



Esko Penttinen

TRANSITION FROM PRODUCTS TO SERVICES WITHIN THE MANUFACTURING BUSINESS

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ABSTRACT

Goods are distribution mechanisms for service provision. In a new emerging paradigm, tangible products, embodied with knowledge, are seen as "appliances" for the performance of services (Vargo & Lusch 2004a). In this dissertation, we look at the transition from products to services within the manufacturing business. Increasingly, manufacturing companies rely on services for both growth and increased profitability. The objectives of this study are (1) to describe, conceptualize, and illustrate the transition from focusing on products to focusing on services through a number of case examples in manufacturing companies, (2) to examine the requirements for the transition, (3) to explore the motives for the transition, and (4) to analyze the implications of the transition. To tackle these questions, we use both qualitative methods (case studies) and quantitative methods (survey-based regression analysis).

The main contribution of this study is the identification of information technology innovations as an important requirement and an enabling factor for this transition. Companies need new information systems, for example, in the form of condition monitoring from a distance and knowledge sharing through information systems. We argue that it would not be possible for manufacturing companies to move towards the service focus without these systems. Another contribution of the study is the observation that this transition requires manufacturing firms to move closer to the customer companies and to adopt a more relational form of interaction with their customers. Compared to the transactional type of interaction, the relational type exhibits stronger operational linkages, more extensive information exchange, and more adaptations by the seller.

The results also indicate that coercive and economic pressures act as the main motives for this transition. Customer companies are demanding more complete offerings including a greater degree of services (coercive pressures). There are also important economic incentives for manufacturing companies to move towards services. Services generate steadier revenue streams than product sales, and hence, manufacturing companies can protect themselves against market fluctuations by focusing on service contracts. In addition, service contracts can be seen as a good way to ensure the MRO (maintenance, repair, and operations) product business.

Keywords: service, transition, information technology, manufacturing

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TABLE OF CONTENT

PART I: OVERVIEW OF THE DISSERTATION

<u>1. INTRODUCTION.....</u>	<u>3</u>
1.1 BACKGROUND.....	5
1.1.1. SERVICES LITERATURE	5
1.1.2. BUNDLING LITERATURE	7
<u>2. RESEARCH OBJECTIVES, METHODOLOGY, AND THEORETICAL FRAMEWORK.....</u>	<u>9</u>
2.1 RESEARCH PROBLEM AND OBJECTIVES OF THE STUDY.....	9
2.2 THEORETICAL LENSES	10
2.2.1. TRANSACTION COST ECONOMICS	10
2.2.2. PRINCIPAL-AGENT PROBLEM	11
2.2.3. RESOURCE-BASED VIEW OF THE FIRM.....	11
2.2.4. INSTITUTIONAL ISOMORPHISM.....	12
2.2.5. EVALUATION OF THE THEORIES.....	13
2.3 OUTLINE AND METHODOLOGY OF THE STUDY	14
2.3.1. METHODOLOGY AND RESEARCH DESIGN	14
2.3.2. RESEARCH QUESTIONS AND METHODOLOGICAL CHOICES FOR EACH OF THE ESSAYS	17
2.4 RESEARCH QUESTIONS, POSITIONING THE PAPERS AND THEORIES	19
<u>3. REVIEW OF THE RESULTS.....</u>	<u>20</u>
3.1 OPPORTUNITIES AND CHALLENGES FOR B2B MANUFACTURING FIRMS: MOVING FROM PRODUCTS TO SERVICES – CASE SKF.....	20
3.2 IMPROVING FIRM POSITIONING THROUGH ENHANCED OFFERINGS AND BUYER-SELLER RELATIONSHIPS.....	22
3.3 EXPLAINING THE TRANSITION FROM PRODUCTS TO SERVICES IN THE MANUFACTURING BUSINESS	24
3.4 EXPLORING THE FEATURES OF SUCCESSFUL E-BUSINESS OFFERINGS	26
3.5 RESULTS OF THE THESIS.....	27
<u>4. EVALUATION AND CONCLUSIONS</u>	<u>28</u>
4.1 THEORETICAL IMPLICATIONS.....	30
4.2 MANAGERIAL IMPLICATIONS.....	32
4.3 POSITIONING THE FINDINGS TO EARLIER RESEARCH.....	33
4.4 LIMITATIONS AND FURTHER RESEARCH	36
<u>5. REFERENCES.....</u>	<u>37</u>

LIST OF FIGURES:

FIGURE 1. RESEARCH QUESTIONS.....	9
FIGURE 2. RESEARCH PROCESS (ACCORDING TO THE TERMINOLOGY OF EISENHARDT 1989B).....	16
FIGURE 3. RESEARCH QUESTIONS, POSITIONING THE PAPERS AND THEORETICAL LENSES	19
FIGURE 4. RESEARCH QUESTIONS AND RESULTS OF THE STUDY	27

PART II: THE ORIGINAL PAPERS

Penttinen, E. & Saarinen, T. (2005) Opportunities and Challenges for B2B Industrial Manufacturing Firms - case SKF. In eds. Saarinen, Tinnilä, and Tseng 2005. *Managing Business in a Multi-Channel World: Success Factors for E-Business*. Idea Group Publishing.

Penttinen, E. & Palmer, J. (2007) Improving Firm Positioning Through Enhanced Offerings and Buyer-Seller Relationships. *Industrial Marketing Management*, 36(5), pp. 552-564.

Penttinen, E. Explaining the Transition from Products to Services in the Manufacturing Business. "Unpublished"

Horsti, A., Penttinen, E. Saarinen, T. & Korhonen, P. Exploring the Features of Successful E-Business Offerings. "Unpublished"

1. Introduction

According to the new emerging paradigm in marketing, goods are seen as distribution mechanisms for service provision (Vargo and Lusch 2004a). Marketing has moved from a goods-dominant view, in which tangible output and discrete transactions were central, to a service-dominant view, in which intangibility, exchange processes, and relationships are central (Vargo and Lusch 2004a). It is not goods themselves that are useful to customers; it is the services that the goods deliver. Therefore, customers do not buy goods or services; they buy offerings which render services which create value (Gummesson 1995).

This change is very clear in business-to-business manufacturing. In the past, manufacturers concentrated on optimizing transactions and production output. The companies regarded their products as keys to improved profitability. Today, increasingly, manufacturing companies are relying on services in creating both growth and improved profitability. Services are thus becoming more and more important in business-to-business (B2B) manufacturing: today, they account for 60% of KONE's turnover (2005) and 43% of Wärtsilä's turnover (2005). What implications does this change have for manufacturing companies? How can companies move towards the service focus? What are the mechanisms that drive this change? It is the aim of this dissertation to examine the motives, the new requirements, and the implications of this transition as well as the change process itself.

Services represent between 60% and 80% of the GDPs of the world's advanced economies (Spohrer and Maglio 2005). However, service science is not yet seen as a legitimate field of science. Even as it is researched, written about, and taught, services management is not a discipline in its own right but rather a stepchild of academic fields such as marketing or operations (Kramer et al. 2005). This thesis (written in the department of business technology and information systems

science) aims at giving answers to these calls for research by contributing to the stream of literature on manufacturing services.

The thesis is multidisciplinary in nature and uses qualitative and quantitative research methods with the aim of theory and methodology triangulation. In the thesis, a number of case companies is used: SKF (producer of ball bearings), KONE (manufacturer of elevators), Wärtsilä (engine manufacturer), Canon (producer of printing machines), Lexmark (producer of printing machines), PBM Plastics (manufacturer of plastic cups), and Lamor Corporation (manufacturer of oil spill cleaners). All of these companies are experiencing increasing revenues from services (consultation, condition monitoring, maintenance services etc.). In addition to these case companies, the thesis draws on a survey consisting of 111 responses from business units among 60 Finnish companies.

The essay-based thesis shows that the information technology innovations by the supplier and the buyer's trust in the supplier turned out to be very important in the transition (Penttinen and Saarinen 2005). Moving towards services required the supplier firm to move towards a more relational contracting with the client (Penttinen and Palmer 2007). Coercive pressures stemming from customer companies as well as economic pressures act as the main drivers for this transition (Penttinen 2007). In addition, we use data from a survey conducted among 60 Finnish companies (both manufacturing companies and other companies) and show that B2B manufacturing companies should customize their market offerings, whereas B2C companies should be wary of customization (Horsti et al. 2007). Moving towards service-based business in manufacturing essentially means that the supplier customizes its offering to the market. This can be done by developing various services and bundling them together with the products.

Next, we will present the related literature on services and bundling. Then, we will discuss the research problem and the research questions in the second section. We will also go through the theoretical points of departure and discuss the methodological choices taken in the thesis. Finally, we will present the conceptual framework for the thesis and discuss the results of the study.

1.1 Background

The thesis draws on the literature on services which is discussed in the fields of economics, marketing, and operations. In addition to the services literature, the transition is conceptualized using the literature on bundling. Throughout this study, we use two main streams of literature to conceptualize the transition from products to services: the services literature and the bundling literature. We also refer to the business model literature which distinguishes the offering as an integral part of a more comprehensive business model. According to Hedman and Kalling (2003), other components include customers, competition, activities and organization, resources, suppliers, and the scope of management. In this study, we examine the offering level consisting of physical components and service components.

1.1.1. Services literature

There are three basic approaches to the definition of services. The first approach lists the descriptive characteristics (or non-characteristics) of services (ECC 1991; Zeithaml et al. 1985). The second approach establishes a continuum from pure products to pure services (often using one of the characteristics from the first approach) (Rathmell 1966; Shostack 1977). The third approach defines services as activities, performances, or changes in the condition of an economic unit (Hill 1999; Hill 1977; Vargo and Lusch 2004a). We will next briefly go through each of these approaches.

The Economic Council of Canada (ECC) defines services using the following characteristics: (1) intangibility, (2) direct contact between producer and consumer (the idea of co-production), (3) non-transferability, and (4) non-storability (ECC 1991). Similarly, Zeithaml et al. (1985) list intangibility, heterogeneity, inseparability, and perishability (IHIP) as the distinguishing traits of services. Recently, however, this IHIP framework has been criticized for being the remnant of a goods-based manufacturing model of exchange (Lovelock and Gummesson 2004; Vargo and Lusch 2004b). For example, the tangible character of some goods such as electricity can be questioned

(Drechsler 1990). Similar comments can be made on other characteristics that are used to define services. For example, we question the heterogeneity of some standardized banking services (such as checking account services), perishability of teaching services, and the inseparability of production and consumption of database services. We conclude that although these characteristics are very useful in describing how we perceive services, none of these characteristics or traits leads to a universal definition of services.

The second approach to define services is to formulate a continuum from pure products to pure services. Therefore, instead of a dichotomy, products and services are seen as combinations of discrete elements which are linked together to form a continuum. For example, Shostack (1977) uses the notion of tangibility to draw a continuum of market entities from tangible dominant to intangible dominant. She sees the example of salt as the purest form of products and teaching as the purest form of services. Similarly, Rathmell (1966) argues that economic products lie along a goods-services continuum. He uses "the percentage of major classes of personal consumption expenditures allocated to services" to position the products on the continuum.

The third approach to define services is to describe them as activities, performances, or changes in the condition of an economic unit. This approach is illustrated with the seminal definition given by Hill (1977,336): *"A service is a change in the condition of an economic unit which results from the activity of another economic unit. The ownership of a good can be transferred from one economic unit to another in an exchange transaction, whereas no such exchange is possible for a service."* Similarly, Lovelock and Gummesson (2004) put emphasis on the fact that services offer benefits through access or temporary possession, instead of ownership. Gadrey (2000) extended Hill's work by adding the notion of the right to use a technical and human capacity: *"Any purchase of services by an economic agent B (whether an individual or an organization) would, therefore, be the purchase from organization A of the right to use, generally for a specified period, a technical and human capacity owned or controlled by A in order to produce useful effects on agent B or on goods*

C owned by agent B or for which he or she is responsible.” Lovelock and Wright (1999) define services as acts or performances: *“A service is an act or performance offered by one party to another. Although the process may be tied to a physical product, the performance is essentially intangible and does not normally result in ownership of any of the factors of production.”* Finally, Vargo and Lusch (2004a) define services as *“application of specialized competencies through deeds, processes, and performances for the benefit of another entity or the entity itself”*.

In this thesis we adopt the Vargo and Lusch (2004a) definition but also measure the depth of the share of services within a given buyer-seller relationship. This is similar to the second category of defining a continuum of offerings, ranging from product-like to service-like. We also use the term completeness of an offering to describe to what extent services are included in an offering. This is consistent with Anderson (2002) who discusses, among other issues, who should assemble a gas grill, the consumer or the company. Similarly within manufacturing, more complete offerings often exhibit a greater scale of services than less complete offerings.

Within the literature on manufacturing, researchers talk about the relative importance of tangible goods and the relative importance of services. Oliva and Kallenberg (2003) argue that the relative importance of services is growing and that the companies are moving towards tangible goods as "adds-on", something that comes together with the services. This is completely different from the past when – in manufacturing companies – services were seen as "adds-on". Similarly, Wise and Baumgartner (1999) suggest that manufacturers should go downstream towards the customers: *"now that providing services is more lucrative than making products, the old foundations for success in manufacturing are crumbling. Smart manufacturers are creating new business models to capture profits at the customer's end of the value chain."*

1.1.2. Bundling literature

The bundling literature, initiated by Burstein (1960) and Stigler (1963), and later formally formulated by Adams and Yellen (1976), originally seeks to contemplate why firms often sell their

goods in packages: sporting and cultural organizations offer season tickets, restaurants provide complete dinners, banks offer checking, safe deposit, and travelers' check services for a single fee, and garment manufacturers sell their retailers clothing grab bags comprised of assorted styles, sizes, and colors (Adams and Yellen 1976). This original article has been the reference for numerous articles, both theoretical and empirical. After the Adams and Yellen (1976) seminal paper, the literature on bundling in the early stages was mainly economics-oriented. Recently, marketing literature has witnessed a spurt in articles devoted to the study of bundling (Venkatesh and Kamakura 2003).

More recently, Stremersch and Tellis (2002) provide a synthesis of strategic bundling in marketing and articulate the different bundling strategies. It adds the bundling focus to the Adams and Yellen (1976) framework: either price or product. Price bundling is defined as the sale of two or more separate products as a package at a discount, without any integration of the products (e.g. variety pack of cereals). Product bundling is the integration and sale of two or more separate products at any price (e.g. multimedia PC). (Stremersch and Tellis 2002). See also Penttinen (2004) for a systematic literature review of the bundling literature.

In this thesis, we argue that the transition from products to services within the manufacturing sector essentially means bundling products and services together and thus formulating a more complete offering. For example, a bearing manufacturer may start providing the market with runnability of bearings in which bearings and maintenance services are bundled together. This indicates a move to a more complete market offering in which the supplier does more for the company than before. This is closely related to the definition of services being work done for someone else.

2. Research objectives, methodology, and theoretical framework

2.1 Research problem and objectives of the study

This study is about the transition in focus from products to services within the manufacturing sector. The objectives of this study as a whole, the original papers, and this introductory part are as follows:

1. To describe, conceptualize, and illustrate the transition from product focus to service focus through a number of case examples in manufacturing companies
2. To examine the requirements for the transition
3. To explore the motives for the transition
4. To analyze the implications of the transition

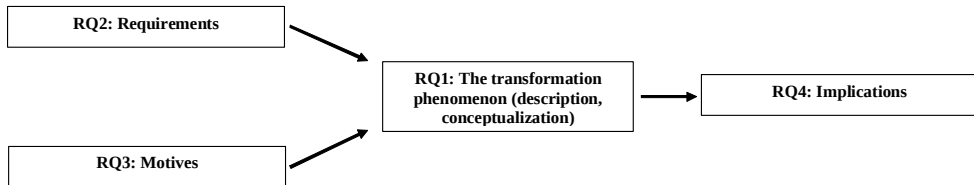


Figure 1. Research questions

These objectives aim at creating new knowledge about the possibilities of enhancing the service operations in manufacturing companies. In this study, theory and methodology triangulation is used. The thesis uses more than one theoretical scheme in the interpretation of the transition from products to services. Furthermore, the research problem is examined through different sets of empirical data and using different research methodologies. Both quantitative and qualitative research methods are used with the aim of methodology triangulation. By combining multiple theories, methods, and empirical materials, we aim at overcoming the weaknesses or intrinsic

biases and problems that come from single-method, single-theory studies. We will next present the theoretical lenses and then discuss the methodological issues.

2.2 Theoretical lenses

As theoretical lenses, we use transaction cost economics, the principal-agent problem, the resource-based view of the firm, and institutional isomorphism. Transaction cost economics is originated from micro-economics, the principal-agent problem from economics, the resource-based view of the firm from strategic management and micro-economics, and institutional isomorphism from sociology and organizational theory. We argue that, together, these theories provide a more holistic view of the researched phenomenon and insights into the research questions.

2.2.1. Transaction cost economics

Transaction cost economics (Williamson 1985; Williamson 1975) examines how interactions between economic entities are organized. It concentrates on the differences between markets and hierarchies, but acknowledges a third form, "future deals" (Llewellyn 1931) that are located between the market extreme and the hierarchy extreme. Williamson (1985) names these as hybrid transactions and situates them in between discrete market transactions and highly centralized, hierarchical transactions. According to this theory, the transaction costs can be used to define the optimal form of contracting. For the purposes of our study, we have divided transaction costs into coordination costs and transaction risk [similarly as in Clemons and Row (1992)]. Coordination costs are the direct costs of coordinating actions between economic agents. Examples are the cost of obtaining information (Stigler 1961) and the cost of coordinating input in production (Alchian and Demsetz 1972). Transaction risk is the cost related to the potential of cheating or opportunistic behavior (Williamson 1985). In this thesis, we use transaction cost economics to evaluate the different forms of organizing transactions and interactions between the manufacturing company and its clients.

2.2.2. Principal-agent problem

The principal-agent theory investigates the problem of motivating one party to act on behalf of another. Here, an economic actor, the principal, hires another actor, the agent, to perform tasks on her behalf but cannot ensure that the agent performs these actions well. There are two main problems which the agency theory addresses. There is the agency problem in which the desires and goals of the principal and the agent are in conflict, and it is difficult or costly for the principle to verify what the agent is actually doing (Eisenhardt 1989a). A natural remedy to this problem is to invest resources in the monitoring of actions (Holmstrom 1979), or to provide incentives for the agent (Grossman and Hart 1983). Another problem is the problem of risk sharing that arises when the principal and the agent have different attitudes towards risk (Eisenhardt 1989a). Related to this thesis, we argue that when manufacturing companies (agents in this case) are moving to the service focus (in which services constitute the offering instead of mere tangible products), their customer companies (principals) may find it more difficult to observe the performance of the agent.

