Many interviewees even perceived customer service and modifications of products as services. In both cases, at the beginning of the research program, a willingness to increase services in their offering was

identified. In Case A, an effort was initiated to start making the service offering more systematic and better defined, for example. Both companies sought additional business possibilities and wanted to get closer to the customer through this change.

A few years later, not that much had really happened, regarding the level of servitisation in Case A. A clear majority of the company's service offering still includes services that are very product-centric and even feature-like. In fact, one could argue that many of these are not necessarily services, but rather modifications of the basic product, which are nothing new in manufacturing companies (Danese & Romano, 2004). Case A also offers customers "real" services, such as services related to logistics, but these are only single cases, instead of following a systematic approach.

The current situation in Case B is quite similar. When interviewees described the current service offering of the company, most of the mentioned services were very closely linked to the end products, and can even be considered attributes of the products. There were also many interviewees who still linked services quite closely to perceived service levels, especially to delivery times and reliability. As with Case A, Case B also offers its customers some "real" services. However, these represent a clear minority in the company's offering and are rather occasional.

In some sense, the servitisation of Case B has even moved a bit backwards. In the beginning of the research program, the product offering included more customised product variants, which were the closest thing to services offered, in addition to the occasional pure service. During the covered period, a decision was made that the studied business unit would focus on more bulk product variants.

Results

As described above, the progress in servitisation has been very slow in both companies. It could, in fact, be argued that no real servitisation has happened. In the later interviews, several factors preventing the servitisation of the case companies were identified. These are described next.

Both case organisations are business units of relatively large manufacturing companies. In this Results section, especially in the chapter discussing the role of managerial commitment, "business unit level" refers to the business unit in which the majority of the interviews were conducted. "Company level", on the other hand, refers to the hierarchical levels above the business unit in the organisational structure.

Managerial commitment

As mentioned in the beginning of this chapter, a few years ago there was a clear service-related vision in the company level management of Case A. However, this change vision was never transferred into anything concrete at the business unit level. In fact, many interviewees argued that even the vision-level discussion disappeared quite quickly. The interviewees did not identify a clear "push towards services" coming from the levels above the business unit. Case A has a long history as a manufacturing company, and many interviewees argued that the company was still led mainly as a manufacturing company.

As mentioned, there wasn't a clear managerial push coming from the company level. In contrast to the company level, interviewees described some managerial commitment at the business unit level. Many interviewees explained how the business unit wanted to broaden and improve the service offering, but commitment or support from the company level was lacking. However, most of the interviewees argued that several improvements and investments in the production would have been required to really increase the level of the service business. Multiple investment proposals had been made by the unit, but very few of these were accepted by the company-level managers. Because of the numerous refused investment proposals, the enthusiasm at the unit level also decreased. This illustrates how managerial commitment

was missing from two directions: pushing the business unit towards services, and supporting the business unit's own work towards services.

As in Case A, in Case B no real progress in servitisation had occurred. Despite this, multiple different changes had been implemented in the business unit, and many interviewees described the importance of managerial commitment to the success of these changes. This managerial commitment included elements of both formal authority and informal attitudes, personalities and enthusiasm. Although the changes mentioned were not directly related to servitisation, they were conducted to fix other problems related to production maturity, which was perceived as preventing the possibility for servitisation. In addition to the commitment of the business unit-level managers, some interviewees of Case B also mentioned how the business unit had a clear role inside the large company. This was a clear positive change, compared to the earlier situation, some interviewees argued. Thus, Case B illustrates the possibility for managerial commitment becoming a change management success factor, in contrast to Case A.

Production maturity

Especially in Case B, the maturity of the production functions was limiting the servitisation process. This was discussed especially by the managers of the company. In the beginning of the study period, there were many problems, for example, related to quality. Many interviewees, especially managers, described how these production problems had to be fixed before any real servitisation could begin. In addition to quality, several problems were also related to production capacity and production planning. All of these problems together led to a situation, whereby a company level decision was made that the business unit would focus on its less-customised product variants. Thus, production maturity was not just limiting the servitisation, but in fact Case B even "took a few steps backwards".

Although no servitisation-related cultural change was clearly identified, the production changes also affected the work culture of Case B. Previously, the production personnel's attitudes towards quality were even a bit neglectful. "Who cares about a few centimetres" was a common attitude towards the quality of the end products described by several interviewees. Interviewees representing both the managerial and the production levels of the business unit shared a common opinion that the culture towards quality improved significantly during the period. Thus, the intended servitisation process ended up improving and correcting existing production processes and the quality culture in Case B, despite the fact that no progress in servitisation was achieved.

In Case A, the production maturity issues did not come up as explicitly as in Case B. However, the interviewed production personnel of Case A, in particular, thought that production investments would be a clear prerequisite, if the company wanted to start real servitisation. This illustrates the product-centric culture in both companies; in both case companies, a clear majority of the service offerings include services that can be considered product features, enhancements or modifications, instead of real services.

Regarding cultural changes, some changes related to attitudes towards quality and services were also identified in Case A. As in Case B, in Case A, the production personnel's attitudes towards quality improved. Many interviewees described how the customers' requirements increased all the time, thus requiring a stronger focus on quality issues. In addition to quality aspects, a cultural change towards services was also required; the interviewees described how simply delivering a tangible product was no longer sufficient. According to the interviewees from all levels of the business unit, this cultural change had also been initiated. A thought shared by many interviewees, including the production interviewees, illustrates the realisation that cultural change is both needed and has begun: "The customer doesn't want a piece

of raw material anymore; he wants a more ready-made product."

Ability to sell services

Among the business unit interviewees of Case A, there was some frustration towards the sales personnel of the company. Some interviewees argued that the sales personnel were not working hard enough to sell services, instead of only products. When discussing the sales issue further, the ability of the sales personnel to sell services was specifically questioned. "I don't really know, if the sales guys know what we could do," was a common thought expressed by the interviewees.

The issue of selling services was discussed with the company-level sales personnel of Case A. The sales interviewees described how it could be difficult for salespeople to know the very broad product and service offerings of a large company. Especially, the sales interviewees highlighted that a sales person has to focus more and more on the customer's problems and look for a solution, instead of just selling several products and/or services. Regarding the required solution-centric attitudes, most of the interviewed sales personnel were quite happy with the current situation of Case A. However, there were also more critical voices among both the sales and business unit personnel. They argued that selling and customer buying habits are in the process of changing, but not all are on-board with it and it still has to evolve.

The sales issues of Case A were related to understanding the available product-service combinations and the sales personnel's focus on solutions, instead of products and services. In Case B, a significant effort had been made to make the selling of the product-related services easier. The company had created a catalogue-like approach to the services, in which the link between each service and end product was illustrated. The main goal of this catalogue was to illustrate the current availability and estimated delivery times of different products. However, the catalogue also makes it easier for the customer to understand which combinations are available. On one hand, this catalogue-like approach can be considered a slight sign of positive progress in the servitisation of Case B. On the other hand, the illustration of different product-service combinations is again an example of the product-centric nature of Case B's service offerings. In the catalogue-like approach, the customer selects services connected to the products, almost like choosing features of a modular product.

Constant changes and attitude towards the changes

Both of the case companies were very similar in the sense that no significant progress in servitisation was identified. Despite the lack of progress in servitisation, several change efforts had been conducted in both companies. However, the attitude towards these changes differed a bit between the case companies.

In Case A, several significant changes had occurred within the last few years and many of these had originated at the company level. These include, for example, different structural reforms both in the business unit and at the company level. Many of the interviewees expressed how they were tired of the constant changes. The situation was made even worse by the feeling that change ideas coming from the business unit level to the company level were very seldom accepted.

There were also lots of changes happening in Case B. When compared to Case A, many interviewees in Case B had a more positive, attitude towards most of the changes. When comparing the changes conducted in the case companies, there were more changes coming from the company level in Case A, while in Case B many changes originated at the business unit level. This may have had an effect on the attitude towards the changes. The internal origin of the changes was also combined with a strong managerial commitment in Case B, although the lack of

detailed planning was criticised. Of course, not all the changes were agreed upon by all of the interviewees, but the attitude towards the changes was more positive in Case B than in Case A.

Macroeconomic and industrial environment

During the time period when the interviews were conducted, a global financial crisis was affecting the whole western world. The effects of the financial difficulties were discussed by many interviewees in both case companies. The interviewees divided the effects of the financial crisis into two groups. Because the interviewees' perceptions were relatively similar in both cases, these are discussed in conjunction next.

On one hand, the weak financial situation forces the customer companies of the case companies to shift their focus to their core businesses. Interviewees argued that, in theory, this should benefit the case companies. The logic behind this argument was that when the customer companies focus on their core businesses, they are prone to outsource bigger parts of their value chains. This could allow the case companies to sell more services together with their products.

On the other hand, the weak financial situation had led to a situation where many customer companies were struggling, were purchasing and investing less, and were putting a lot of price pressure on the case companies. These implications of the financial situation affected the case companies in a negative way. It was argued by a large majority of the interviewees that, despite the possible positive effects of the financial crisis, the negative effects were much higher.