2.2.3. Resource-based view of the firm

The resource-based view of the firm argues that firms possess resources and that some of those resources can lead to the creation of competitive advantage. The physical resources of a firm consist of tangible things: plant, equipment, land, and natural resources, raw materials, semi-finished goods, waste products and by-products, and even unsold stocks of finished goods. There are also human resources available in a firm: unskilled and skilled labor, clerical, administrative, financial, legal, technical, and managerial staff (Penrose 1959). The resource perspective provides a basis for addressing some key issues in the formulation of strategy, such as which resources should be developed through diversification or what types of firms it would be desirable for a particular firm to acquire (Wernerfelt 1984). According to Barney (1986), a firm seeking greater than normal economic performance should make its strategic choices on the basis of its unique skills and capabilities, rather than from the analysis of its competitive environment. Again, related to this

thesis, we are interested in exploring how new resources and capabilities are used when manufacturing companies proceed from product focus to service focus.

2.2.4. Institutional isomorphism

Institutional theory examines how structures, rules, norms, and routines become established as authoritative guidelines for social behavior. In this thesis, we refer to DiMaggio and Powell (1983) who seek to explain why organizations in a specific line of business (as in the case of manufacturing companies) grow increasingly similar to one another. Borrowing from population ecology, they use the concept of isomorphism, which is *"a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions"* (DiMaggio and Powell 1983). They distinguish three mechanisms that trigger institutional isomorphic change. The first is external pressure, e.g., legal obligations and standards, towards similarity (coercive isomorphism); the second is uncertainty, inducing imitation and copying of successful organizational models (mimetic isomorphism); and the third is related to the cognitive and normative base of the professions which shape organizations (normative isomorphism). Within information systems, institutional isomorphism has been used to study IT innovation, IT development and implementation, and IT adoption and use (Mignerat and Rivard 2005). As an example, Swanson and Ramiller (2004) argue that mindlessness in innovating with IT may be rooted in what is called institutional preemption, meaning that in their IT structures and practices, firms often come to look more alike than might be expected given the differences in their individual circumstances. For positioning the institutional perspective in information technology, we refer the reader to Orlikowski and Barley (2001) and to Mignerat and Rivard (2005). In this thesis, we use the institutional theory to explore the mechanisms that drive manufacturing companies to adopt the service focus.

2.2.5. Evaluation of the theories

In the thesis, we use three theories (transaction cost economics, resource-based view of the firm, and principal-agent problem) to examine what implications the transition towards the service focus incurs to companies. We use the fourth theory (institutional isomorphism) to examine the motives for the transition. Three of the four chosen theoretical lenses originate from economics. While transaction cost economics and agency theory talk about successful contracting, the resource-based view of the firm talks about sustainable competitive advantage through assets, capabilities and resources. Broadly speaking, the resource-based view suggests that firms seek to capitalize on and increase their capabilities and endowments, whereas organizational economics asserts that firms focus on minimizing the costs of organizing (Combs and Ketchen Jr. 1999). Institutional theory, on the other hand, originates from organization theory and aims at explaining institutional emergence.

What, then, are the benefits and drawbacks of using four different theoretical lenses? Concerning the benefits, by bringing multiple perspectives to bear on the organizational phenomena is one of the appealing qualities of strategic management research (Combs and Ketchen Jr. 1999). More important and valuable contributions are apparent when strategy is viewed as a pluralistic arena where many disciplines and methodologies meet and compete to answer a set of applied research questions (Meyer 1991). In addition, by using several theoretical frameworks, it is possible to obtain a more holistic view of the subject matter than by using one specific theory. Overall, the objective of the thesis is to provide a more holistic view of the transition from products to services, and this calls for the use of multiple theoretical lenses as well as multiple research methods. Drawbacks of using a collection of theories instead of one? In some cases, the suggestions of the theories might be in conflict. For example, some resource-poor firms confront a dilemma in that the resource-based view of the firm points them towards cooperation whereas transaction cost economics discourages cooperation (Combs and Ketchen Jr. 1999). However, Silverman (1999) argues that while conflicts between the two theories exist (transaction cost and resource-based), the

strong complementarities between them should not be ignored. Principles from transaction cost economics can be integrated into resource-based prescriptions and recommendations concerning diversification. For example, some rent-generating resources might be too asset-specific to allow contracting.

2.3 Outline and methodology of the study

Next, we discuss the research design and then present the research methodologies and specific research questions of each paper. The overall research questions are (1) to describe, conceptualize, and illustrate the shift from product focus to service focus through a number of case examples in manufacturing companies, (2) to examine the requirements for the transition, (3) to explore the motives for the transition, and (4) to analyze the implications of the transition.

2.3.1. Methodology and research design

In this dissertation, we use both qualitative and quantitative research methods to address the research questions described in 2.1. Consequently, the empirical material comes from the qualitative interviews with the case companies (SKF, Lamor, PBM Plastics, KONE, Wärtsilä, Canon, and Lexmark) and from the quantitative survey among 60 Finnish companies¹. Overall, during the course of research, the research approach moved from inductive reasoning to more deductive reasoning. To illustrate this progression, the first paper was a descriptive, exploratory single-case study with very few a priori constructs. We were interested in understanding and describing the transition that took place in the company and chose the theoretical frameworks in dialogue with the empirical observations. Conversely, the last two papers are more deductive, with clearly defined hypotheses to start with. In the third paper, we wanted to find out what the mechanisms are that explain the transition. We used an a priori framework (coercive, normative, and mimetic forces) and tested the framework by conducting clearly structured interviews at the

¹ Thanks to co-author Aleksi Horsti for sharing data.

case companies. In the fourth paper, we tested how nine features of the market offering affect the profitability of electronic business.

The research process started in autumn 2001 with initial, informal discussions with the first case company, which was the bearing-producer SKF. Based on these discussions, we formulated the first two research questions, which were (1) to conceptualize and illustrate the transition with empirical data and (2) to examine the requirements for the transition. We got access to three client companies and conducted interviews in each of these companies representing three different industries (paper, energy, and steel). Based on these data, we wrote the first paper discussing how this specific company moved its focus from products to services. To further deepen our understanding and to get comparative data, we decided to conduct interviews with three additional case companies (PBM Plastics, Lamor, and KONE). Using these data from four companies, we wrote the second paper addressing the first two research questions. The additional case companies allowed for cross-case pattern search, and we were able to discuss how these companies had made the move towards service-based concepts.

Having found answers to the first two research questions to some extent, we then developed two additional research questions: we wanted to examine the mechanisms that drive companies to adopt the service focus (research question 3) and, in addition, we were interested in investigating the implications of the move towards the service focus to companies (research question 4). In order to address the third research question, we turned to three additional case companies (Canon, Lexmark, and Wärtsilä). One reason for choosing these three companies as case companies was the fact that all of these companies had recently made announcements of new service concepts. We conducted structured interviews in these companies examining the drivers that explain the transition. To address the fourth research question, we used quantitative data from 60 Finnish companies. Finally, we turned to the existing literature and searched for conflicts and similarities to the findings of this

present study. The research process is depicted in the following figure. We use the terminology by (Eisenhardt 1989b).

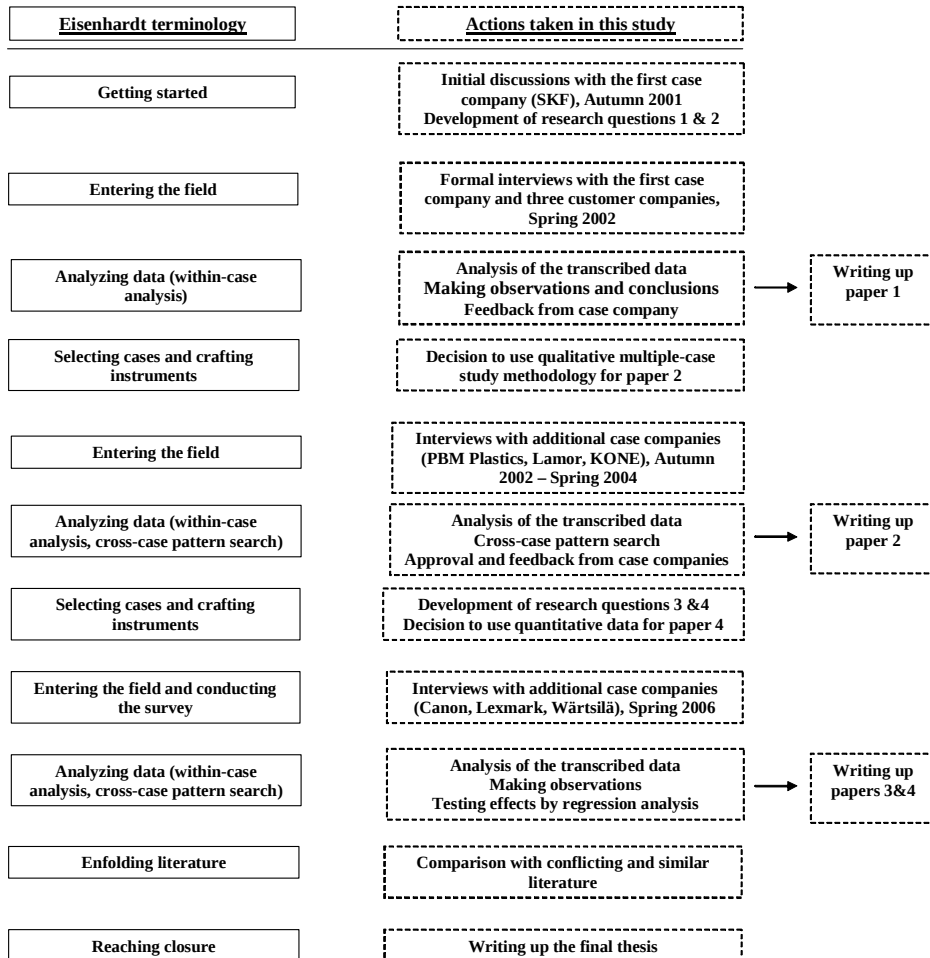


Figure 2. Research process (according to the terminology of Eisenhardt 1989b)

To sum up, the first three papers are qualitative interview-based case studies. The case study methodology has a distinct advantage when a "how" or "why" question is being asked about a contemporary set of events, over which the investigator has little or no control (Yin 1994). Furthermore, the strength of the case study approach is that it enables the capture of "reality" in

considerably greater detail and the analysis of a considerably greater number of variables than is possible with many other approaches (Galliers 1992). A drawback of the case study approach is that it provides limited possibilities for generalizing the results. Therefore, we adopt a quantitative survey-based approach in the fourth paper. Here, we aim at more generalizable results using linear regression analysis. We will next discuss the methodological choices of each of the essays.

2.3.2. Research questions and methodological choices for each of the essays

The first paper, “*Opportunities and Challenges for B2B Industrial Manufacturing Firms - Case SKF*”, presents a firm that has recently repositioned itself as a full-service bearing supplier. The objective of the paper is to illustrate the challenges that this change brings to this specific manufacturing company. This research paper is a single-case study describing the evolution from merely pushing bearings to the market to competing with services and maintenance contracts. More specifically, the case SKF is based on over a dozen interviews with the CEO and CIO of SKF Finland as well as three client companies of SKF over a 2.5-year period in 2001-2004. The paper uses the concepts of full-service contracts (Stremersch et al. 2001) and service process analysis (Tinnila and Vepsäläinen 1995) to conceptualize the transition. We argue that by using these concepts, we can track the changes taking place in the company in greater detail.

The second paper, “*Improving Firm Positioning Through Enhanced Offerings and Buyer-Seller Relationships*”, examines the transition and connects it with the literature on buyer-seller relationships. The objective of the paper is to compare the paths that these companies have taken to reach more complete offerings exhibiting a greater degree of services. To attain this objective, we use the theories of transaction cost economics, the resource-based view of the firm, social exchange theory, and principal-agent theory as underlying theoretical foundations. These theories give advice on the decision problem of organizing activities between organizational entities, on the problem of diversification, and also on buyer-seller relationships. The paper adopts the multiple-case study methodology by drawing on four manufacturing companies (SKF, KONE, Lamor, and PBM

Plastics). In addition to the empirical observations from the case SKF, the case Lamor was conducted during the period between Fall 2003 and Fall 2004, and includes several discussions with the CEO, the CIO, the business development director, and the business controller. The case PBM Plastics is based on discussions with the CEO during the period from Fall 2002 to Spring 2004. Most of the interviews with SKF, Lamor, and PBM Plastics were tape-recorded and transcribed. The case KONE is primarily based on three doctoral dissertations assessing firm capabilities and product/service offerings.

The third paper, *“Explaining the Transition from Products to Services”*, explores the motives behind this transition. Whereas the other papers see the transition as a way to differentiate from competitors, here, the idea is to look at the homogenization of companies. In other words, we argue that companies are in fact starting to show close resemblances, for example, in terms of their strategic focuses and marketing slogans. Therefore, the objective of this paper is to examine the motives behind this process of homogenization. To this end, we use the concept of institutional isomorphism (DiMaggio and Powell 1983) and discuss the coercive, mimetic, and normative forces. The paper uses multiple-case study methodology and aims at finding similarities and differences in the cases of SKF, Canon, Lexmark, Wärtsilä, and KONE. In addition to the empirical material on SKF, we conducted interviews at Canon, Lexmark, Wärtsilä, and KONE in 2005-2006. These interviews were structured, lasted 1.5 hours each, and were transcribed by the author.

The fourth paper, *“Exploring Success Factors and Market Offerings: A Comparison of Manufacturing-Units and Service-Units”*, aims at examining the factors related to the company’s market offering and how they affect the electronic business profitability of the firm. The paper uses quantitative methods in the form of survey and linear regression analysis. The initial factors were derived from literature, expert interviews, and pilot testing of the questionnaire. The actual survey was sent out to 450 respondents in 61 companies, and 111 responses from 60 different companies

were received. Concerning the methodological benefits and drawbacks, while the survey data is limited to the actual questions on the questionnaire and does not allow for follow-up questions, the data nevertheless provides a larger-scale analysis of the features related to the companies' market offerings.

2.4 Research questions, positioning the papers and theories

This thesis aims at exploring what new requirements are needed when moving toward the service focus, and also what motives do companies have for the transition, at describing the process itself, and at examining the outcomes of the transition. The following figure depicts the positioning of the papers. We will next briefly discuss why these four theories were chosen as the theoretical lenses to be used in the study.

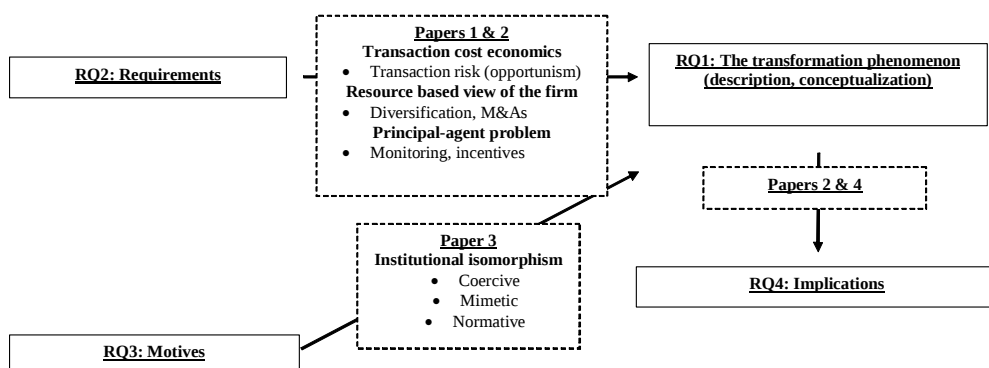


Figure 3. Research questions, positioning the papers and theoretical lenses

To analyze the requirements for the change, we use the theories of transaction cost economics, the principal-agent problem, and the resource-based view of the firm. More specifically, we use the notions of transaction risk and opportunism (TCE), diversification (RBV), and monitoring and incentives (principal-agent). These theories aim at explaining why certain forms of contracting are suitable for certain situations, how to motivate an agent to act in the interests of the principal, and what kind of resources are needed when companies seek sustainable competitive advantage.

To explore the motives for adopting the service focus, we use the institutional theory and discuss the coercive, mimetic, and normative processes. Here, we observe a number of companies making the same kind of strategic decisions to focus on services. The theory to explain this kind of isomorphic change is that of institutional isomorphism (DiMaggio and Powell 1983).

We conceptualize the process using the literature on services and bundling. We find these notions suitable when looking at the real-life case examples. We will next review the results of the individual papers and then proceed to evaluating the results of the thesis.

3. Review of the results

We will next review the results of each separate research paper. First, the results are reviewed as individual research projects. Then, we link the results of the research paper to the research framework discussed earlier.

3.1 Opportunities and challenges for B2B manufacturing firms: moving from products to services – case SKF

In this paper, we describe one manufacturing company (SKF) and discuss its evolution from merely acting as a bearings supplier to offering maintenance service contracts. The shift is conceptualized using the notion of full-service contracts (Stremersch et al. 2001), which are contracts that use bundling of products and services and are an extension in meeting customer needs. The company, SKF, first extended its product range to include additional products and services that support the core product, bearing (extension in meeting customer needs). These new products and services included, for example, enhanced monitoring systems and training services. Then, in the second phase, SKF bundled these products and services together and started to offer operability of bearings as a full-service concept.

The paper also presents the evolution of maintenance at SKF. Traditionally, SKF conducted component sales in which the price of the product defined the revenues to SKF. These products

included, e.g., bearings, seals, chambers, lubricants, and installation tools. Then, depending on the depth of the relationship between SKF and its customer, the revenues were defined as service fees (e.g. condition monitoring, installation, and training services), package deals (a combination of products and services), and ultimately as based on performance (SKF takes responsibility of the functioning of the machine).

The findings suggest that information technology innovations play a critical role in the transition from product-based revenue logic to the service-based concepts. At SKF, there were two main information technology projects that set the stage for the transition: intelligent bearings and *endorsia.com*. With the *intelligent bearings*, the user can get more accurate data on the condition of the bearing by measuring the run-out and the vibration of the bearing. This can be done with the help of a sensor that is attached to the bearing or the bearing housing. SKF offers its client software to be used with these intelligent bearings. The software makes a connection between the client's enterprise resource planning systems and SKF's information systems. For example, this allows the replenishment processes to be handled automatically. *Endorsia.com* is an electronic marketplace allowing the users to connect with their preferred suppliers and customers at a single interface and to create a platform for doing business. The user can use this single interface to access real-time technical information, product availability, delivery times, and conditions. These two information systems make it possible for SKF to offer maintenance services more economically than before.

When discussing the new business concept with three customer companies of SKF, it became clear that the long-term business relationship with SKF was vital. They clearly stated that they have long-term plans with SKF concerning, for example, the new product development projects, and that the reputation of SKF is essential when moving towards more service-based concepts between them and SKF. Clearly, it would have been very difficult for some other bearing supplier to make a sales pitch proposing a service-based model. Therefore, we see that trust in the supplier is a very important requirement when moving towards service-based revenue models.

Related to the research framework, we argue that information technology innovation and trust are important requirements for the transition.

3.2 Improving firm positioning through enhanced offerings and buyer-seller relationships

In this paper, we analyze the strategic repositioning of firms through changes in their market offerings and buyer-seller relationships. Based on literature on strategy, marketing, economics, and information systems, we formulate a two-by-two matrix using the completeness of offering (less complete vs. more complete) as the vertical axis, and the type of relationship (transactional vs. relational) as the horizontal axis. We evaluate this framework with four case studies (SKF, KONE, Lamor, and PBM Plastics) and observe that the move towards service focus necessitates a move to a more relational interaction with the customers. Relational interaction is measured using the amount of information exchange, operational linkages, legal bonds, cooperative norms, and relationship-specific adaptations by the seller (Cannon and Perreault Jr. 1999).

The paper offers both theoretical and managerial implications. The theoretical findings of the article reflect the theories of transaction cost economics, the principal-agent problem, and the resource-based view of the firm.

Transaction cost economics uses behavioral assumptions such as opportunism and bounded rationality as key concepts. When interviewing the customer companies of SKF, for example, it was clear that the customers were contemplating the additional costs of planning, adapting, and monitoring the more complete transactions. Clearly, they were afraid of any kind of opportunistic behavior on SKF's part. Similarly, uncertainty played a key role in the new business proposition by Lamor. Offering an availability-based service solution to oil spill response readiness is an example both of uncertainty and of assets which are highly specific.

The *principal-agent problem* considers a situation where an economic actor, the principal, hires another actor, the agent, to perform tasks on her behalf but cannot ensure that the agent performs

these actions well. When a manufacturing company (agent) chooses to adopt the service focus, it does more for the client company (principal) than it used to do, and the revenue logic changes from product-based to service-based or even performance-based. Here, it becomes more difficult for the principal to examine the agent's efforts. In the article, we discuss the examples of Lamor which uses the open-book principle to lower the monitoring costs for the principal, and PBM Plastics which allows the customers to monitor and audit the internal processes of PBM and thus show them the progress on newly developed products. Similarly, SKF has built in a profit-sharing scheme so that SKF, acting as the agent has an incentive to perform well.

The *resource-based view of the firm* considers a company in terms of its resources. From our case studies, it became clear that focusing on services requires new resources, assets, and capabilities from the seller. For example, Lamor acquired these resources by building a network consisting of suppliers and governmental units. Similarly, SKF networked even with its competitors to create the electronic marketplace, www.endorsia.com. This facilitated the information exchange between the partners, which was also evident at KONE and PBM, which both utilized information systems to more effectively tap organizational resources.

The *managerial findings* suggest that companies have used two main approaches for this transition: (1) the acquisition of new competencies through networking and (2) the implementation and use of innovative information technology. Many of the interviewed companies realized that they cannot move to the service focus on their own. One desired outcome of networking is the expansion of the pool of resources and capabilities available to the firm. Our empirical evidence indicates that some of the moves towards the service focus could not have been possible without enhanced information technology. For example, SKF and KONE could not move to the service focus without the intelligent maintenance surveillance from a distance. PBM's ability to collaborate with customers on new product development was directly supported by the use of information technology: the company uses web cameras, process control systems, and the Internet to maintain connections with

customers and to facilitate new product development. Lamor used information technology to create databases in order to facilitate the sharing of resources such as equipment and personnel.

Related to the research framework, this paper contributes by further illustrating the importance of information technology systems as enablers for this transition. It also discusses the acquisition of new resources through networking and through mergers and acquisitions as a requirement for the move. In addition, the need for transparency is observed as a requirement for the transition. A more relational type of interaction between the buyer and the seller is identified as an outcome of this change.

3.3 Explaining the transition from products to services in the manufacturing business

In this paper, we examine the mechanisms that drive manufacturing companies to adopt the service focus. We use the theory of institutional isomorphism (DiMaggio and Powell 1983) to explain why all manufacturing companies seem to start to rely on services. We discuss the coercive, mimetic, normative, and economic pressures driving this transition.

Coercive pressures result from formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which the organizations function. These pressures may be felt as force, as persuasion, or as invitations to join in collusion (DiMaggio and Powell 1983). The findings of the thesis suggest that – in the case of manufacturing companies' move towards services – these pressures result mainly from customer requests, and from legal and environmental regulations. We observed a general tendency for customer companies to concentrate on core competencies; and, often, these competencies do not include, e.g., maintaining machinery. As an example, a customer company representative of SKF stated that they had over 20,000 suppliers and that they wanted to cut that number first to one tenth and then onwards. This acted as an indicator to SKF to create a bundle which included a larger set of bearings and bearings-related services. In addition to these customer

needs, legal pressures regulate the maintenance of machinery. For example, buildings need to be assured of the functioning of their elevators (KONE), and the regulations on the environmental effects of power engines (Wärtsilä) are much stricter today than in the 1980's. These pressures contribute strongly to the mechanisms driving this change in manufacturing companies.

Mimetic pressures are illustrated through the benchmarking of successful companies operating in the same industry. While the companies did not see themselves as imitating other firms' practices, they did use the benchmarking of other companies. *Normative pressures* stem from the usage of consulting services and research organizations' reports. For example, the companies offering printers as a service to customer companies all reported having read the Gartner reports. These reports state that the printing business is the last information-technology-related area available for outsourcing.

In addition to these three isomorphic pressures, the *Economic pressures* driving manufacturing companies to adopt the service focus are considerable. First, offering services was seen as a good way to generate steadier revenue streams than the traditional product sales. This can help manufacturing companies to protect themselves against market fluctuations in the first-time installation market. Second, for example, the year-to-year maintenance contracts were seen as a means to ensure the MRO (maintenance, repair, and operations) business. Once the maintenance contract is done, the manufacturing company can use its own MRO products. Hence, *"printers and other related machines are often sold to customers at a very low margin. MRO business is most important to us. Service is a great way to ensure the MRO business."* (Printer producer).

Related to the research framework, mainly coercive and economic pressures have explanatory power over the manufacturing companies' transition of focus from products to services.

3.4 Exploring the features of successful e-business offerings

In this paper, we examine the success factors related to the company's market offering. We begin by extracting nine factors from the literature and expert interviews. These factors are "easy access to the offering", "quality of the offering", "economic pricing", "easy to use", "life-cycle management", "customer feedback utilization", "targeted services", "simple and clear features", and "wide range of goods and services". Using principal component analysis, we are able to find four main components: *quality*, *customization*, *ease of use*, and *wideness of product/service offering*. We use these components to explain electronic business profitability, and find that *quality* and *wideness of product/service offering* have a positive effect on profitability. We then test the effect using contextual variables: type of business unit (manufacturing vs. service), type of customer (B2B vs. B2C), and technology experience (late vs. early adopters) and find that *customization* has a positive effect on manufacturing units, B2B companies, and early adopters of technology.

According to our results, manufacturing units and B2B firms can obtain higher electronic profitability by customizing their market offering to customer companies. Obviously, customizing the market offering incurs costs to companies. Making these investments and customizing the market offering to each customer seem profitable primarily in the B2B market and for manufacturing companies. By customizing the market offering, the supplier does more for the customer than it used to do and thereby allows the customer to off-load some work. On the other hand, service units and B2C firms should be cautious of too much customizing their market offering. We argue that in the B2C market, companies should leave the customization process to the consumer, giving her the necessary tools for customization. This finding is consistent with Anderson (2002) where he examines pareto-efficient agreements between buyers and sellers and concludes that seeking pareto-efficient agreements only makes sense in markets where negotiation and customized agreements are possible (such as in B2B markets). In addition, we found that early adopters of technology (EDI and the Internet) can use customization to increase the profitability of

electronic business. These companies have experience in electronic business activities (experience in implementing electronic business as well as better knowledge of customer needs and wants) and can leverage this experience for better customization than the late adopters of technology.

Related to the research framework, we argue that B2B and manufacturing firms can use customization to increase their electronic business profitability. In addition, they should have a wide enough product/service offering to meet the extension in customer needs. These two notions, customization and the wideness of product/service offering have a positive effect on B2B and manufacturing companies' electronic profitability. Manufacturing companies' move towards the service focus essentially means customizing the market offering and including a larger variety of products and services to offer to customer companies.

3.5 Results of the thesis

Based on the discussion above, we formulate the following figure to present the findings of the thesis.

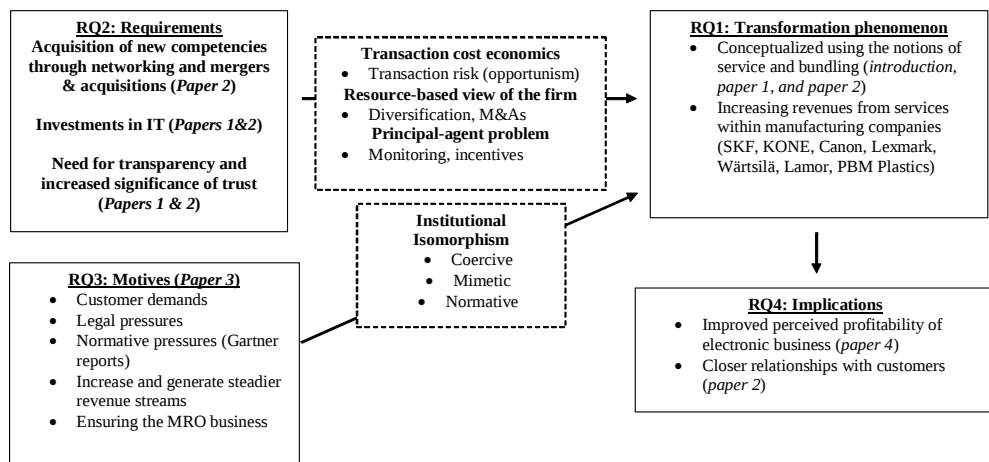


Figure 4. Research questions and results of the study

In the upper right-hand corner, we have the phenomenon where manufacturing companies increasingly rely on services. We conceptualize it using the literature on services and bundling, and illustrate the shift in seven case companies. In the upper left-hand corner, we have the requirements for the transition: the acquisition of new competencies, investments in IT, and the need for transparency and trust. These results were obtained using the theories of transaction cost economics, the resource-based view of the firm, and the principal-agent problem. In the lower left-hand corner, we have the motives for the strategic move toward services. These results were acquired using the theory of institutional isomorphism. In the lower right-hand corner, we have the outcomes of the transition: improved perceived profitability of electronic business and closer relationships between the buyer and the seller.

4. Evaluation and conclusions

This thesis set out to explore the phenomenon of moving the focus from products to services within the manufacturing business. The objectives of this study were (1) to describe, conceptualize and illustrate the transition from product focus to service focus through a number of case examples in manufacturing companies, (2) to examine the requirements for the transition, (3) to explore the motives for the transition, and (4) to analyze the implications of the transition. To tackle these questions, we used qualitative and quantitative methods in the form of case studies and a survey-based statistical regression analysis.

The main contribution of this study is the identification of information technology innovations as an important requirement and an enabling factor in this transition. All of the researched companies needed new information systems in the form of condition monitoring from a distance and knowledge sharing through information systems, for example. We argue that it would not have been possible for manufacturing companies to move towards focusing on services without these systems. Another contribution of the study is the observation that this transition has required manufacturing firms to move closer to the customer companies and thereby adopt a more relational

form of interaction with their customers. Compared to a transactional type, a relational type exhibits stronger operational linkages, more extensive information exchange, and more adaptations by the seller.

The results also indicate that coercive and economic mechanisms act as the main motives for this transition. As an example of a coercive pressure, customer companies are demanding more complete offerings including a greater degree of services. We consider these pressures as "informal persuasions" [see (DiMaggio and Powell 1983)] by some other organization. Therefore, we argue that these are coercive rather than normative pressures driving manufacturing companies to adopt the service focus.² We also extend the DiMaggio and Powell framework from the organizational and institutional setting to a more strategic one by saying that there are also important economic incentives for manufacturing companies to move towards services. Services generate steadier revenue streams than product sales, and hence, manufacturing companies can protect themselves against market fluctuations by focusing on service contracts. In addition, service contracts can be seen as a good way to ensure the product business.

What was perhaps the most surprising finding was that all the companies were contemplating the same set of problems. The case companies reflect, after all, rather heterogeneous industries (bearings, heavy machinery, printers, oil spill cleaners etc.), but all of these companies were making the same kind of strategic repositioning towards providing services. Their marketing slogans and sales pitches are alike, and the problems they encounter are similar. Condition monitoring from a distance was used by all of the researched companies. For example, the issues

² Positioning customer demands to one of the categories of isomorphic change has proved to be somewhat difficult. For example, Teo, Hock Hai, Kwok Kee Wei, and Izak Benbasat (2003), "Predicting Intention to Adopt Interorganizational Linkages: an Institutional Perspective," *MIS Quarterly*, 27 (1), 19-49. examine the assimilation of ERP systems. They consider the perceived dominance of customer adopters as a coercive pressure, and the extent of adoption among customers as a normative pressure. However, the objective here in this thesis is to explore the mechanisms, not to categorize them. Actually, DiMaggio, Paul J. and Walter W. Powell (1983), "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields," *American Sociological Review*, 48 (2), 147-60. themselves state that these types intermingle in empirical settings and that this typology is an analytic one, therefore the categories are often not empirically distinct.

discussed in paper 2 relating to the use of information technology in the form of condition monitoring from a distance were directly applicable to the additional cases of paper 3.

4.1 Theoretical implications

This thesis provides a holistic view of the transition from products to services by using a rich data set containing case studies and survey data, and by using four different theoretical lenses through which the phenomenon is examined. More specifically, we used transaction cost economics, the principal-agent problem, the resource-based view of the firm, and the concept of institutional isomorphism as theoretical points of departure. All of these theories work fairly well in this research setting and provide insights to the overall research problem. But what is missing from these theories in the light of this thesis or what can be added to these theories? We will next go through each of these theories briefly and make suggestions of points that the theories haven't taken into consideration.

Concerning transaction cost economics, the notions of bounded rationality, opportunism, uncertainty, and asset specificity were useful in analyzing the transition. However, when examining the interactions between the manufacturing companies and their customer companies, we found that trust and long-term relationships may alleviate the buyer's fear of opportunistic behavior on the manufacturer's part. Trust and reputation are not included in transaction cost theory. It treats transactions as though they occur without any knowledge of past behavior of the parties involved in the transaction. According to the findings of this current thesis, the lack of trust issues is a serious limitation when trying to apply the theory of transaction cost economics to the transition from product focus to service focus.

Similarly, we see the theory of the principal-agent problem very useful in analyzing the interaction between the two parties. This transition is a perfect example of a situation where a principal delegates work to the agent and cannot verify that the agent has behaved appropriately. The theory can inform us, for example, about the monitoring costs incurred to the principal. However, we

found that, often, these monitoring costs are not static. For example, information technology can be used to lower the monitoring costs incurred to the principal. In some cases, the agent actually has an incentive to lower these monitoring costs by using the open-book principle or by making it easy for the principal to observe the actions of the agent.

The transition from the product focus to the service focus is also a good example of a transition where new resources are needed. The resource-based view of the firm talks about strategic factor markets where firms buy and sell the resources necessary to implement their strategies. In the case of markets for companies, firms wishing to implement a strategy of product diversification may decide to do so by acquiring other firms. Or, a firm can sometimes choose to implement strategies that exploit resources already under their control. Again, we do not consider these resources to be static resources which are either in the control of the company or have to be acquired from the outside. While some of our case companies did acquire competencies by mergers and acquisitions, there were also cases where the current staff was completely re-educated. This altered the resource base of the firm and enabled the firm to pursue the service focus.

Institutional theory was used to explore the mechanisms that drive this change. Institutional theory considers the mechanisms of coercive, mimetic, and normative pressures driving organizations to become similar. What was missing from this framework was the acknowledgement of important economic pressures which drive manufacturing companies to strive towards steadier revenue streams and ensure the MRO business. Therefore, we extend this framework from the organizational and institutional setting to a more strategic one by adding these economic pressures to the framework³.

In addition to these theories, this thesis provides empirical illustrations for Vargo and Lusch (2004a) who state that goods are becoming distribution mechanisms for service provision and that

³ This category of economic pressures has been discussed previously from the point of view of institutional isomorphism by, e.g., Granlund, Markus and Kari Lukka (1998), "It's a Small World of Management Accounting Practices.," *Journal of Management Accounting Research*, 10, 153-79. when examining the homogenization of accounting practices.

all economies are services economies. Manufacturing companies have realized that goods are transmitters of operant resources⁴, and that wealth is obtained through the application and exchange of specialized knowledge and skills.

4.2 Managerial implications

What are the key takeaways for managers? Clearly, information technology plays a key role in the transition from the product focus to the service focus. All the researched companies in this thesis used innovative information systems. For example, SKF and KONE used innovative information systems in the form of condition monitoring and maintenance evaluation from a distance. Similarly, Lamor created databases in order to facilitate the sharing of resources such as equipment and personnel. Therefore, we argue that managers should evaluate how their information systems cope with the new requirements.

Similarly, managers should map their existing resources and evaluate what kind of new resources are needed when moving to the service focus. These resources might include, for example, personnel with a new kind of set of skills, resources that act as local service providers, or resources that add complementary products and services to be bundled to the initial market offering. There are basically three ways of acquiring these resources: buying them through strategic factor markets, acquiring them through networking, and modifying current resources through re-education. For example, the results of this study show that re-educating the current sales people to perform as service consultants instead of mere sellers of the product is challenging, but feasible. The adoption of the service focus, often, requires more relational interaction with the customer companies. Therefore, manufacturing companies should keep this in mind when hiring, for example, new sales managers.

⁴ Operant resources are resources on which an operation or act is performed to produce an effect; operant resources are employed to act on operand resources Vargo, Stephen L. and Robert F. Lusch (2004a), "Evolving to a New Dominant Logic for Marketing," *Journal of Marketing*, 68 (1), 1-17..

Should all CEOs now adopt the service focus in their companies? While many companies can generate additional and steadier revenue streams and extract improved profitability by focusing on services, not all companies need to reposition themselves as service providers. Let's take for example the case of IKEA. It has been very successful in providing the market with a less complete offering where the degree of service is very low and despite this, IKEA has been a success story. Hence, we see that CEOs need to analyze their business and develop market offerings that are suitable for their own businesses. This thesis has demonstrated how some firms have moved towards services and what kind of challenges and opportunities this change has opened for these companies.