In the interviews, the interviewees were also asked to identify service possibilities for the future. Among the interviewees, there were surprisingly many who struggled to identify any really different services, compared to the current service offerings. These interviewees explained: "Well, it's hard for me to imagine how we could add any new services to a simple product like this." This seems to imply that the characteristics of the industry might affect the servitisation. For example, in a different industry, it could be possible to lease end products, instead of selling those. However, in this industry, the nature of the end products makes this type of service impossible. Furthermore, this may demonstrate that the strong manufacturing culture still exists in the case companies, as some interviewees maintain that future services will continue to be strongly linked to the products.

On the other hand, there were also many interviewees who identified multiple creative service possibilities. This seems to imply that the nature of the industry is not limiting the possibilities for servitisation. Instead, a cultural change towards a more solution-centric and innovative thinking is required.

Synthesis

The results of this study have illustrated the five groups of factors preventing the servitisation in the case companies: managerial commitment, production maturity, ability to sell services, constant changes and macroeconomic and industrial environment. These factors are summarised in Table 16.

Discussion

There are many reasons for manufacturing companies to move towards a service business, including environmental benefits and the possibility to differentiate the company from its competitors (Aurich et al., 2010; Baines et al., 2007). Despite the attractiveness of a service business, the servitisation changes are not easy or trivial. Several studies covering the problems and challenges of servitisation have been published (e.g., Baines et al. 2009b; Kuo et al., 2010). Although the literature covering the challenges of servitisation exists, the current literature leaves room for complementary work on two important aspects.

TABLE 16.
Factors preventing the servitisation in the case companies

	CASE A	CASE B
MANAGERIAL COMMITMENT	• In the beginning, there was a company level change vision. The vision was not completely transferred into anything concrete. • Managerial commitment was missing from two sides: pushing the business unit level towards service business, and supporting the business unit level's enthusiasm towards services.	• No real progress in servitisation was achieved. However, multiple changes related to production maturity were conducted. • Regarding these changes, many interviewees linked managerial commitment to the success of these changes.
PRODUCTION MATURITY	• Importance of production maturity did not come up as explicitly as in Case B. • However, many production personnel discussed production investments as prerequisites for servitisation. • A cultural change was occurring within the covered years. This change related to attitudes towards quality and services versus products.	• Most of the interviewees argued that the maturity of the production was limiting the possibilities for servitisation. • There were, for example, several quality-related problems, which the company wanted to fix first. • Within the covered years, a significant cultural change related to attitudes towards quality was achieved.
ABILITY TO SELL SERVICES	• The salespeople might not have the knowledge or understanding of the service offering, especially because of the high number of products and services in a large company. • A clear cultural change is required, regarding the move towards selling solutions.	• A catalogue-like approach was developed in order to help sell the products and services. • The catalogue-like approach can be identified as a slight positive sign of servitisation. • On the other hand, the catalogue-like approach demonstrates the product-centric nature of Case B's services.
CONSTANT CHANGES	• There were many changes occurring and several of these originated outside the business unit. • Interviewees expressed some tiredness towards constant changes.	• Despite the high number of changes, the general attitude towards the constant changes was more positive than in Case A. • Most of the changes originated in the business unit itself.
MACRO-ECONOMIC & INDUSTRIAL ENVIRONMENT	• A weak financial situation could, in theory, be beneficial for the case companies, because it would force customer companies to outsource bigger parts of their value chains. However, in reality, the negative effects of the weak financial situation were considered much higher in both case companies. • The nature of the industry can limit the possibilities for servitisation. On the other hand, a cultural change is required to achieve solution-centric and innovative thinking.	

First, although the literature considers factors preventing the servitisation, usually studies either describe challenges encountered by companies that in the end have been successful in their servitisation process (e.g., Baines et al., 2014, Baines et al., 2009b; Martinez et al., 2010), or do not explain at all whether or not the case companies have succeeded in servitisation (e.g., Martin & Horne, 1992; Kindström, 2010). Secondly, the current servitisation literature concentrates on companies whose service offerings are not undeveloped (e.g., Brax, 2005; Martinez et al., 2010). This means that, although the companies are seeking to move towards a service business, the starting point is not, so to speak, level zero, but they already have some clear service operations in place.

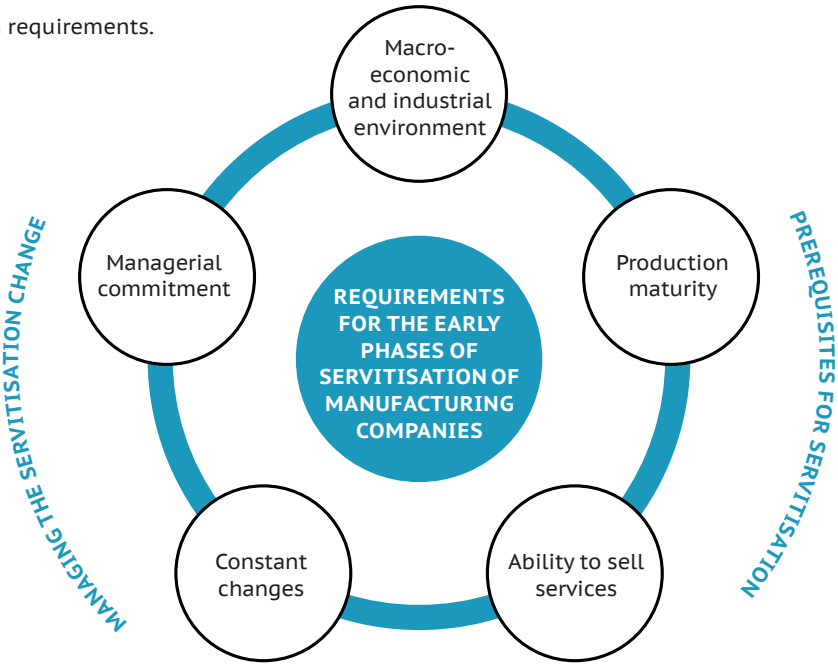
The results of this study complement the current literature described above. In both case companies, a clear willingness to move towards a service business was evident a few years ago. Despite this, the companies did not succeed in progressing the servitisation. This illustrates the existence of factors actually preventing servitisation, rather than simply hindering it. In both cases, the current service offering is also unsophisticated; a great majority of the elements identified by the interviewees as services are very closely linked to the end products of the companies and even feature-like.

In our study, five preventing factors were identified. These can be divided into two groups: "managing the servitisation change" and "prerequisites for servitisation". This division is illustrated in Figure 9.

Managing the servitisation change

The factors "managerial commitment" and "constant changes" belong to the first "managing the servitisation change" group. In general, in the change management literature, the lack of managerial commitment is often mentioned as a source of change failure (Whelan-Berry & Somerville, 2010). Surprisingly, the importance of managerial commitment as a hindering factor has not been widely recognised in the existing servitisation literature. The study by Gebauer and Friedli (2005) is one of the few considering this in their listing of characteristics of companies struggling with the change. In their study, they highlight that managers themselves need to believe in the economic

FIGURE 9.
Servitisation requirements.



power of services (Gebauer & Friedli, 2005). In our results, the lack of managerial commitment at the company level was one of the main reasons for Case A's servitisation not progressing. Related to managerial commitment, the importance of a common change vision (Whelan-Berry & Somerville, 2010) and change justification (Ford et al., 2008) are often emphasised in the change management literature. The importance of these should also be acknowledged in relation to servitisation, because servitisation is a large change effort for a manufacturing company. In our empirical results, several change efforts affecting Case A originated outside the business unit, making it harder to justify the need for and logic behind the changes.

A second factor belonging to the group "managing the servitisation" relates to the number of simultaneous or consecutive changes. Again, this is an aspect discussed in general change management literature, but not really in the servitisation literature. The existing change management research discusses, for example, the balance between stability and change, and both the positive and negative effects of making several changes at a high pace (Klarner & Raisch, 2013). In both of our cases, there were many different changes happening in a short period of time. Especially in Case A, signs of tiredness towards constant changes were apparent. In Case B, however, a similar phenomenon was not identified as clearly. An important difference between the cases was that, in Case B, most of the changes originated in the business unit itself, which – together with a good managerial effort – could have resulted in a more positive attitude towards the changes. Similar to managerial commitment, the aspect of multiple change efforts has to be taken into account when planning servitisation. It is not advisable to carry on many other change efforts concurrently with the servitisation process.

Prerequisites for servitisation

As described in the beginning of this chapter, the current servitisation literature does not take a stand on which companies should go through servitisation, but rather generally accepts that servitisation should happen (Johnstone et al., 2008). However, in our study, three additional preventing factors were identified, which form the group "prerequisites for servitisation". Especially in Case B, but also partly in Case A, the maturity of the production was considered to limit the possibilities for servitisation. Despite the organisational level, almost all the interviewees in Case B shared a common idea: "If our production is not reliable enough, it's not sensible to even talk about any new services." This idea is rather new to the current servitisation literature. Especially because our case units are taking their very first steps in the servitisation process, their service offering is still very closely product-related. This increases the importance of production maturity as a prerequisite for servitisation. Thus, managers need to carefully consider whether their company's production is stable enough to allow building services on it.