We think that the way the manufacturing firms are evaluated will change. Today, when financial analysts evaluate the shares of manufacturing companies, they look mainly at the order books of manufacturing companies. Order books describe how many products, for example, engines an engine manufacturer has on its order. Usually, changes in the size of the order book have an effect on the company's share value. While the order-book is an important aspect to consider when thinking of the company's future cash flows, we see that the number of service contracts should be, in the future, as important as the order-book for analysts when trying to evaluate the firm.

4.3 Positioning the findings to earlier research

This study examines the changes taking place in the manufacturing industry: increasingly, manufacturing companies rely on services in search for revenue growth. Similarly, on the macro level, service industries have grown in importance compared to agriculture and manufacturing industries. Steady productivity increases in agriculture and manufacturing have meant that it takes ever fewer hours of work to produce or buy a pound of food, an automobile, a piece of furniture, or a home appliance. While productivity improves, demand for goods is somewhat capped; people can only consume limited quantities of food, automobiles, sofas, houses, or washing machines (Quinn 1992). It is this stagnated product demand that has pushed economic value downstream, away from

manufacturing and toward providing services required to operate and maintain products (Wise and Baumgartner 1999). These macro economic changes in industry structures act as important drivers for the transition towards services in manufacturing companies.

Although many manufacturing companies are currently experiencing the move towards the service focus, the topic is not something new. As an empirical example, one of our cases, KONE, turned to services already in the 1970s: in 1978, the maintenance business accounted for half of the company's turnover (Kela 1993). As a result, the topic has been researched in earlier literature under various labels. Researchers have examined, for example, the service-centered model of exchange and the emergence of the service paradigm (Quinn 1992; Vargo and Lusch 2004a), technologically facilitated networks and coordination (Malone and Rockart 1991; Poulymenakou and Klein 2006), systems selling (Mattsson 1973), and customer care (Helander 2004).

Over the past several decades, new perspectives have emerged that have a revised logic focused on intangible resources, the co-creation of value, and relationships; as opposed to tangible resources, embedded value, and transactions (Vargo and Lusch 2004a). This service-centered model of exchange suggests dynamic exchange relationships that involve performing processes and exchanging skills and/or services in which value is co-created with the customer (Vargo and Lusch 2004a). This dissertation provides empirical data from seven manufacturing companies that have adopted the service-centered model of exchange. Our work confirms that, increasingly, the role of goods is to act as transmitters of operant resources (see definition above). In other words, goods are intermediate products through which services can be rendered.

Resulting from the marriage of computers and networks, coordination costs have decreased. For example, data-processing systems helped to eliminate thousands of clerks from the back offices of insurance companies and banks (Malone and Rockart 1991). A second-order effect of reducing coordination costs is an increase in the overall amount of coordination used. As an example, Otis Elevator Company increased the amount of its coordination with its Otisline system (Malone and

Rockart 1991), in which highly trained multilingual operators receive trouble calls through a national toll-free number. This real-time availability of data vastly improved the management of repair activities (Malone and Rockart 1991). Related to our study, these improvements in coordination technologies have paved the way for innovative service concepts in manufacturing companies.

The recent advances in ICT infrastructures have created a situation in which companies are forming networks specifically to create innovative forms of business (Poulmenakou and Klein 2006). Many small and medium sized companies have identified value propositions, which are based on technologically facilitated network effects (Poulmenakou and Klein 2006). Similarly, one of our findings is the realization that – when moving to the service focus – companies need to create a network and acquire a pool of resources which are coordinated through innovative IT solutions (e.g. equipment and knowledge sharing through information systems and condition monitoring from a distance).

Systems selling literature points out that the firm should be market- or customer-oriented and not product-oriented (Mattsson 1973). In systems selling, an individual supplier supplies the whole system including the software components as opposed to product selling where the supplier supplies only one of the system's components (Mattsson 1973). In this stream of literature, the concept of customer care has been defined as *“integrated and proactive approach which ensures that customers can fully utilize the benefits of the supplier's value proposition”* (Helander 2004). Our research is related to the concepts of systems selling and customer care. However, in this dissertation, we look at a more fundamental change in the way companies formulate their product/service offerings. In some cases, the seller even discourages the purchase of the product itself, inviting the buyer to purchase operability and availability of the product. This is often the case when printing companies approach their B2B customers. As another example of a more fundamental change, we must remember that KONE moved to services already in the 1970s but it

is only recently that KONE has started offering availability of elevators instead of regular service visits and machine parts.

4.4 Limitations and further research

This study is about the transition from products to services. We concentrate on the manufacturing companies' change from the product focus to the service focus. As a limitation of the study, we see the relatively small number of the case companies restricting the generalization of the results. In this study, we describe the changes taking place in seven case companies (SKF, KONE, Canon, Lexmark, Lamor, PBM Plastics, and Wärtsilä). Further research could take the results of this current study and test them in a larger set of manufacturing companies.

This thesis has concentrated on manufacturing firms. Therefore, we aim at generalizing the results of this current study mostly to the manufacturing industry. However, a similar transition can be observed in several other industries as well. Offices, for example, are increasingly being offered as comprehensive service bundles (Nurmi 2004), in which different kinds of products and services are bundled for the customer company (actual premises and furniture, but also, e.g., postal, restaurant, lobby, maintenance, and cleaning services). As another example, innovative car sharing clubs, such as the Citycarclub, make it possible for consumers to join a car sharing club and thus have no need to own their cars. In this case, customers are not purchasing goods (automobiles) but the right to use a good. Services are often distinguished from goods by the fact that the ownership is not transferred in the case of services.

This study examines the effect of focusing on services on electronic business profitability of the firm. While it is interesting to find that the service focus contributes to the electronic business profitability of the firm, further research could, for example, examine the effect of the service focus on the overall profitability of the firm. What kind of an effect does the shift in focus from product to service have on manufacturing firms? A research setting might, for example, examine the timing of focusing on services and its effect on overall business profitability.

Managers and consultants talk about the "productization" of maintenance services. By this, they mean standardized service contracts in which there is little room for negotiation and adaptations. Further research could look into these contracts and examine the levels of standardization of these maintenance contracts.

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PART II: THE ORIGINAL PAPERS

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ESSAY 1: Penttinen, E. & Saarinen, T. (2005) Opportunities and Challenges for B2B Industrial Manufacturing Firms - case SKF. In eds. Saarinen, Tinnilä, and Tseng 2005. *Managing Business in a Multi-Channel World: Success Factors for E-Business*. Idea Group Publishing.

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Chapter VIII

Opportunities and Challenges for B2B Manufacturing Firms: Moving from Products to Services-Case SKF

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Abstract

Today, many traditional manufacturing firms are focusing on their service operations, which are often seen as a better source of revenue than the first-time installations. Information and communications technology (ICT) can accelerate this process by offering efficient ways to deliver services to the customers and by allowing companies to transform their traditional product strategies to services. This chapter tells the story of a traditional component supplier that wanted to become a service firm. The transition is analyzed based on an established theoretical framework identifying efficient strategies for delivering different types of services, thus providing managers with guidelines for choosing the appropriate business model. The findings of this single case study confirm that the role of ICT as an enabler in the transition process is significant. Furthermore, the buyer's trust in the supplier turned out to be an essential factor in developing new service-based business.

Introduction

Levitt (1972) first announced that everybody is in service. It has taken a long time for companies and researchers to make sense of this provocation. It was not until recently that researchers turned to manufacturing companies and found that manufacturing strategy can be successfully based on a service approach (Fry et al., 1994). Today, managing the transition from products to services is a very important emerging managerial issue in the business-to-business environment (Oliva & Kallenberg, 2003).

The objective of this chapter is to describe how one specific firm—Svenska Kullager Fabriken, SKF—has undergone the change from product-oriented thinking to services-based concepts. We analyze this transition using an established framework and discuss the challenges and opportunities that the repositioning of the company's offering creates. More specifically, we use the theory of full-service contracts (Stremersch et al., 2001) to describe how SKF has moved from offering products to offering full-service contracts. In addition, we use the Service Process Analysis (SPA) (Tinnila & Vepsäläinen, 1995) to evaluate the different channels that SKF uses for the different kinds of offerings.

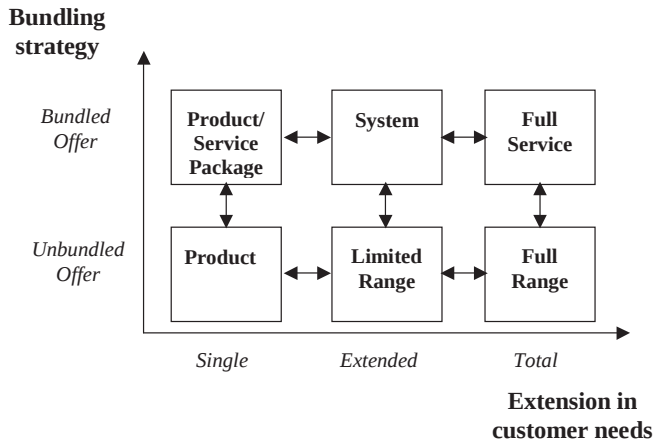
We find that the information and communications technology (ICT) provides firms with a strategic tool that acts as the main enabler in the transition from products to services. In the case of SKF, information technology is used via *endorsia.com* to build closer electronic linkages to customer companies. In addition, SKF has added intelligence to its products by developing enhanced status-reporting bearings. These two ICT developments—*endorsia.com* and intelligent bearings—are described in this chapter. Also, we find that the buyer's trust in the supplier is an essential factor in the transition from products to services-based systems. The finding is in line with previous theoretical work, which suggests that these enhanced relations between a buyer and a seller require considerable trust in order to create the full-service offering.

The chapter is organized as follows: the next section briefly presents the theories of full-service contracts and service process analysis. The third section introduces the case SKF. In the remaining sections, we present theoretical and managerial implications.

Full-Service Contracts

The traditional marketing literature defines services as intangibles, variables, and perishables. Therefore, the consumption and production processes of services

Figure 1. Full-service contracts (Stremersch et al., 2001)



cannot be separated. Rust et al. (1996) and Kotler (1999) define products as “anything that can be offered to a market for attention, acquisition, use, or consumption that might satisfy a want or need. It includes physical objects, services, persons, places, organizations, and ideas” (p. 291). A service is seen by Kotler (1999) as “any activity or benefit that one party can offer to another that is essentially intangible and does not result in the ownership of anything” (p. 291).

In our study, we use the concept of full-service contracts (Stremersch et al., 2001) to examine the transition from product-oriented thinking to services-based concepts. Full service is defined as a bundled offering that is an extension in meeting customer needs, requiring interaction between the supplier and the customer and thus making it more challenging than traditional delivery (Figure 1).

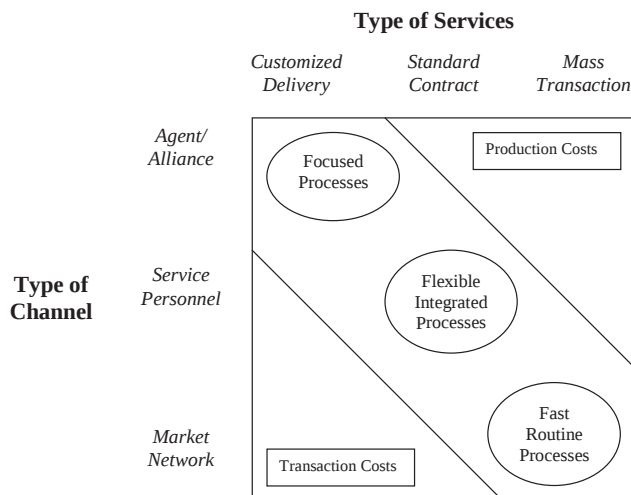
The bundling literature, initiated by Burstein (1960) and Stigler (1963) and later formally formulated by Adams and Yellen (1976) originally seeks to contemplate why firms often sell their goods in packages (e.g., sporting and cultural organizations offer season tickets and restaurants provide complete dinners). In the business-to-business context, bundling is often used to create full-service offerings in order to provide customer companies a single point of contact (Cristol & Sealey, 1996; Stremersch et al., 2001). A review of current literature on bundling is provided in Stremersch and Tellis (2002) and Penttinen (2004).

The second dimension, extension in customer needs, describes the extent to which customer needs are satisfied by the supplier firm. The three levels are single, extended, and total need fulfillment. The general proposition of many academic and practitioner-oriented research papers has been that firms are developing more comprehensive solutions and services to meet customer needs (Goldman et al., 1995; Weill & Vitale, 2001; Wise & Baumgartner, 1999).

In order to investigate the different delivery channels within this transformation from products to services, we need a theoretical framework that allows us to match different types of channels to different types of services. For this purpose, we use the Service Process Analysis (SPA) (Tinnila & Vepsalainen, 1995). The objective of the SPA is to evaluate the efficiency of matching the type of service being offered with alternative types of delivery channels. The axes of the SPA matrix, therefore, represent the type of service and the type of channel. The three types of channels used in this study are agent, service personnel, and market network. The three types of services are customized delivery, standard contract, and mass transaction. The efficient combinations can be found on the diagonal. (1) Focused processes should be used for customized services offered by specialized agents. (2) Flexible integrated processes can be used to handle standard contracts offered by service personnel. (3) Mass transaction services can be handled via market network through fast routine processes. Figure 2 illustrates the framework.

The SPA model facilitates the analysis of strategic repositioning of services, such as replacing the service provided by a new type of service, resegmentation of a full service into several specialized services, or establishing a new channel. Advances in data networks have created several new types of channels providing services discussed mainly in the information systems literature (Tinnila, 1997).

Figure 2. Service process analysis (adapted from Tinnila & Vepsalainen, 1995)



Case SKF

SKF (Svenska Kullager Fabriken) is the leading global supplier of bearings. SKF was founded in 1907 and, from the very beginning, focused intensively on quality, technical development, and marketing. Today, the company employs 38,600 people worldwide and has a turnover of about 4.5 billion euros. The company produces bearings, which are used in all kinds of rotating machines and equipment. This chapter presents the case of SKF Finland. The biggest bearing users for SKF in Finland are the paper and pulp industry as well as the steel industry, but, in addition, all the machine manufacturers of gearboxes, electrical motors, pumps, and so forth are large consumers of bearings. Globally, the biggest bearing user is the vehicle industry.

Bearings are used to keep rotating shafts in their position, to ease friction between moving parts, and to carry load. Bearings are produced in various sizes and shapes, with the smallest bearing weighing just a few grams and the larger ones weighing a few tons. The material used to produce bearings can vary from conventional steel to ceramics, brass, and plastics. Roller bearings are mainly made of special steel.

Recently, with the help of the strong application and maintenance knowledge of bearing mounting, lubrication, condition monitoring, and so forth, the company has begun offering comprehensive maintenance contracts to its customers. The electronic marketplace and the intelligent bearings already described play a key role in this new strategy of SKF.

Moving Toward Full-Service Contracts

Throughout the 1980s, SKF has been seen on the market as a high-quality component manufacturer that provides customers products and services on a transactional basis. Products and related services were sold and purchased separately; they were not bundled together. The customers interacted with SKF on issues related to logistics, product development, and the like, but the operational linkages and information exchange were relatively low.

As a response to the increased customer demand, SKF extended its product line by developing new products and related services and by bundling them together. The innovative bearings increased the production output capacity of one customer's paper machine, and the bundled purchasing of related material (i.e., lubrication oil) made life easier for another.

In 2000, the company began offering a totally new kind of business deal—runability and operability of bearings. In the new business offering, SKF guaranteed to keep the bearings rolling in the customer's machines.

“The aim of SKF Integrated Maintenance Solution is to offer customers a service which would make it possible for the customer to outsource their bearing maintenance, i.e. SKF would take the full responsibility of the bearing maintenance including condition monitoring, lubrication, replacement and logistics needed to get a new bearing for replacement. The customers of SKF are invited to outsource everything related to bearings to SKF. This would mean that the customers of SKF would no longer have to purchase the bearings, they would in fact purchase simply comprehensive maintenance functions and runability for their machinery” (CEO SKF Finland).

Each agreement is customized to specific business needs. The customer can choose which areas it wants to include, based on internal resources and current supplier contracts. “These new concepts require SKF to build closer relationships with the customers and to understand well the processes of the customers” (CEO SKF Finland). Within a full-service contract, SKF plays a significant part in increasing the reliability and integrity of the plant. SKF shares some of the risk as well as the savings, while the customers receive agreed-upon financial returns without capital investment.

Therefore, in response to the changes taking place in the industry, SKF has developed new products and service concepts to offer to its customers. These new concepts require SKF to build closer relationships with the customers and to better understand the processes of the customers. Two different concepts that illustrate this are *endorsia.com* and intelligent bearings, which are part of the new SKF service strategy. The following figure illustrates the move from single unbundled product offering toward full-service bundled offering.

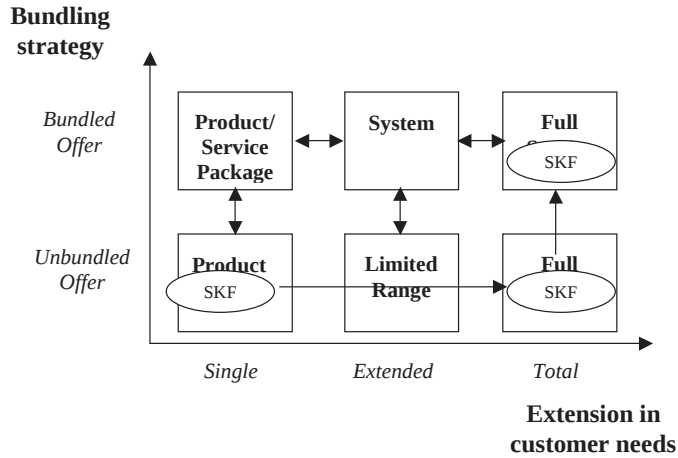
The company first extended its product range to include additional products and services that support the core product (bearing). Then, in the second phase, SKF bundled these products and services together and started to offer operability of bearings as a full-service concept.

Setting the Stage: *endorsia.com* and Intelligent Bearings

Next, we will discuss two information technology components that SKF has implemented in order to offer the full-service contracts: (1) the creation of *endorsia.com*, an electronic marketplace that facilitates the connections between SKF and its clients by providing a single interface and a platform for doing business and (2) the development of intelligent bearings, which are an important part of the new SKF service strategy.

In order to streamline the purchasing processes toward their customers, SKF, INA, Timken, Sandvik, and Rockwell Automation came together to create an electronic marketplace called *endorsia.com*. These five companies are the

Figure 3. Moving toward full-service, case SKF



owners of the marketplace, but endorsia.com is open to all brands that sell industrial goods. One of the main advantages of endorsia.com is that it brings together large numbers of buyers and sellers. Therefore, the products bought and sold in the marketplace are not limited to bearings. The marketplace gives users the opportunity to connect with their preferred suppliers and customers at a single interface and to create a platform for doing business. For distributors and end users, endorsia.com promises an efficient and cost-effective purchasing system. The user can use this single interface to access real-time technical information, product availability, delivery times, and conditions.

In addition to creating this marketplace, SKF has developed intelligent bearings. With this new type of bearings, the user can get more accurate data on the condition of the bearing by measuring the run-out and the vibration of the bearing. This can be done with the help of a sensor that is attached to the bearing or the bearing housing. Naturally, there are considerable benefits of knowing more accurately the status of the bearing condition; for example, there is an hourly monetary loss of more than 10,000 euros when a paper machine cannot be used due to a mechanical problem (i.e., a bearing failure). SKF offers its clients software to be used with these intelligent bearings. The software makes a connection between the client's ERP (enterprise resource planning) systems and endorsia.com. For example, this allows the replenishment processes to be handled automatically.

Discussion

Theoretical Implications: Differentiated Offerings

This chapter discusses the move toward full-service contracts. However, SKF also offers component sales for those customers not willing to invest in the new business offering. The objective of the component sales is cost minimization, whereas the full-service contracts aim at improving plant productivity. To compare these two different offerings (i.e., component sales and full-service contracts) to the SKF's initial positioning, we use the service process analysis matrix.

We can see that SKF has differentiated its positioning on the SPA matrix by creating two different offerings. There are component sales (B) for those clients who are interested in cost minimization and full-service contracts (A) for those who are willing to work in close collaboration with SKF. This finding of general services differentiating toward expert services and, in addition, toward mass transaction services is supported in earlier research (Kemppainen & Vepsäläinen, 2003; Tinnila & Vepsäläinen, 1995).

Managerial Implications: IT and Trust

The industrial maintenance business is undergoing major changes. Many maintenance supplier companies see their role extending toward the client company's processes. This chapter has described how one specific company—SKF—has differentiated its product/service offering. The following figure presents the evolution of maintenance from component sales toward partnerships.

Figure 4. SKF's differentiated offerings

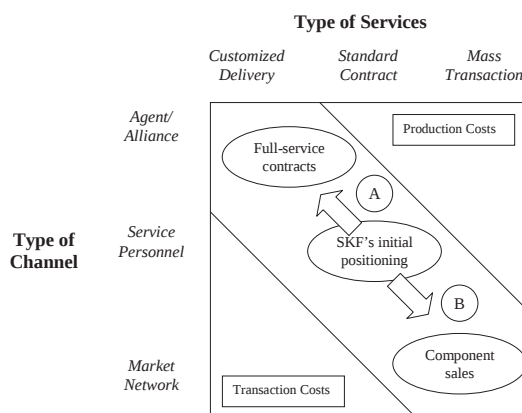
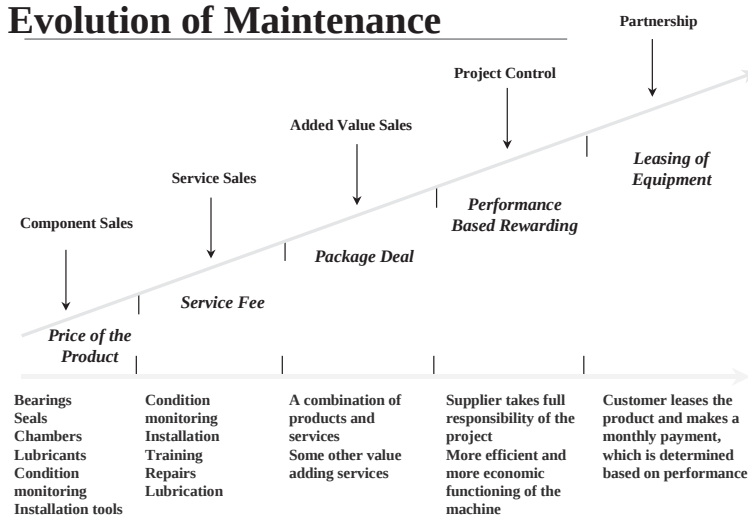


Figure 5. Evolution of maintenance at SKF



From case SKF, we can see that the trust in the supplier is a key factor in the move toward full-service contracts. Full-service contracts require some responsibility to be shifted from the customer to the supplier, and this naturally requires significant trust in the supplier on the client's part.

In addition to the trust, investments in innovative information technology played an important part in the transition toward full-service contracts at SKF. It would be impossible for SKF to offer these contracts without the intelligent bearings and the electronic marketplace, *endorsia.com*.

Conclusion

This chapter tells the story of a product manufacturer that first began offering additional services to support the product and then proceeded to offering full-service contracts to those customers who were interested in close collaboration and partnerships. This single-case study reveals the role of information technology as the main enabler in the transition. Also, the customer's trust in the supplier plays an important role in the change from product sales toward full service. Therefore, a company contemplating the move toward services-based concepts should invest in innovative information and communications technology and remember that building trust is very important.

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Improving firm positioning through enhanced offerings and buyer–seller relationships

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Abstract

We analyze the strategic repositioning of firms through changes in their market offerings and buyer–seller relationships. Based on literature from strategy, marketing, economics, and information systems, we formulate a two-by-two matrix to examine alternatives for positioning. We evaluate the framework with four case studies of companies that have recently moved toward more complete product/service offerings and stronger relational linkages with customers. These moves followed two different paths. The product/service path initially focused on the development of new and related products, product bundles, and the addition of product-related services. The relational path first focused on establishing closer relationships with customers including closer operational linkages, enhanced information sharing, more fully articulated legal and contractual obligations, and enhanced cooperation. In all the cases, the strategic repositioning was influenced by customer needs and enabled by information technology and the acquisition of new competencies through networking.

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1. Introduction

Changes in interorganizational relations and customer requirements have led many product manufacturers to reassess their competitive positions. This strategic positioning involves both the company's offering and the company's relations with its business customers as two critical dimensions. Effective positioning is a key factor in long-term organizational success, and both the offering and customer relationships are two areas in which firms have an opportunity for strategic choice. The objective of this paper is to provide a theoretically justified framework for analyzing why, when, and how firms are likely to make strategic moves and to apply this framework across four case studies.

Prior research has identified differing degrees of completeness of an offering (Anderson, 2002; Stremersch, Wuyts, &

Frambach, 2001). While every product or service offering is at least partially complete, more complete offerings typically include the bundling of products and services (Adams & Yellen, 1976; Eppen, Hanson, & Martin, 1991; Stremersch & Tellis, 2002) and the development of more comprehensive solutions to customer needs (Goldman, Nagel, & Preiss, 1995; Stremersch et al., 2001; Weill & Vitale, 2001). The general proposition of these papers has been that firms are moving toward offering more complete solutions and services instead of providing mere products (Goldman et al., 1995; Wise & Baumgartner, 1999). In particular, the literature on manufacturing suggests that product manufacturers should integrate service components to their core products (Oliva & Kallenberg, 2003). In a similar vein, the literature on marketing discusses the paradigm change move from the goods-centered dominant logic to the service-centered logic (Vargo & Lusch, 2004a, 2004b).

The nature of buyer–seller relationships is also a key dimension of strategic positioning. The economic framework of markets and hierarchies (Coase, 1937; Williamson, 1975) as coordinating mechanisms has been extended to include relational contracting between these two extremes (see, e.g.,

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Ring & Van De Ven, 1992; Williamson, 1985). In dyadic relations, the concentration is on the non-hierarchical relations: transactional and relational. In our study, we adopt Cannon and Perreault (1999) and divide the relationships into transactional and relational by using the aspects of operational linkages, information exchange, legal bonds, cooperative norms, and adaptations by the two parties.

We seek to bring together the two research streams on the completeness of an offering and the nature of a relationship to formulate a theoretical framework for analyzing company positioning. We utilize transaction cost economics (Williamson, 1975, 1985), resource-based view of the firm (Penrose, 1959; Wernerfelt, 1984), social exchange theory (Lambe, Wittmann, & Spekman, 2001; Thibaut & Kelley, 1959), and principal–agent theory (Grossman & Hart, 1983; Holmstrom, 1979) as underlying theoretical foundations. We present illustrative case examples and conclude that our case firms have repositioned their offerings within the framework, providing offerings with greater completeness and adopting more relational coordinating mechanisms. However, the case firms took two different paths: the product/service path initially focused on making the offering more complete and the relationship path initially focused on developing a closer relationship with the customer. Our results indicate that this repositioning has been enabled by implementing new information technology and enhanced learning through networking.

We formulate our theoretical framework in the following section. The research methodology is discussed in the third section. In the fourth section, we present illustrative case examples. The final sections discuss the results, present the conclusions, and suggest avenues for further research.

2. Literature review and development of research framework

In this section, we use theory from a variety of disciplines to develop a framework for identifying potential positioning and movement on the dimensions of completeness of offering and buyer–seller relationships.

2.1. Completeness of offering

The concept of a firm's offering to the market has been discussed in a wide range of academic literature. Prior literature has identified differing levels of completeness of an offering (Anderson, 2002; Goldman et al., 1995). We will next discuss these streams of literature, present the definition used in this study to describe the completeness of an offering and discuss the theories that suggest strategic options for firms on this dimension.

The bundling literature, initiated by Burstein (1960) and Stigler (1963) and later formally formulated by Adams and Yellen (1976), originally sought to understand why firms often sell their goods in packages: restaurants provide complete dinners, banks offer checking, safe deposit, and travelers' check services for a single fee, and garment manufacturers sell their retailers clothing grab bags comprised

of assorted styles, sizes, and colors (Adams & Yellen, 1976). They distinguish three alternative bundling strategies: pure component strategy (unbundled offering), pure bundling strategy (components available only in bundled form), and mixed bundling strategy (components available in bundled form as well as separately). Stremersch and Tellis (2002) provide a synthesis of strategic bundling in marketing and articulate the different bundling strategies and extend the bundling focus to the Adams and Yellen (1976) framework: either price or product. Price bundling is defined as the sale of two or more separate products as a package at a discount, without any integration of the products (e.g., variety pack of cereals). Product bundling is the integration and sale of two or more separate products at any price (e.g., multimedia PC) (Stremersch & Tellis, 2002). Most of the extant literature on bundling concentrates on the business-to-consumer context. In the business-to-business world, bundling is often used to create full-service offerings (Stremersch et al., 2001) in order to provide customer companies a single point of contact (Cristol & Sealey, 1996).

Besides bundling, another attribute to distinguish between different levels of completeness of an offering is the extension in meeting customer needs (Stremersch et al., 2001). An offering consists of goods and services, which are then transformed into solutions that address customer problems. Solutions are far more valuable to customers than generic packages of goods, services, and information that then have to be turned into solutions by the customer (Goldman et al., 1995). The degree of completeness of an offering relates to the degree to which customer problems are solved and to the amount of the additional work left to the customer. According to Anderson (2002), a complete offering leaves no additional work to the customer, and a non-complete offering needs to be completed by the customer. A more complete offering often exhibits higher levels of service components (Anderson, 2002; Goldman et al., 1995; Wise & Baumgartner, 1999); the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself (Vargo & Lusch, 2004a).

Based on the discussion above, we use product bundling and extension in meeting customer needs as the attributes to distinguish between less complete offerings and more complete offerings. Our definition is drawn from Stremersch et al. (2001) defining full-service offerings as "comprehensive bundles of products and/or services that fully satisfy the needs and wants of a customer related to a specific event or problem".

As our objective is to model the repositioning of a company's offering, we concentrate on the dynamics of this dimension. Therefore, we are interested in examining why, when, and how a specific company would move on the continuum between less complete and more complete offerings. Transaction cost economics (Williamson, 1975, 1985) examines how interactions between economic entities are organized. For the purposes of our study, we divide transaction costs into coordination costs and transaction risk (Clemons & Row, 1992).

Coordination costs are the direct costs of coordinating actions between economic agents. These include, e.g., the cost of obtaining information (Stigler, 1961) and the cost of coordinating input in production (Alchian & Demsetz, 1972). Firms with less complete offerings typically have lower coordination costs, but if these costs can be controlled or lowered, firms can find economic incentives to begin more complete offerings. Transaction risk is the cost of cheating or opportunistic behavior (Williamson, 1985). If there is a possibility for opportunistic behavior on the seller's part, the buyer might be reluctant to accept a more complete offering. This is related to the principal–agent theory, which investigates the problem of motivating one party to act on behalf of another. The solution is to provide appropriate incentives so that agents act in the way principals wish them to (Grossman & Hart, 1983).

Another line of theoretical thought, the resource-based view (Penrose, 1959; Wernerfelt, 1984) of the firm focuses on analyzing firms from the resource side rather than from the product side. It provides a basis for addressing issues such as which resources should be developed through diversification and what types of firms it would be desirable for a particular firm to acquire (Wernerfelt, 1984). In relation to our study, we argue that, if the seller has the necessary resources to provide the more complete offering, or if it is less expensive for the seller than for the buyer to obtain these resources through networking or through mergers and acquisitions, then a move (or a diversification) toward a more complete offering is justified from the seller's point of view.

2.2. Nature of buyer–seller relationship

The marketing literature suggests a variety of buyer–seller relationships, ranging from discrete transactions to relational exchange (Day, 2000; Dwyer, Schurr, & Oh, 1987; Moller & Torronen, 2003). Our study adopts this continuum of buyer–seller relationships ranging from transactional to relational. This classification has been accepted and used by several researchers (see, e.g., Apte & Vepsäläinen, 1993; Clemons, Reddi, & Row, 1993; Day, 2000; Dwyer et al., 1987; Moller & Torronen, 2003; Ring & Van De Ven, 1992). To more fully operationalize these concepts, we follow the Cannon and Perreault (1999) study and use (1) information exchange, (2) operational linkages, (3) legal bonds, (4) cooperative norms, and (5) relationship specific adaptations by the seller or the buyer as measures for positioning the nature of a relationship on the continuum from transactional to relational. These elements provide a measure for the relationship and capture aspects of commitment and the expectation of future interactions among the buyer–seller pair.

Transaction cost economics (TCE) concentrates on the differences between markets and hierarchies (Coase, 1937; Williamson, 1975, 1985). Llewellyn (1931) observed that there are complex “future deals” located between the market and hierarchy extremes. Williamson (1985) names these as hybrid transactions and situates them in between discrete market transactions and highly centralized, hierarchical

transactions. TCE suggests that relational contracting develops for transactions of a recurring and non-standardized kind (high degree of asset specificity), where continuity of the trading relation is valued (Williamson, 1985). TCE posits that firms will move from merely transactional to more relational coordination when the transactions are recurrent, the degree of uncertainty increases, and the risk of opportunism is small.

Social exchange theory (SET) (Homans, 1958; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959) has been used extensively by marketing scholars to explain business-to-business relational exchange. The key aspect of SET is the positive outcome (or the expectation of a positive outcome) of the social interaction (Lambe et al., 2001). The two parties enter into a relationship and/or maintain an old one because they expect that doing so will be rewarding (Homans, 1958; Thibaut & Kelley, 1959). Lambe et al. (2001) present dependence, trust, commitment, cooperation, relational norms, and satisfaction as the variables that have been used in the literature to operationalize SET. The theory suggests that increased commitment, cooperation and relational norms will lead firms to move toward a more relational exchange, while the lack of trust, commitment, and cooperation will move firms toward a purely transactional relationship.

2.3. Theoretical framework

Based on the discussion above, we construct the following framework (Fig. 1). The vertical axis describes the completeness of the offering, measured on the continuum from less complete to more complete offerings. The horizontal axis describes the nature of the buyer–seller relationship, measured on the continuum from transactional to relational.

Compared to a less complete offering, a more complete offering is typically bundled and offers an extension in meeting customer needs and wants. Compared to transactional, a relational type exhibits stronger operational linkages, more

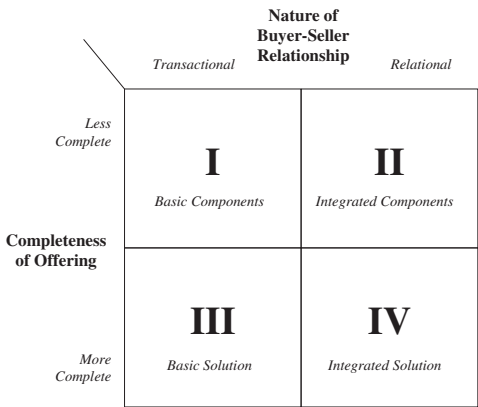


Fig. 1. Conceptual framework for the study.

Table 1
Attributes of the cells

Cell	Cell I: basic components	Cell II: integrated components	Cell III: basic solution	Cell IV: integrated solution
<i>Offering</i>				
Bundled	No	No	Yes	Yes
Extension in meeting customer needs	No	No	Yes	Yes
<i>Nature of relationship</i>				
Operational linkages	LO	HI	LO	HI
Information exchange	LO	HI	LO	HI
Legal bonds	LO	HI	LO	HI
Cooperation	LO	HI	LO	HI
Adaptations	LO	HI	LO	HI
Description	Basic offering with limited service or extensions	Product is basic, but, e.g., key element in another product or offering, requiring stronger relationship with the customer	Offering includes extensions and service, but relationship remains transactional	Complete offering and close relationship with the customer
Benefits	Simple Costs are clear	Enhanced relations with the customer Stronger product development Possible innovation	Complete product is more differentiated	Strong relationship with the customer Possible value-added Innovation possible Possible co-development of product
Drawbacks	Limited differentiation Limited relationship with customer	Relationship management costs Potential conflicts in relationship Value of product as sub-component may be limited	More complex product involves some bundling costs Coordination costs high	Relationship management costs Risks of higher reliance on customer
Examples	Components such as nuts and bolts	Integrated sub-assembly components in, e.g., automotive and aerospace industry	Application service providers and telecommunications as bundled offerings	Full-service contracts in industrial maintenance

extensive information exchange and legal bonds, higher cooperative norms, and more adaptations by the seller (see Table 1).

3. Research methodology

Our research methodology is theory-initiated case study (Yin, 1994). Our conceptual framework was developed on the basis of a literature review. To illustrate the theoretical framework, we use the case study methodology by presenting four cases. We chose to control the variability to some extent by taking all of the cases from the product manufacturing environment. The case companies were successful, and all of them had been identified as having made recent competitive repositioning moves. Two of the companies were smaller (with turnover less than 20 million euros) and two were larger (over 4 billion euros). The cases also illustrate the different cells of the framework and allow us to explore the different paths the companies have taken.