The second identified prerequisite refers to the selling of services. Especially in Case A, the production personnel revealed some frustration with the sales personnel of the company. In the servitisation literature, the challenge to motivate the salespeople to sell services is also acknowledged (Oliva & Kallenberg, 2003), but it has not received wide attention. Both the business unit level interviewees and the interviewed sales personnel of Case A described challenges related to selling solutions, instead of only single products and simple services. Some interviewees also referred to the need to adjust the measurement of the business unit level's units in order to promote servitisation. It was argued that Case A was still being led as a manufacturing company, despite the high-level visions towards a service business. This issue is also discussed in the existing servitisation literature (e.g., Martinez et al., 2010). Therefore, it is important to consider these changes in selling and the necessary new capabilities before the change effort is made

The last preventing factor refers to the environment in which a company acts. During the

time period covered in this study, a global financial crisis was affecting the whole western world. The negative effects of this bad financial situation were often emphasised by the interviewees. In the current servitisation literature, some authors even suggest that the economic downturn might be a suitable environment to increase servitisation in firms (Kohtamäki et al., 2013; Neely et al., 2011; Turunen & Neely, 2012). On the other hand, Neely et al. (2011) found that the proportion of the manufacturers' revenues coming from services has been rather stable, and they raise the question as to what is keeping firms from increasing service revenues. Still, these studies have not studied this matter in-depth. In addition to the financial situation, it was also questioned by some of the interviewees whether it would be possible to enhance servitisation in an industry where the basic nature of the end products is relatively simple. These two aspects together, the financial situation and the industry in which a company acts, form the last preventing factor identified in our study. Even if all the other prerequisites are fulfilled, it is possible for these environmental characteristics to prevent the servitisation of a manufacturing company. The effect of the environment, in general, has also been mentioned in the current literature (e.g., Hou & Neely, 2013).

Concluding the discussion of this study, the current servitisation literature identifies several factors hindering the servitisation process. However, in our study, we have identified a few additional factors, as well as factors that have not received wider attention thus far. These can be divided into two groups: management of the servitisation change and prerequisites for servitisation. First, management of the servitisation change has received rather limited attention in the existing literature covering the challenges of servitisation. However, servitisation is a major change for a manufacturing company, thus requiring a focus on change management aspects as well. Secondly, there are prerequisites for servitisation (especially production maturity), which must be fulfilled. These prerequisites are especially related to companies whose service offerings are highly unsophisticated, and who are just taking their first steps in the servitisation process. If these prerequisites are not met, it is unlikely for a company to succeed in the servitisation process. Therefore, it seems that servitisation might not be a suitable answer for all companies; certain factors need to be considered first and the decision to start servitising the company should not be made lightly.

Conclusions

Academic contribution

Our study has complemented the current servitisation literature by identifying factors that seem capable of preventing the servitisation process. It presents both factors that appear to be prerequisites for the servitisation process and factors emphasised by the change management literature, but which are rather infrequently discussed in the literature covering the challenges of servitisation. Additionally, our study seeks to open the subject of identifying when and what kind of companies should strive for servitisation for wider discussion, as it seems that servitisation might not be a suitable strategy for all.

Furthermore, the existing research on the challenges of servitisation has identified several factors hindering the process. However, a majority of the existing studies do not analyse the phase of the servitisation process to which these factors apply. Our results indicate that there are factors related to the very early phases of the servitisation process, which are ignored by the existing research.

Managerial implications

This study provides important information for manufacturing companies that are considering whether or not to broaden their business towards services. It gives managers clear questions to answer before deciding on the matter: is our production mature enough to enable creating suitable services and solutions, are there other changes going on in our company that could affect the change process, and is the general financial situation and the nature of the industry suitable for servitisation?

Furthermore, this study reminds managers that basic change management should not be forgotten in the servitisation process either. Managerial commitment and other ongoing or recently implemented change processes need to be considered. Additionally, this study reminds managers that services will not sell themselves, and that selling services and solutions clearly differs from product selling. Thus, sales people need to be taken into account when planning the servitisation process.

Limitations and ideas for further research

The research was implemented as a case study. This research method can be highly subjective, which increases the possible errors caused by the researcher and his or her interpretations. Also the low number of case units decreases the generalisability of the results. In addition to the low number of case units, both cases were single business units in large companies; thus, it is possible that different business units from the same companies would have given us different results.