The case approach gives a rich picture and insights through interactions with key players. Key-informant interviewing, structured interviews, and reviews of internal information enabled the researchers to cross-check results from observations and field notes (Sanday, 1983). This involved work with the key players as a group and individually (Harvey & Myers, 1995). The identification of critical incidents also provides a framework for identifying stages of organizational development (Pettigrew, 1985).

Our case research included several interviews and numerous site visits as well as an extensive review of company documents. Specifically, the case SKF is based on over a dozen interviews with the CEO and the CIO of SKF Finland as well as three client companies over a 2.5-year period in 2001–2004. The case KONE is primarily based on three doctoral dissertations assessing firm capabilities and product/service offerings. Marschan (1996) interviewed 110 people and studied KONE's new organizational forms and information systems; Kela (1993) conducted a longitudinal study from 1968 to 1992 evaluating KONE's manufacturing capabilities; and Tinnila (1997) examined the transformation and strategic repositioning of KONE's processes. The case Lamor was conducted during the period between Fall 2003 and Fall 2004, and includes several discussions with the CEO, the CIO, the business development director, and the business controller. The case PBM Plastics is based on discussions during the period from Fall 2002 to Spring 2004. Most of the interviews with SKF, Lamor, and PBM Plastics were tape-recorded and transcribed.

An illustrative case study should (1) capture the transforming events, (2) capture the emerging technology of the institution, and (3) document institutional changes. The cases should address a significant issue and provide substantial evidence in sufficient detail from multiple sources (Yin, 1994). We followed this approach in selecting our cases. The current research examines the completeness of an offering and the nature of a relationship as the key dimensions. An illustrative case will clearly identify a firm in its position in the theoretical

framework and articulate the changes made in repositioning the firm.

4. Empirical findings: multiple case study

In this section, we discuss the framework through illustrative case examples. We describe how the companies have repositioned their offerings on the framework. We discuss the cases of SKF, KONE, Lamor, and PBM Plastics.

4.1. Moving toward assured operating capacity: case SKF

SKF (Svenska Kullager Fabriken) is the leading global supplier of bearings, founded in 1907. From the very beginning, SKF focused intensively on quality, technical development, and marketing. Today, the company employs 38,600 people worldwide and has a turnover of 4.5 billion euros. The company produces bearings, which are used in various rotating machines and equipment. In Finland, the biggest bearing users for SKF are the paper and pulp industry as well as the steel industry, but also all the machine manufacturers of gearboxes, electrical motors, pumps, etc. are large consumers of bearings. Globally, the biggest bearing user is the vehicle industry.

Coming to the 1990s, the firm was seen on the market as a high-quality component manufacturer that provided customers products and services on a transactional basis. These products and services were sold and purchased separately, they were not bundled. The customers interacted with SKF on issues related to logistics, etc. but the operational linkages and information exchange were relatively low. Therefore, we position the initial company offering to cell I.

As a response to the increased customer demand, SKF extended its product range by developing new products and related services. By bundling them together, SKF created an offering with higher asset specificity (move 1, Fig. 2). The innovative bearings increased the production output capacity of a customer's paper machine and the bundled purchasing of

related material (such as lubrication oil) made life easier for another customer. For example, "In 1996, SKF installed one of the most advanced monitoring systems in the world at the Star Petroleum Refinery in Thailand. The system monitors and prevents breakdown of all rotating equipment at the refinery such as generators, turbines, gear cases, and pumps. The market for such systems is also growing rapidly in the paper industry" (Dahlbom, Hanseth, & Ljungberg, 2000).

Therefore, as a response to the increased demand for operating systems of this kind, in 2000, the company began offering a totally new kind of business deal: assured operating capacity and operability of bearings. In the new business offering, SKF would guarantee to keep the bearings rolling in the customer's machines (move 2, Fig. 2).

"The aim of SKF Integrated Maintenance Solution (IMS) is to offer customers a service which would make it possible for the customer to outsource their bearing maintenance, i.e. SKF would take the full responsibility of the bearing maintenance including condition monitoring, lubrication, replacement, and logistics needed to get a new bearing for replacement. The customers of SKF are invited to outsource everything related to bearings to SKF. This would mean that the customers of SKF would no longer have to purchase the bearings, they would in fact purchase simply comprehensive maintenance functions and runnability for their machinery." (CEO SKF Finland)

When interviewing the customer companies of SKF, it was clear that they were aiming at drastically reducing the number of suppliers. For example, one customer company had 20,000 suppliers (SKF being one of them), and its objective was to cut that number first to one-tenth (to 2000 suppliers) and then to even fewer suppliers. Therefore, one motivation for SKF's repositioning was that customers were demanding more complete offerings. Another motivation for SKF was to generate revenue, since the margins on component sales of bearings were declining and the company was searching for new ways of generating revenue.

Each IMS agreement is customized to specific business needs. The customer can choose which areas he wants to include, based on internal resources and current supplier contracts. "These new concepts require SKF to build closer relationships with the customers and to understand well the processes of the customers" (CEO SKF Finland). Building these close relationships included stronger operational linkages, enhanced information exchange, and clear legal bonds articulating the parties' responsibilities. "From being experts on the production of bearings, SKF has to learn more and more about its customers and their business. At the European sales office in Turin, for example, more and more people are becoming engaged in direct customer interaction" (Dahlbom et al., 2000). The information exchange also increased the level of reciprocity and sharing of resources such as technical expertise.

SKF created new information systems in order to be able to provide this new kind of business offering. They did this, firstly, by creating www.endorsia.com, an electronic marketplace that facilitates the connections between SKF and its clients by

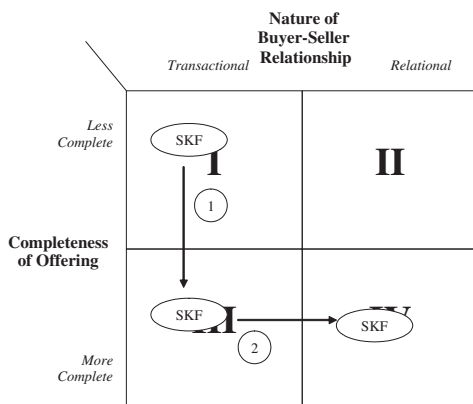


Fig. 2. The case SKF.

providing a single interface and a platform for doing business; and, secondly, by adding intelligence to the core product and thus innovating intelligent bearings, which are an important part of the new SKF service strategy. These intelligent bearings report the status of the bearing and therefore make the maintenance processes economically more efficient.

The main challenge for SKF was to assure the customer companies of the new business offering. "...the customer's trust in the supplier plays an important role in the change from product sales toward full-service contracts" (Penttinen & Saarinen, 2005). To overcome this problem and to convince the customers to purchase the integrated maintenance solutions, SKF created a network of resources by building close relationships both vertically and horizontally. An illustration of this is www.endorsia.com, which is equally owned by SKF and its competitors, Timken, INA, Sandvik, and Rockwell Automation.

This new approach allows SKF to extract more steady streams of revenue by ensuring continuous year-to-year contracts. "Contract sales for Integrated Maintenance Solutions and Predictive Maintenance were significantly higher than in 2003" (SKF, 2005). These full-service contracts have resulted in greater customer retention and higher profitability. For example, according to the SKF Annual Report 2004, the operating margin of the service division that provides the integrated maintenance solutions is 10.6%, which is higher than at any other division at SKF (SKF, 2005, p. 111). By fully exploiting the innovative intelligent bearings, SKF is maximizing the output of the company's resources.

We see in the case of SKF a move from a transactional, less complete offering to a relational and more complete offering. The company first extended its product range and created bundles of products and services. In the second phase, they started offering assured operating capacity, which required the company to build closer relationships with their customers. Hence, we see SKF moving from cell I to cell III to cell IV.

4.2. Moving toward availability: case KONE

KONE is a Finnish elevator-manufacturing company, founded in 1910. KONE remained a domestic manufacturing company until the 1960s when the first foreign acquisitions were made. Today, KONE Elevators is the third-largest elevator manufacturer in the world with 34,400 employees worldwide and a turnover of 5.3 billion euros.

Due to the high need to maintain the installations, KONE very early turned to developing maintenance and modernization business units. By 1978, the maintenance business accounted for half of the group's turnover (Kela, 1993). The modernization and maintenance businesses have grown considerably, the number of agreements reaching 440,000 in 1996 (Tinnila, 1997). These maintenance contracts required the establishment of legal bonds and operational linkages with the customers. This led to increased information exchange and establishment of cooperative norms related to reporting and evaluating the quality of service levels. Hence, the company very early moved from transactional to relational contracting. In the process,

however, the offering remained the same. The company offered basic maintenance but it was not an extension in meeting customer needs, nor was it a case of bundling products and services (move 1, Fig. 3).

In the year 2000, as a response to the growing customer demand, the company began offering availability of elevators instead of regular maintenance visits and machine parts. KONE has implemented two major changes in the maintenance service. First, the service offering was redesigned to offer availability instead of regular visits, defined as a fixed number of visits per year (Kempainen & Vepsäläinen, 2003). In other words, instead of a number of maintenance visits per year (which are invoiced separately or as stated in the contract), KONE offers availability of their elevators so that an agreed level of availability is defined. It is then KONE's responsibility to meet the agreed level by incorporating, e.g., intelligent components that permit faster response times and preventive action including required maintenance visits. Second, when availability of the equipment is used as the measure of service quality, access to the service site needs to be pre-authorized. In the new type of offering, "there is no time to search for people with authorized access (e.g., entrance code, keys). This called for immediate improvement in access to maintenance site. This availability-based service contract and pre-authorized access shifted the focus from routines to shared resources. The key to the reliable and responsive service is sharing of relevant information, which, in turn, supports the incentive-based service contract regime" (Kempainen & Vepsäläinen, 2003, pp. 118–119). Information technology plays a key role in the new offering. KONE has developed built-in diagnostics capabilities that further enable preventive maintenance as troubleshooting can be done from a distance (move 2, Fig. 3).

In order to be able to provide this availability-based contract, KONE has acquired several small elevator maintenance firms. For example, during the year 2004, KONE acquired companies such as Door Systems Inc. from the USA and Overhead Doors from Australia (KONE, 2005).

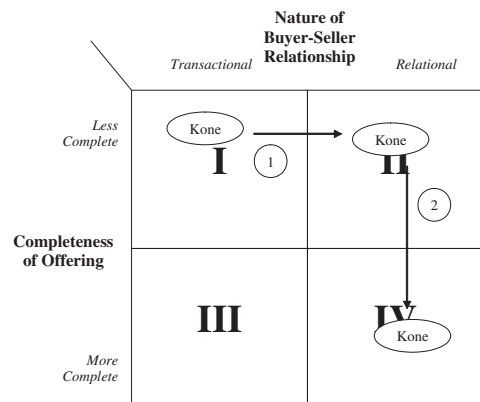


Fig. 3. The case KONE.

The main motivation for KONE's repositioning was the continuing relative decline in its new installations business for elevators. In addition, the company was willing to respond to the customer demand for year-to-year contracts. By moving toward offering availability, the company has been able to achieve higher revenue growth and profitability. For example, the market value of KONE has soared from 1.5 billion euros in 2000 to 5 billion euros in 2005.

KONE started out as a domestic manufacturing company operating on a transactional basis. Initially, the company moved from transactional to relational contracting. More recently, the company has begun offering maintenance in terms of availability. Hence, we see KONE moving from cell I to cell IV.

4.3. Moving toward risk management and insurance: case Lamor

Lamor (Larsen Marin Oil Recovery) Corporation Ab is a family-owned Finnish company founded in 1982. In the early years, the main activity consisted of shipbuilding and repair. Later, stiff brush oil skimmers came to the core of the Lamor product range and the company was able to reach the position as the leading manufacturer of oil spill equipment in the world. Today, Lamor Corporation is active in over 50 countries and employs more than 300 people in its network globally. There are 31 persons on the payroll in Finland (working directly for Lamor). The turnover of the company was 18.2 million euros in 2003.

The company started out as a product manufacturer. In the 1990s, in response to customer demand and the company's own desire to become a key player, it made its offering more complete by extending the product range to include complementary products and services alongside the brush oil skimmers. These services included, e.g., oil spill training, tank cleaning, satellite monitoring, air pollution investigations, etc. (Lamor, 2005) (move 1, Fig. 4).

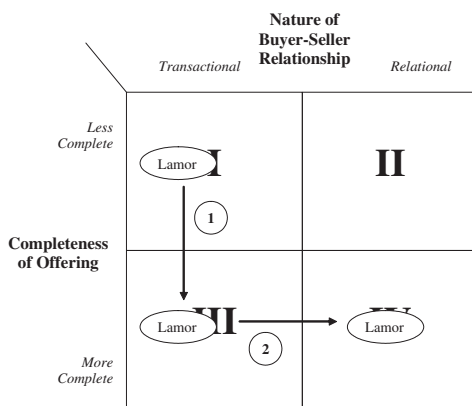


Fig. 4. The case Lamor Corporation.

In the year 2003, the company initiated the creation of Environmental Action Centers (EACs). Instead of buying material, updating it and keeping it in warehouses, the client companies of Lamor are invited to join these centers. The joining requires substantial information exchange and legal bonds, which clearly state the responsibilities of the two parties (move 2, Fig. 4).

“The underlying idea behind the Environmental Action Centers is to coordinate and support response organizations in a state of readiness 24 hours a day in the event of environmental incidents. To achieve this stage of full alertness and response readiness, an organization specializing in this type of operation had to be created. For this purpose, Lamor created a division the role of which is to establish, develop, and maintain regional EACs on a global scale. The objective of this division is to act as a locomotive of environmental cluster and thus create an international network of EACs that can locally provide prevention, response, recovery, and remediation services for all environmental incidents and especially oil spill accidents. These EACs will be established together with local parties which can be governments, local governments, harbors, public/private corporations with interest in environmental protection.” (CEO Lamor)

The EACs' clients are divided into three groups based on their interests and resources in environmental protection. *Key clients* include organizations that are responsible for the environment such as the government. They engage in the local EAC operation on a long-term basis and have the possibility of becoming a partner of the EAC in question. The second group, *clients* are potentially polluting companies and pay fixed annual payments to the EAC. *Image clients* are not potential polluters; they get only image advantage from financing an EAC. In the event of an environmental accident, the polluters will be charged market prices for the accident except for those polluters who are clients of an EAC and are paying annual development fees.

“The initiative idea for these centers was formulated during such oil spills as the Inkoo case in Finland (Summer 2003). In these situations, the government and the oil company responsible for the incident contacted the Lamor corporation to obtain the necessary machines and equipment to clean the spill. Lamor personnel provided the material and, as they were leaving the scene, they were asked to remain there and help with the cleaning process.” (CEO Lamor)

Hence, the customers very clearly stated that their core competencies did not include the purchasing of the oil skimmers, keeping them in stock, and maintaining readiness to deal with oil spill response operations, nor other kinds of environmental protection. This acted as the key motivation for repositioning. Also, the general public's concern in environmental protection is increasing: with growing demand for active environmental protection.

The establishment of the EACs requires active networking from Lamor. Lamor created a network of key suppliers and uses

the open-book principle to attract clients. The creation of these centers requires substantial information exchange within and between the centers. This led to the sharing of resources including equipment, personnel, and databases. The development process of the information system allowing this exchange proved to be very difficult although the company invested heavily in information technology. The company separated the IT unit from the business unit so that the information system remained a purely enabling factor and not the driver for the transition.

By acting as the locomotive of collaboration in these centers and making the participants of the network dependent on each other, Lamor experienced higher customer satisfaction and retention. By forming partnerships and writing up annual contracts, Lamor is able to achieve steadier revenue streams than before the repositioning. In conclusion, Lamor seeks competitive advantage from the repositioning by maintaining direct contacts to customers and by generating steady revenue streams.

Lamor extended its product range in order to make the offering more complete. In the next phase, the creation of the environmental action centers required the establishment of legal bonds that specify the obligations and roles of both parties. Hence, we see Lamor moving from cell I to cell III to cell IV.

4.4. Moving toward new product development as a service: case PBM

PBM Plastics is a Virginia-based manufacturing firm with 150 employees and annual sales of USD 12 million. The company owns the majority of the North American market in baby bottle liners. Offering high quality and significant flexibility, PBM Plastics has doubled its sales every year since 2001 and has established accounts with national mass-merchandisers, grocery, and drug retailers in the United States and Canada.

When Adam Burke took over as president of PBM Plastics in mid-2000, the firm faced a number of significant obstacles. Burke saw technology as a mechanism for dealing with many of the obstacles, “I thought it was important to look for ways in which information and communication technologies could help us leverage our critical people and time resources while aiming at the crucial needs of the company.” The Melt Phase Forming technology did not function as expected and the existing machines were plagued with quality production issues. PBM Plastics was also impacted by the poor reputation of the former company, Questech: the suppliers refused to sell raw materials to the new company because of Questech’s poor payment history and the customers declined to form new associations with PBM Plastics because of Questech’s poor product delivery.

Burke began an immediate effort to correct some of the key problems. His initial focus was on rebuilding the relationships, “We had to establish new relationships with suppliers and customers. In many cases, this was harder than beginning a new relationship, because the potential partners had been soured by past experiences with our predecessors.” An early success was a firm commitment from WalMart for PBM to supply them with

private-label, drop-in baby bottle liners by January 2001. The challenge was to meet this commitment in less than six months. This key incident defined the initial move for PBM to focus on developing deeper relationships with retailers (move 1, Fig. 5).

After the success with WalMart, PBM Plastics established accounts with other major retailers. “One of the most important elements of our use of information technology was getting a better handle on who our customers were and which ones were most likely to be good partners,” according to Celeste Vaughn, Marketing Communications Manager.

In an effort to build relationships while maintaining quality production, PBM offered retailers a window on operations by putting web accessible cameras in its factory. This allowed the company to actually look at problems as they occurred and improve work processes and resource allocation. The cameras also helped customers gain confidence that the technology was working. The cameras were also used by suppliers to audit and show customers progress on newly developed products. According to Jim Horton, Director of Operations, “this was a revolutionary change for us. It allowed us to monitor equipment and employee interactions and give us increased credibility with customers and suppliers.”

With the relationships firmly established the firm began to expand its product range into baby bottles, aspirators, and sippy cup caps. The new product development capability is a consulting service to current and potential customers, and represents a move from cell II to cell IV. This interorganizational process required to support new product development can be, and often is, very time consuming and costly for both the customer and the supplying organizations. Celeste Vaughn suggests, “because Melt Phase is such a new technology and customer awareness of its capabilities is limited, condensing the time involved with this traditional new product development process is vital to the success of PBM.”

PBM Plastics has implemented a system on the website that is designed to assist prospects with creating customized product solutions for their specific applications. The company defines three steps that include concept development, prototype

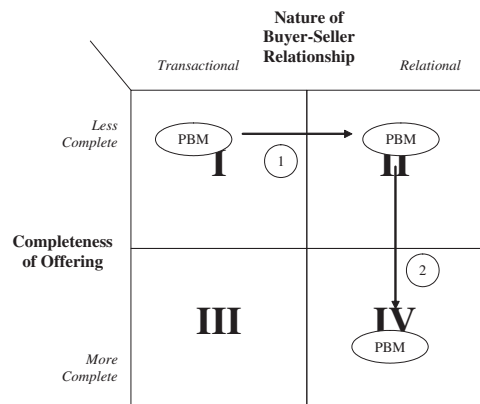


Fig. 5. The case PBM Plastics.

Table 2
Case summary

Case	Move 1	Move 2	Path
SKF (moving to assured operating capacity)	Bundling products and services	Operational linkages and information exchange (endorsia.com)	cell I–III–IV
KONE (moving to availability)	Focusing on operational linkages and cooperation	Reconstituted the package by bundling (built-in diagnostics)	cell I–II–IV
Lamor (moving to insurance and risk management)	Extending the product range	Information sharing (knowledge management for EAC)	cell I–III–IV
PBM (moving to NPD as a service)	Establishing relationships with customers	Extended the product range (web cameras and web-based CRM)	cell I–II–IV

development, and commercialization. The process emphasizes the speed with which the PBM Plastic's design team can develop a prototype. In the first step, a prospect chooses the basic parameters of the new product. With the various shapes graphically represented, the prospects define the cross-section and shape of the product.

Next, the prospect chooses the type of wall and lip that should be used on the new product. The type of material that should be used is chosen from a long list of materials varying in terms of rigidity and cost/performance. Finally, the prospect defines the application for the new product, optional features, and the environment in which it will be used. In this process, the design properties are entirely chosen by the customer using the self-service website, thus consolidating the steps, time, and costs associated with the new product design.

This new offering provides multiple advantages to PBM Plastics, increasing relationship depth with existing customers, identifying new customers, and offering a revenue stream with much higher margins than the manufacturing side of the business (move 2, Fig. 5).

PBM Plastics had to re-establish relationships with its suppliers and customers. Then, the company was able to move to providing a more extensive product line as well as new product development as a service. PBM developed a highly profitable offering in new product development through rapid prototyping and web-enhanced interaction with customers. Hence, we see PBM moving from cell I to cell II to cell IV.

4.5. Summary of the cases

There are basic similarities across the four cases. Each of the firms began in the first quadrant, providing less complete

offerings through a transactional mechanism (see Table 2). All of these firms were product manufacturers and all moved to providing more complete offerings via relational means. Two of the cases followed a path that initially required a move to a more complete offering. These firms did this by extending the current product range or by bundling existing products and services together. The other path initially focused on building close relationships with customers through increased operational linkages, information exchange, legal bonds, and the establishment of cooperative norms.

Another commonality across the case studies was the fact that the repositioning was prompted by customer needs and resulted in an improvement in the company's positioning by generating steadier revenue streams. Customer companies are increasingly focusing on their core competencies and demanding more complete product/service offerings. Another similarity was the desire to maintain customer contacts and improve customer retention. All the case companies were successful in this endeavor and achieved improved financial performance and greater customer satisfaction (Table 3).

5. Discussion

Our initial goal in this paper was to examine changes in competitive positioning through changes in offerings and buyer–seller relationships. We were struck by the literature across academic disciplines that identifies the need for manufacturing firms to integrate service components into their product offerings (Goldman et al., 1995; Oliva & Kallenberg, 2003; Wise & Baumgartner, 1999). The four product manufacturing firms we studied have all recently made strategic moves

Table 3
Motivators and competitive advantage

Case	Motivator	Competitive advantage/outcome
SKF (moving to assured operating capacity)	Customer needs (clients' need to reduce the number of suppliers) and SKF's desire to achieve steady revenue streams because of decreasing margins in the basic business	Higher profitability, greater customer retention and steadier revenue streams
KONE (moving to availability)	Relative decline in new installations business	Revenue growth and steadier revenue streams
Lamor (moving to insurance and risk management)	Customer demands	Greater customer retention and steadier revenue streams
PBM (moving to NPD as a service)	Customer needs (clients' core competencies do not include maintaining readiness to react to environmental accidents) and Lamor's desire to maintain direct customer contact	Lamor plays a central role in EACs
	Client companies' quality concerns and PBM's desire to improve its reputation for quality	Revenue growth and more profitable revenue streams Regained customer confidence

to provide more complete offerings and establish stronger linkages with their customers.

In all four cases, the firms had initially offered specific, but limited product offerings and typically operated in a transactional routine in their customer relationships. The two larger firms, KONE and SKF, had been somewhat successful with this model, but found increasing pressure from customers to provide more complete product offerings. In addition, both firms were seeking additional turnover and higher margins. One of the smaller firms, PBM, had not been successful with its limited product offering and saw the need to enhance its reputation as well as grow revenue. The other small firm, Lamor, was motivated by customer requests, but it also wanted to increase margins. In all the four cases, the firms were prompted to reposition in response to customer requests and by the desire to increase revenue and margins.

The findings of the four case studies give evidence of two distinct paths: one path initially focusing on the market offering and the other initially focusing on the customer relationship. SKF and Lamor followed the first path. They both extended their product offering by bundling products and services and by extending the value of the market offering through enhanced logistics and sharing of resources. As a second move and partially as a result of these new market offerings, both SKF and Lamor developed closer relationships. KONE and PBM followed the second path, improving customer relationships through improved operational linkages, information sharing and legal bonds. A second move enhanced their market offerings through extended services and product/service bundles.

In all four cases, the companies bundled products with services in new ways. In each case, the firms improved customer relationships through enhanced information sharing and focus on customer interactions. Increased customer input and interaction was evident at PBM, which improved the firm's reputation with customers. Lamor identified key customer segments and developed specific offerings for them. SKF and KONE, in consultation with customers redefined the customer requirements toward accessibility and reliability improving customer satisfaction. In addition, all four firms experienced increased revenues and margins following these repositionings.

Surprisingly, all four firms began in quadrant I and ended in quadrant IV. This may not be the outcome for all firms, however, it does appear that quadrants II and III may be less sustainable, because they have higher coordination costs (cell III) or higher relationship management costs (cell II). We believe that some firms may stay or return to quadrant I when they have a sustainable cost advantage in the production of the basic component. Firms can also be successful operating in cell II by leveraging the stronger customer relationships into higher market shares and margins. However, they must understand how to control the additional management relationship costs. Cell III can also be a successful position as firms develop a highly asset-specific and differentiated offering. The challenge in this quadrant is to control the coordination costs that incur from coordinating transactions of complex solutions on a transactional basis.

While it is—to some extent—a strategic choice by the seller to move toward a market of more complete offerings, it is the customer that either accepts or rejects such a repositioning. It was clear that, across all the four case studies, one of the main challenges for the suppliers was how to convince the customers of the value of the new business proposition.

5.1. Theoretical implications

The strategy, economics, and marketing literature offer insights into competitive positioning. Our work combines the (Anderson, 2002; Cannon & Perreault, 1999; Stremersch et al., 2001) streams to provide a theoretically based framework for examining firms in transition. Our contribution is both the framework and its use across four cases. Our exploratory results support the existence of a continuum of less and more complete product offerings as well as a continuum of buyer–seller relations ranging from transactional to relational. While the framework is formulated as quadrants, the nature of offerings and dyadic relationships are dynamic and are truly on a continuum. The framework also reflects transaction cost economics, resource-based view of the firm, social exchange theory, and principal–agent problem as foundational theories.

Transaction cost economics uses behavioral assumptions such as opportunism and bounded rationality as key concepts. In addition, it identifies asset specificity, uncertainty, and frequency as the principal dimensions with respect to which transactions differ. All of these concepts were found from the case studies. When interviewing the customer companies of SKF, it was clear that the customers were contemplating the additional costs of planning, adapting, and monitoring the more complete transactions (bounded rationality) (Williamson, 1985). Clearly, they were afraid of any kind of opportunistic behavior from SKF's part. Similarly, uncertainty played a key role in the new business proposition by Lamor. Offering a total solution to oil spill response readiness is an example of both uncertainty and of assets which are highly specific. PBM has lowered the cost of new product development, preparing highly specific assets in the form of prototypes, which also tend to reduce customer uncertainty.

In a similar fashion, the *principal–agent problem* considers a situation where an economic actor, the principal, hires another actor, the agent, to perform tasks on her behalf but cannot ensure that the agent performs these actions well. A natural remedy to this problem is to invest resources into the monitoring of actions (Holmstrom, 1979), or to provide incentives for the agent (Grossman & Hart, 1983). Lamor uses the open-book principle and thus lowers the costs of monitoring for the principal. Together with its customers, SKF has built in a profit-sharing scheme so that SKF, acting as the agent, has an incentive to perform well. PBM's role in co-development of new products with customers allows both monitoring and significant mutual incentives for success.

Resource-based view of the firm considers a company in terms of its resources. From our case studies, it became clear that moving to a more complete business offering requires new resources and assets from the seller. For example, Lamor

acquired these resources by building a network consisting of suppliers and governmental units. Similarly, SKF networked even with competitors to create the electronic marketplace, endorsia.com. This facilitated information exchange between the partners, which was also evident at KONE, and PBM, which both utilized information systems to more effectively tap organizational resources.

Social exchange theory emphasizes the positive outcomes between the parties in a relationship and suggests that relationship-based governance develops over time (Lambe et al., 2001). This was evident in the case SKF. When the company approached its existing customers with the new business proposition of providing runnability of bearings, they were clearly relying on SKF's good reputation as being a high-quality bearings manufacturer. We argue that this is an indication of the positive outcomes discussed in the social exchange theory. Conversely, it would have been very difficult for a firm that did not have this "legacy" to convince the buyers of the new business deal.

The literature on the *transition from goods to services* discusses the fundamental shift in the worldviews of companies that are beginning to focus on the service operations instead of merely their product offerings (Oliva & Kallenberg, 2003; Vargo & Lusch, 2004a, 2004b). Our study contributes to this stream of research by providing empirical evidence of four manufacturing firms that have moved from a goods-centered dominant logic to a more service-centered one. Instead of "pushing" goods to the market, these firms are competing with services—that is, with the "application of specialized competencies (knowledge and skills) through deeds, processes, and performances for the benefit of the buyer" (Vargo & Lusch, 2004a).

5.2. Managerial implications

This framework enables managers to identify the firm's current location and search for potential differentiators in market offerings or customer relationships. They can evaluate potential moves to other quadrants. The cases identified two distinct paths for firms seeking new revenue, improved profitability, and stronger customer relationships. One path begins with establishing a more complete offering. This product/service-focused path requires the development of new and related products, the identification of possible product bundles, and/or the addition of product-related services. The other path first focuses on establishing closer relationships with customers. This often involves closer operational linkages, enhanced information sharing, more fully articulated legal and contractual obligations, and enhanced cooperation.

Why and when do companies reposition? The underlying motivation for all case companies was the aim for steadier revenue streams. Moving from component sales to year-to-year contracts generated steadier cash flows for SKF, KONE, and Lamor. These case companies decided to reposition their market offering when they experienced a relative decline in the component sales (less complete offering) or when the margins on the components (such as bare bearings at SKF) were getting smaller.

Another motivator for the repositioning across all cases was customer requests. This was the case for Lamor, for example, when the government and the oil company asked the Lamor personnel to remain at the scene and help with the cleaning process. Companies also repositioned when customers pushed them to do so. PBM was losing customers and worked hard to regain their trust and business, while SKF and KONE both responded to customer demands for rethinking the value propositions of the firms' offerings. After the initial move to product bundling or improved customer relationships, firms are motivated to move to cell IV by the additional opportunities for growth. This is evident in the PBM move that leveraged newly improved customer relationships and opened up new lines of business, including the high margin opportunities in new product development.

How do companies reposition? We can distinguish two main approaches and enablers for this transition: (1) the acquisition of new competencies through networking and (2) the use and implementation of innovative information technology. Many of the interviewed companies realized that they cannot move to providing complete offerings on their own. Therefore, we conclude that new competencies are required when moving toward a more complete offering. Another strategy is to build close relationships horizontally, even with competitors, and network with them to provide the customer a single point of contact. This is required especially in cases where the object of transaction is complicated, such as a paper machine. SKF, for example, has realized that it cannot guarantee the operability of a paper machine on its own but needs to build a network of competencies. One desired outcome of this acquisition of new competencies is the expansion of the pool of resources and capabilities available to the firm. These new competencies enable the seller to formulate a more complete offering, which usually requires a more complete product range. For example, Lamor Corporation moved to providing a more complete offering just by expanding its product range to include also other equipment than skimmers. And by collaborating with the government, it can further develop its business offering toward a comprehensive oil recovery.

Our empirical evidence indicates that some of the moves toward more complete offerings could not have been possible without enhanced information technology (IT), which appears as a key enabler for all four firms as they move toward cell IV. While all the firms in our study had a basic level of technology, there were no new technology initiatives in support of the initial moves of any of the cases (see Table 2). However, for the final move to cell IV, all firms initiated new technology projects. This suggests that firms can move along the continuum for either the completeness of an offering or the nature of a relationship without significant new technology implementations, but must incorporate new technology to support the move to relational and more complete offerings. For example, SKF and KONE cannot provide their more complete offerings without the intelligent maintenance surveillance from a distance. PBM's ability to collaborate with customers on new product development was directly supported by the use of IT: the company utilizes web cameras, process control systems, and the Internet

to maintain connections with customers and to facilitate new product development. Lamor used IT to create databases in order to facilitate the sharing of resources such as equipment and personnel. Therefore, we see the role of IT as an enabler, rather than a trigger, as the move toward a more complete offering is usually initiated by customer needs.

5.3. Further research topics

The proposed framework has some similarities with other theoretical models formulated as two dimensional frameworks (see, e.g., Apte & Vepsäläinen, 1993; Hayes & Wheelwright, 1979; Tinnila & Vepsäläinen, 1995). The general normative proposition of these papers has been that some kind of match should be established; and, often, this match is found on the diagonal. The intuitive normative proposition would be to match less complete offerings to a transactional approach and more complete offerings to relational contracting. Indeed, our case studies support this view as all of our cases began in cell I and proceeded, eventually, to cell IV. However, further research could investigate cell IV as a potential strategic optimum since our empirical observations suggest the existence of a preferred firm position in the framework, namely cell IV. Future research can provide a more comprehensive answer by analyzing the competitive positioning of additional firms in other industries. We see the limited number of the case companies as a limitation to the study and would propose that additional firms should be identified and analyzed to see if our results can be further validated in other industries. Some of the researched companies conducted business in more than one cell in the framework and made a distinction between different customer types. Further research could address this division of customers into different cells of the framework as well as performance differences among the cells.

6. Conclusions

This paper makes several contributions in the area of competitive positioning. First, it provides a theoretically based framework for analyzing the completeness of offerings and the nature of buyer–seller relationships. Second, the framework identifies available strategic positions for firms. Third, the paper describes two distinct paths that four case firms have taken to reach more complete offerings and stronger relationships with their customers. Fourth, IT enablement was identified as a key requirement for competitive positioning.

The model provides a tool to analyze different offerings within a company. The framework was well received by the practitioners in all of the case companies. The four cases suggest that strategic options are available to firms whether their initial focus is product or customer development.

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ESSAY 3: Penttinen, E. Explaining the Transition from Products to Services in the Manufacturing Business. "Unpublished".

Explaining the transition from products to services in the manufacturing business

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Abstract

Purpose - This research aims at exploring the mechanisms that drive manufacturing companies to innovate new services and integrate them into their core product offering. Using the concept of institutional isomorphic change (DiMaggio and Powell 1983), we start by examining the coercive, mimetic, and normative mechanisms to explain this process of homogenization.

Design/methodology/approach - A multiple case study of five manufacturing companies (SKF, Canon, Lexmark, Wärtsilä, and KONE).

Findings - The results show that all the mechanisms have explanatory power over the transition. However, coercive pressures resulting from customer requests turned out to be most important. Mimetic pressures are illustrated through the benchmarking of successful companies operating in the same industry. Normative pressures stem from the usage of consulting services and research organizations' reports (e.g. Gartner group reports). In addition to these mechanisms, we extend the framework to include economic pressures such as pressures to generate new revenue and to protect the business against market fluctuations.

Practical implications - The framework offers managers a structured way of examining the mechanisms that drive many manufacturing companies to move towards services. A manager can reflect these pressures to her own company and evaluate if there is room for strategic repositioning of focus toward a more services-based concept.

Originality/value - Motivated by previous studies that provide managerial advice as to how the transition should be carried out, this paper is the first attempt to systematically examine the mechanisms that can explain the transition from products to services within the manufacturing sector.

Keywords Manufacturing, from products to services, explanatory mechanisms

Paper type Research Paper

1. Introduction

Within business-to-business (B2B) manufacturing, traditional product-producing companies such as General Electric, Xerox, SKF, KONE and many others are announcing that, today, they are service companies [see e.g. Bowen and Ford (2002) and (Penttinen and Palmer 2007)]. Indeed, the services' share of the turnover of manufacturing companies is increasing at a steady rate. Take for example companies such as Wärtsilä (a producer of power plants and ship motors) or KONE (a manufacturer of elevators). In 2005, the services' contribution to their turnover was 43% (33% in 2002) and 60% (57% in 2002), respectively.

The extant literature provides some explanations for this transition. For example, services have higher margins than products and provide a more stable source of revenue; customers are demanding more services; and services can be a source of competitive advantage as they are more difficult to imitate (Oliva and Kallenberg 2003). However, the literature clearly lacks a systematic examination into the mechanisms of this transition within manufacturing companies. Therefore, in this paper, our objective is to examine these mechanisms.

For many companies, the initial purpose of this repositioning from products to services was to differentiate from competitors by adding services to the product offering and thus gaining a key supplier status (Ulaga and Eggert 2006). Often, in the case of industrial manufacturing, the core products have become standardized and the margins decreased due to increased competition. Hence, the companies have

had to find other sources of revenue, and services are seen as a good way to increase margins and to differentiate from competitors. However, now that practically all traditional product manufacturers are repositioning themselves as service and solution providers, the companies are actually starting to resemble themselves. They are using the same marketing slogans, and their value proposition is essentially the same: offering maintenance as outsourcing solutions. The theory to explain this kind of isomorphic change is that by DiMaggio and Powell (1983). They examine the process of homogenization of organizations and discuss the coercive, mimetic, and normative mechanisms that drive companies and organizations to adopt similar organizational forms.