Semi-structured interviews were used for data collection. Interviews as a data collection method form an additional limitation for this study. Interviews are prone to subjectivity from both the interviewer and the interviewee. It is possible for either the interviewee to misunderstand a question, or for the interviewer to incorrectly interpret the interviewee's answers.

The third and last limitation of our study relates to the general financial situation. As has been mentioned several times, the global financial crisis was ongoing during the same years as our study. It is possible that the financial situation had such a significant effect on the industries of our case units that it prevented their servitisation, thereby potentially hiding other factors related to hindering servitisation.

Our results highlight several needs for further research:

- Both of our case units offer solutions for similar industries. Servitisation challenges may depend on context. Thus, additional studies are required in a variety of different environments.
- Our research is one of the very few studies covering the challenges that are particularly related to the early phases of servitisation. Thus, additional studies focusing on this part of the process are required.
- Both of our case units are single business units of large companies. Additional studies should focus on several business units within a single company, thereby providing a better picture of the servitisation of a whole company, especially in relation to the early phases of servitisation.

References

Armenakis, A. & Bedeian, A. (1999). Organizational change: a review of theory and research in the 1990s. Journal of Management, 25(3), 293-315.

Aurich, J. C., Mannweiler, C., & Schweitzer, E. (2010). How to design and offer services successfully. CIRP Journal of Manufacturing Science and Technology, 2(3), 136-143.

Baines T.S., Lightfoot H.W., Benedettini, O., Kay J.M. (2009a). The servitization of manufacturing: A review of literature and reflection on future challenges. Journal of Manufacturing Technology Management, 20(5), 547 – 567.

Baines, T.S., Lightfoot, H.W. & Kay, J.M. (2009b). Servitized manufacture: practical challenges of delivering integrated products and services. Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture, 223(9), 1207-1215.

Baines, T.S., Lightfoot, H.W., Evans, S., Neely, A., Greenough, R., Peppard, J., Roy, R., Shehab, E., Braganza, A., Tiwari, A., Alcock, J., Angus, J., Bastl, M., Cousens, A., Irving, P., Johonson, M., Kingston, J., Lockett, H., Martinez, P., Michele, P., Tranfield, D., Walton, I. & Wilson, H. (2007). State-of-the-art in product-service systems. Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture, 221(10), 1543-1552.

Baines, T.S. & Shi, V.G. (2014). Servitization transformation: drivers, benefit and barriers. In Baines, T., Clegg, B. & Harrison, D. (eds.) Growth through servitization, Birmingham (UK): Aston University.

Brax, S. (2005). A manufacturer becoming service provider–challenges and a paradox. Managing Service Quality, 15(2), 142-155.

Burnes, B. (2011). Introduction: Why does change fail, and what can we do about it? Journal of Change Management, 11(4), 445-450.

Cook, M.B., Bhamra, T.A., & Lemon, M. (2006). The transfer and application of product service systems: from academia to UK manufacturing firms. Journal of Cleaner Production, 14(17), 1455-1465.

Ford, J.D., Ford, L.W. & D'Amelio, A. (2008). Resistance to Change: The Rest of the Story. The Academy of Management Review, 33(2), 362-377.

Gebauer, H. & Friedli, T. (2005). Behavioral implications of the transition process from products to services. Journal of Business & Industrial Marketing, 20(2), 70–78.

Gopalani, A. (2010). A new model for service businesses in product-centric firms. Journal of Business Strategy, 31(6), 4-11.

Hou, J. & Neely, A. (2013). Barriers of Servitization: Results of a Systematic Literature Review. Proceedings of The Spring Servitization Conference 2013, pp. 189-195.

Hughes, M. (2011). Do 70 per cent of all organizational change initiatives really fail? Journal of Change Management, 11(4), 451-464.

Johnstone, S., Dainty, A. & Wilkinson, A. (2008). In search of 'product-service': evidence from aerospace, construction, and engineering. The Service Industries Journal, 28(6), 861-875.

Kindström, D. (2010). Towards a service-based business model – Key aspects for future competitive advantage. European Management Journal, 28(6), 479-490.

Klarner, P. & Raisch, S. (2013). Move to the Beat – Rhytms of Change and Firm Performance. Academy Of Management Journal, 56(1), 160-184.

Kohtamäki, M., Partanen, J., Parida, V. & Wincent, J. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. Industrial Marketing Management, 42(8), 1374-1385.

Kuo, T.C., Ma, H.Y., Huang, S.H., Hu, A.H. & Huang, C.S. (2010). Barrier analysis for product service system using interpretive structural model. The International Journal of Advanced Manufacturing Technology, 49(1-4), 407-417.

Martin Jr, C. R. & Horne, D. A. (1992). Restructuring towards a service orientation: the strategic challenges. International Journal of Service Industry Management, 3(1), 25-38.

Martinez, V., Bastl, M., Kingston, J. & Evans, S. (2010). Challenges in transforming manufacturing organisations into product-service providers. Journal of Manufacturing Technology Management, 21(4), 449-469.

Matthyssens, P. & Vandenbempt, K. (2008). Moving from basic offerings to value-added solutions: Strategies, barriers and alignment. Industrial Marketing Management, 37(3), 316-328.

Mont, O.K. (2002). Clarifying the concept of product–service system. Journal of Cleaner Production, 10(3), 237-245.

Neely, A., Benedettini, O. & Visnjic, I. (2011). The servitization of manufacturing: Further evidence. Paper presented at the 18th European Operations Management Association Conference.

Oliva, R. & Kallenberg, R. (2003). Managing the transition from products to services. International Journal of ServiceI Management, 14(2), 160-172.

Sakao, T., Sandström, G. Ö. & Matzen, D. (2009). Framing research for service orientation of manufacturers through PSS approaches. Journal of Manufacturing Technology Management, 20(5), 754-778.

Turunen, T. & Neely, A. (2012). Organising servitization: an in-depth case study. Cambridge Service Alliance. Working paper.

Vandermerwe, S. & Rada, J. (1988). Servitization of business: adding value by adding services. European Management Journal, 6(4), 314-324.

Whelan-Berry, K.S., Gordon, J. & Hinings, C. (2003). The relative effect of change drivers in large-scale organizational change: an empirical study. Research in Organizational Change and Development, 14(2), 99-146.

Whelan-Berry, K.S. & Somerville, K.A. (2010). Linking Change Drivers and the Organizational Change Process. Journal of Change Management, 10(2), 175-193.

Yin, R.K. (2009). Case Study Research: Design and Methods. 4th edition, Thousand Oaks, California, Sage Inc. 219 p.

AUTHOR INDEX

Dr. Saara A. Brax, D. Sc. (Tech.)
Academy Post-doctoral Researcher, Aalto University, School of Science. Research interest: Business-to-business and industrial services, integrated solution business, service operations management, service marketing and management, service modularization, service development and innovation.
e-mail: saara.brax@aalto.fi

Tuomo Eloranta, M.Sc. (Tech)
Researcher and Doctoral Candidate, Aalto University, Department of Industrial Engineering and Management. Research interests: idea management, IT-based collection and development of ideas as well as change processes of innovation practices in organizations.
e-mail: tuomo.eloranta@aalto.fi

Dr. Max Finne, D. Sc. (Tech.)
Assistant Professor at the University of Warwick, Warwick Business School. Research interests: service network management, service operations of industrial companies, student-centered and technology-enabled teaching methods, such as flipped learning.
e-mail: max.finne@wbs.ac.uk

Prof. Jussi Heikkilä, D. Sc. (Tech.)
Professor of Industrial Management, particularly production and operations management at Tampere University of Technology, Department of Industrial Management, Tampere. Research interests: operations management, operations strategies, strategic purchasing.
e-mail: jussi.heikkila@tut.fi

Dr. Magnus Hellström, D. Sc. (Tech.)
Senior lecturer and docent at PBI Research Institute, Åbo Akademi Unversity, Turku. Research interests: project-related services and ecosystems, modular project and industry structures.
e-mail: mhellstr@abo.fi

Dr. Maria Ivanova-Gongne, PhD (Econ. & B.A.)
Postdoctoral researcher at Åbo Akademi University. Research interests: intercultural business relationships in industrial markets; the individual, managerial perspective on business interaction; managerial sensemaking, the role of cognitive and organizational schemas in managerial and organizational behavior and business communication across cultures.
e-mail: mivanova@abo.fi

Laura Kanto, M.Sc. (Tech.)
Chemistry, Product Manager at Medix Biochemica and Doctoral Candidate at Aalto University, Department of Industrial Engineering and Management. Research interests: constructing an organization's customer and user understanding for innovation processes; need for user and customer information/ knowledge in the different stages of innovation process.
e-mail laura.kanto@aalto.fi

Dr. Juha Kuusela, D. Sc. (Tech.)
Governing and developing new software architectures at Danfoss Drives, Gråsten, Denmark. Research interests: Software architectures for embedded multi-core systems for mixed criticality applications in dynamic and changeable real-time environments.
e-mail: juha.kuusela@danfoss.com

Sannamari Lukkaroinen, M. Sc. (Eng.)
Was a research assistant and researcher at Tampere University of Technology, Department of Industrial Management, Tampere. Research interests: customer information and business model innovations in service business.
e-mail: sannamari.lukkaroinen@gmail.com

Prof. Miia Martinsuo, D. Sc. (Tech.)
Professor of Industrial Management, particularly project and service business at Tampere University of Technology, Department of Industrial Management, Tampere. Research interests: management of project and service business; decision making in product and service development; multi-project organizing.
e-mail: miia.martinsuo@tut.fi

André Näsi, B.A. (Econ.)
Development Manager. He has several years of experience in business process development, customer service development, project management and voice of customer process management. He is currently studying for Master of Science in Economics and Business Administration in Hanken School of Economics.
e-mail: andre.nasi@outlook.com

Dr. Sanna Nenonen, D. Sc. (Tech.), M. Sc. (Stat.)
Postdoctoral researcher at Tampere University of Technology, Department of Industrial Management, Tampere. Research interests: Industrial services, servitization, risk and safety management.
e-mail: sanna.nenonen@tut.fi

Dr. Olga Perminova, D.Sc. (Tech.)
Senior researcher at PBI Research Institute and a post-doc researcher at Åbo Akademi University, Turku. Research interests: strategic management, especially decision-making and acting under uncertainty; development of industrial services and service operations; project management and industrial project business as well as foreign economic relations.
e-mail: olga.perminova@pbi.fi

Mari Tanskanen, M.Sc. (Econ.)
HRD Specialist
e-mail: mari.tanskanen@live.com

Dr. Juha Tiihonen, D.Sc. (Tech.)
Senior researcher at University of Helsinki, Department of Computer Science, Helsinki. Research interests: software variability management, product and service configuration, and installed base management.
e-mail: juha.tiihonen@cs.helsinki.fi

Dr. Taija Turunen, D. Sc. (Tech.)
Assistant professor at Aalto University School of Business, Department of Management Studies, Helsinki. Research interests: service operations, dynamic strategies, continuous change, systemic innovation, service driven platforms, digitalization and systemic competitive advantage.
e-mail: taija.turunen@aalto.fi

Eija Vaittinen, M. Sc. (Eng.)
Doctoral candidate at Tampere University of Technology, Department of Industrial Management, Tampere. Research interests: service innovations, customer acceptance and service delivery chains.
e-mail: eija.vaittinen@tut.fi

Lauri Vuorinen, M. Sc. (Eng.)
Doctoral candidate at Tampere University of Technology, Department of Industrial Management, Tampere. Research interests: project management and project business, particularly project control, project lifecycle aspects and multi-project management.
e-mail: lauri.vuorinen@tut.fi

Mikael Öhman, M. Sc. (Tech.)
Doctoral candidate and research project manager in the Logistics Research Group at the Department of Industrial Engineering and Management, Aalto University. Research interests: lean and other improvement tools in the context of industrial services; outcome based contracting and behavioral aspects of operational decision-making.
e-mail: mikael.ohman@aalto.fi

MIIA MARTINSUO, OLGA PERMINOVA-HARIKOSKI
& TAIJA TURUNEN (EDS.)

STRATEGIC CHANGE TOWARDS FUTURE INDUSTRIAL SERVICE BUSINESS

FIMECC's Future Industrial Services program (FutIS) was set up to promote the adoption and expansion of service business in industrial firms. FutIS program has pursued new competence and better profitability for participating industrial firms' service business, and even the transformation of the metals and engineering industry more broadly.

This book is a compilation of articles based on studies carried out within the FutIS program. Each article reports conceptual or empirical research results in a domain that has been considered as relevant among the metal and engineering industry companies either considering or undergoing service business transformation. Various aspects of the processes, practices and cultural ramifications of the strategic change towards service business are covered, through experiences gathered in some of the 20 Finnish industrial firms involved in the FutIS program.

The articles are grouped into three sections:

- Business opportunities through services
- Embedding services into operations and supply networks
- Servitisation as a strategic transformation

As service business has various implications on the strategies, technology support and daily routines in industrial firms, service business transformation is a long-term effort, calling for further research beyond the FutIS program. The chapters in this book both suggest and inspire forthcoming research in various domains.

fimecc

fimecc *fut*IS
HELPING TRANSFORM AN INDUSTRY

Tekes