The paper proceeds as follows. Next, we present the literature discussing the transition from products to services in the manufacturing context. Then, we discuss the concept of institutional isomorphism. In the third section, we discuss the research methodology. In the fourth section, we present the cases. In the remaining sections, we discuss the findings of the case study and provide avenues for further research.

2. Literature review

2.1 Moving from products to services in the manufacturing context

The general transition from goods-based dominant logic to services-based dominant logic is a very current research theme in the marketing and management arena (Vargo and Lusch 2004). The service-centered view of exchange concentrates on concepts such as intangibles, competences, dynamics, exchange processes and relationships, and operant resources (resources that produce effects). This new worldview implies that the goal is to customize offerings, to recognize that the customer is always a co-producer, and to strive to maximize customer involvement in the customization to better fit the customer's need (Vargo and Lusch 2004).

Within manufacturing, this transition can be clearly observed. Increasingly, manufacturing companies are relying on services instead of first-time installations in the search for revenue: maintenance, modernization, consulting, and condition monitoring services are just examples of such services. But

what does it mean when a company shifts its focus from products to services? According to Kramer et al. (2005), *"when shifting from products to services, a supplier does more for the customer than it used to and thereby allows the customer to off-load some work and thus do more for his own customer"*. Similarly, Stremersch et al. (2001) define full-service contracts in the industrial maintenance market as bundled offerings that are an extension in meeting customer needs. Edvardsson (1997) views service as part of a wider concept, product. In other words, the physical component is always a part of the service offering. In the case of manufacturing, spare parts and MRO are the physical components of service offerings.

Extending the boundaries of the firm in this way constitutes a major managerial challenge for manufacturing companies: e.g., how to cope with the change management issues (the acquisition of new organizational principles, structures, and processes) or how to leverage the advantages of the manufacturing firm when moving towards operations services? (Oliva and Kallenberg 2003) In addition, when a company repositions itself from a product manufacturer to a service provider, it needs to move towards a more relational interaction with its customers in order to learn the customer's processes (Penttinen and Palmer 2007).

How about the mechanisms driving manufacturing companies to move towards services? Wise and Baumgartner (1999) state that the weak product demand and the growing installed base have pushed value downstream from manufacturing. A company should assess the attractiveness of the downstream market and look at indicators as the ratio of installed units to annual new-unit sales, the customer's usage costs over the product life cycle relative to the product's price, and the profitability of downstream activities relative to product margins (Wise and Baumgartner 1999). Mathieu (2001) discusses the financial, strategic, and marketing benefits of the implementation of a service strategy. She proposes that the more specific and intense the service maneuver, the higher the financial and strategic benefits. Marketing benefits increase as the organizational intensity increases. (Mathieu 2001)

We conclude that the transition from products to services has significant implications for industrial B2B firms. It offers both new opportunities and presents challenges for companies contemplating such a move. We are interested in providing a structured view into the mechanisms that drive this change. To do this, we apply the framework of institutional isomorphism by DiMaggio and Powell (1983).

2.2 Institutional Isomorphism

In their much cited article, DiMaggio and Powell (1983) seek to explain why organizations in a specific line of business grow increasingly similar to one another. Borrowing from population ecology (Hawley 1968), they use the concept of isomorphism, which is “*a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions*” (DiMaggio and Powell 1983). They distinguish three mechanisms that trigger institutional isomorphic change. The first is external pressure, e.g., legal obligations and standards, towards similarity (coercive isomorphism), the second is uncertainty, inducing imitation and copying of successful organizational models (mimetic isomorphism), and the third is related to the cognitive and normative base of the professions which shape organizations (normative isomorphism).

These mechanisms have been widely applied across a number of disciplines. Within information systems, for example, institutional isomorphism has been used to study IT innovation, IT development and implementation, and IT adoption and use (Mignerat and Rivard 2005). As an example, Swanson and Ramiller (2004) argue that mindlessness in innovating with IT may be rooted in what we will call institutional preemption, meaning that in their IT structures and practices, firms often come to look more alike than might be expected given differences in their individual circumstances.

We will next discuss each of these mechanisms in greater detail. In addition, we will illustrate how these mechanisms work in the real world through some case examples.

Coercive isomorphism

Coercive isomorphism results from both formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function. Such pressures may be felt as force, as persuasion, or as invitations to join in collusion. One example of coercive isomorphism is an organizational change, which is a response to governmental mandate (e.g. new pollution control technologies to conform to environmental regulations). However, coercive isomorphism can also be more subtle and less explicit. For example, the need to lodge responsibility and managerial authority in a formally defined role may lead, e.g., free schools to have a “principal” to negotiate and represent the school to outside agencies. (DiMaggio and Powell 1983)

How has coercive isomorphism been operationalized in previous research? For example, studying the adoption of the multidivisional form (MDF), Palmer et al. (1993) argue that “*the nonfinancial firm on which a corporation is dependent may prefer that it adopt the same structure that they have, to minimize the costs of monitoring and controlling resource exchanges*” (Palmer et al. 1993). In addition to the dependencies between companies, these coercive pressures may also result from formal operating standards backed by legal sanctions. As an example, Lehrman (1994) studies the effect of regulatory change to the survival of the American life insurance companies, and concludes that the institutional environment (regulations) has yielded increasingly uniform, less diverse, life insurance companies.

Mimetic isomorphism

Mimetic isomorphism stems from uncertainty. When organizational technologies are poorly understood, or when the goals of the organization are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations, in other words, imitate existing organizational models. Therefore, the process of imitation can be seen as a response to uncertainty. When an organization faces a problem with ambiguous causes or unclear solutions, it is tempted to imitate similar organizations in their field that it perceives to be more legitimate or successful. (DiMaggio and Powell 1983)

How has mimetic isomorphism been operationalized in prior research? Studying the adoption of the multidivisional form (MDF), Fligstein (1985) examines the percentage of firms in a particular firm's industry that had adopted the MDF by the beginning of the decade in question. Similarly, Levitt and Nass (1989) investigate the homogenization of college-textbook publishing and state that *"copying the texts of other publishers clarifies the access structure of college-textbook publishers by constraining some of the choices attached to the problems associated with producing a new text. That is, editors need not start from scratch in evaluating a text but can ensure that it reflects the basic structure and organization of material other texts."* (Levitt and Nass 1989). Yet another example is provided by Burns and Wholey (1993) who hypothesize that the cumulative force of prior adaptation of matrix management by organizations in regional and local networks is positively associated with new adoptions.

Normative isomorphism

Normative isomorphism stems primarily from professionalization. According to DiMaggio and Powell (1983), there exist two main aspects of professionalization that act as the sources of normative isomorphism. First, universities and professional training institutions are important centers for the development of organizational norms among managers and staff. Second, professional and trade associations are another vehicle for the definition and promulgation of normative rules about organizational and professional behavior.

How has normative isomorphism been operationalized in prior research? For example, Mezas and Scarselletta (1994) examine the standardization process of financial reporting and state that *"... a more orderly process may result from common professional identities among participants in the decision process. Professions provide members with a common culture, in the sense of shared definitions of problems and common repertoires for managing those problems"* (Mezas and Scarselletta 1994). Similarly, when studying the adoption of the multidivisional form (MDF), Palmer et al. (1993) say that *"thus, firms whose CEOs had degrees from elite graduate schools of business should have been more likely than other firms to adopt the MDF"*.

3. Methodology

We use the multiple-case study approach to examine the mechanisms driving the isomorphic change in manufacturing organizations' market offerings. We follow Eisenhardt (1989) and use - a priori - the framework of institutional isomorphism to provide a grounding of construct measures. We then analyze the data from case studies and sharpen the framework in an iterative process (Eisenhardt 1989). As an example of the iterative process, the mechanism of economic pressures was added alongside the initial coercive, mimetic, and normative pressures.

The case study methodology has distinct advantage when a "how" or "why" question is being asked about a contemporary set of events, over which the investigator has little or no control (Yin 1994). In our research, we examine why practically all manufacturing companies are experiencing the same transition in which services account more and more of the company's turnover. Furthermore, the strength of the case study approach is that it enables the capture of "reality" in considerably greater detail and the analysis of a considerably greater number of variables than is possible with many other approaches (Galliers 1991). This was especially important in our work as the objective of this research was to find the underlying mechanisms that drive the transition from products to services within the manufacturing sector. For example, many of the interviewees saw their company as the pioneer in this transition but when the discussion got into greater detail, it turned out that they do use some form of benchmarking of other companies' offerings. Therefore, the case study approach allowed an investigation of the underlying drivers and not only the "official company statements", which would have been, perhaps, the results of a survey approach.

Our case research included discussions and interviews with the key-informants of each of the researched companies. In addition, we conducted an extensive review of company documents such as annual reports and marketing brochures. More specifically, case SKF is based on discussions with the CEO and CIO of SKF Finland as well as three client companies. These interviews were conducted during the period between fall 2001 and spring 2004 and all of these interviews were tape-recorded and transcribed. Case

Canon is based on discussions with the marketing director of Canon Finland during the spring 2006. One extensive interview which lasted 1.5 hours and focused on the transition and its antecedents was tape-recorded and transcribed. Case Lexmark is based on discussions with the country general manager of Lexmark Finland during spring 2006. One extensive interview which lasted 1.5 hours and focused on the transition and its antecedents was tape-recorded and transcribed. Case KONE is based on three doctoral dissertations (Kela 1993; Marschan 1996; Tinnila 1997) as well as on discussions (in spring 2006) with a development manager of the service division. Case Wärtsilä is based on discussions with the vice-president of the service unit. These discussions were conducted through electronic mail exchanges in spring 2006 and focused on the evolution of the service unit and the mechanisms that drive the growth of the unit.

4. Case Studies

Next, we present the cases by giving a brief introduction to the company and then describing the changes taking place in each company's focus.

4.1 Case SKF

SKF (Svenska Kullager Fabriken) is the leading global supplier of bearings, founded in 1907. From the very beginning, SKF focused intensively on quality, technical development, and marketing. Today, the company employs 38,600 people worldwide and has a turnover of 4.5 billion euros. The company produces bearings which are used in various rotating machines and equipment. In Finland, the biggest bearing users for SKF are the paper & pulp industry as well as the steel industry, but also all the machine manufacturers of gearboxes, electrical motors, pumps, etc. are large consumers of bearings. Globally, the biggest bearing user is the vehicle industry.

In 2000, the company began offering a totally new kind of business deal: assured operating capacity and operability of bearings. In the new Integrated Maintenance Solution (IMS) offering, SKF would guarantee

to keep the bearings rolling in the customer's machines. Each IMS agreement is customized to specific business needs. The customer can choose which areas he wants to include, based on internal resources and current supplier contracts. The introduction of these IMS contracts required SKF to innovate new kinds of services. For example, SKF invested heavily on information technology to develop intelligent bearings that are used in condition monitoring services (Penttinen and Palmer 2007; Penttinen and Saarinen 2005).

4.2 Case Canon

Canon, founded in 1937, operates in the industries of electronics and precision engineering. The company employs 115,000 people worldwide and has a turnover of around 24 billion euros. The company has three main business divisions including business machines, cameras, and optical and other products. The company's business machines division, the object of our research, is split into three further units comprising of copying machines, computer peripherals, and business systems.

In 2002, Canon launched the Canon Business Intelligence (CBI) concept. Instead of pushing the printers and copiers to the market, Canon proposes its business customers a combination of hardware, software, and services. Each CBI contract is customized and there is a phase of consultation before each sale. During this consultation phase, Canon's salespeople evaluate whether the client is interested in a large-scale document handling solution or merely in a purchase of an ordinary printer or copier. More and more often, customers are opting for these solutions, and the consultation business already accounts for up to 30 percent of Canon Finland's turnover. The longest consultation periods can last up to 30 days.

4.3 Case Lexmark

Lexmark International Inc. was founded in 1991 when IBM decided to hive off its printing business to retail investors. Lexmark entered the New York Stock Exchange as an independent company in 1995. It is a manufacturer and supplier of printing solutions including laser and inkjet printers, multifunction

products, associated supplies and services. The company employs 13,000 people worldwide and has a turnover of around 4.3 billion euros.

In 2002, Lexmark launched the concept "print-move-manage". "Print" relates to the hardware and technical printing solutions that are used for market entry. "Move" means combining activities, making the most use of multi-function machines, as well as scanning documents into electronic format, saving them, and distributing them electronically. "Manage" is about controlling the output environment: becoming conscious of the costs and trying to find ways to control and lower these costs. The "print-move-manage" concept is offered primarily to large companies, and the customer company can choose from a variety of service levels. The highest service level means that the customer outsources everything from the physical printers to the maintenance and technical support to Lexmark.

4.4 Case Wärtsilä

Wärtsilä was established in 1834 when a sawmill was constructed in a small town of Tohmajärvi in Finland. Today, Wärtsilä supplies ship machinery, propulsion, and sealing solutions for builders, owners, and operators of all types of marine vessels and offshore applications. Wärtsilä is also a significant supplier of decentralized power plant solutions and operation and maintenance solutions. The company employs approximately 12,000 people worldwide and has a turnover of 2.6 billion euros.

Wärtsilä is divided into three business units: Ship Power, Power Plants, and Service. The first two divisions are mainly manufacturing-oriented: concentrating on building and providing complete power systems for ships and power plants. The products offered to marine and offshore applications by Ship Power range from engines and gearboxes to propellers, thrusters, rudders, seals, bearings, and control systems. Power Plants division offers products ranging from single engines to complete turnkey power plants. The Service business unit supports Wärtsilä customers throughout the life cycle of their installation. The Service business unit has been growing steadily, accounting for 43% of the company's turnover in 2005 (33% in 2002). With a global service network of its own service companies in over 60

countries, Wärtsilä provides a wide range of services to its customers during the lifetime of the installation which often exceeds 20 years. With a large installed base of its own engine brands, Wärtsilä provides OEM (Original Equipment Manufacturer) spare parts and services to a solid customer base. Wärtsilä offers its customers a range of different service agreements from agreements on supply of spare parts up to customized Operation & Maintenance (O&M) contracts. The idea of these O&M contracts is that Wärtsilä operates and maintains the customer's power plant, marine or offshore installation. In addition to the above mentioned services, Wärtsilä has extended its service scope to cover upgrading packages to older engines, reconditioning services, automation services, and customer training, among others. Wärtsilä offers services to other manufacturer's engines as well. Thus, by extending the scope of services to other than Wärtsilä engines, the company has been able to strengthen its position as the total service provider and continue the market development.

4.5 Case KONE

KONE is a Finnish elevator-manufacturing company, founded in 1910. KONE remained a domestic manufacturing company until the 1960s when the first foreign acquisitions were made. Today, KONE Elevators is the third-largest elevator manufacturer in the world with 27,000 employees worldwide and a turnover of 3.2 billion euros (in 2005).

Similarly as with case Wärtsilä, the services' share of KONE's turnover - compared to the first-time installations of elevators - has been increasing at a steady rate. Today, elevator maintenance and modernization business accounts for 60 % of KONE's income (currently, KONE has 575,000 elevators under maintenance contracts worldwide). Recently, the new availability-based concept called KONE Optimum Performance Service Agreement has been launched, and the essential idea is to integrate equipment maintenance with continuous surveillance of the equipment and provision of the preventative maintenance. The service agreement is based on written performance guarantees and sets the rate of

availability of the elevator (e.g. 99.5 %). There are different levels of service agreements: the basic, the standard, and the comprehensive.

5. Discussion

All the case companies experienced a somewhat similar evolution from product-producing manufacturers to companies with services as their main focus. We will next discuss the mechanisms that we found as the drivers for this transition.

5.1 Coercive pressures

Coercive pressures result from formal and informal pressures exerted on organizations by other organizations upon which they are dependent and by cultural expectations in the society within which organizations function. These pressures may be felt as force, as persuasion, or as invitations to join in collusion (DiMaggio and Powell 1983). When going through the cases, we can see coercive isomorphism stemming from two sources: customer requests and legal regulations.

First, there are pressures from customers who increasingly demand more complete solutions. For example, when interviewing a customer company of SKF, the interviewee stated “...currently, we have over 20,000 suppliers. First, we want to cut that number to 2,000 and then onwards”. We interpret this as a coercive pressure toward SKF to create a bundle which includes a larger set of bearings and bearings-related services.

For all the case companies that are machine manufacturers (Canon, Lexmark, Wärtsilä, and KONE), there is a large installed base of machines that need maintenance.

"Our customers buy products which have quite long lifetimes, often more than 20 years. The value of the products is also quite substantial. Therefore, the customers demand to get services on their products in order to ensure they can use their product during the whole lifetime." (VP of service division at Wärtsilä)

Second, there are legal pressures that articulate regulations concerning machinery. For example, buildings need to assure the functioning of their elevators, which has prompted KONE to offer year-to-year maintenance contracts. Similarly, in the case of Wärtsilä, environmental issues for various engines have become more and more important:

"...the world is changing every day and new demands are arising. For example regulations on the environmental effects are much stricter now than they were in the 1980's. By offering upgrading and modernization packages to the customers the old engine can fulfill the requirements and the customer can run his engine for some more years." (VP of service division at Wärtsilä)

5.2 Mimetic pressures

Not all institutional isomorphism derives from coercive authority. Uncertainty is also a powerful force that encourages imitation. When organizational technologies are poorly understood, when goals are ambiguous, or when the environment creates symbolic uncertainty, organizations may model themselves on other organizations (DiMaggio and Powell 1983). Therefore, we looked for examples and situations of mimetic behavior when conducting interviews and going through the transcripts. Although we found some evidence of mimetic isomorphism in the form of benchmarking other companies operating in the same industry and in the imitation of marketing slogans, mimetic mechanisms did not emerge as an important explanatory mechanism. This may be due to the methodology used (interviews).

According to DiMaggio & Powell (1983), mimetic pressures stem from uncertainty which encourages imitation. We searched for both technical and relationship uncertainty from our cases. When going through the case examples, we did not find evidence of situations of higher than normal uncertainty.

The respondents saw their companies as pioneers in the service orientation, and therefore did not admit any sort of copying or mimetic behavior. When the discussion got into more detail, however, we learned

that many of the researched companies did use benchmarking of other firms operating in the same industry.

Related to the mimetic pressures, there are similarities in the marketing slogans of the researched companies. For example, SKF offers the performance-based Integrated Maintenance Contract agreements which guarantee maximum plant productivity (SKF 2005). Similarly, KONE offers KONE OPTIMUM Performance Service Agreements with written performance guarantees (KONE 2005). As another set of examples, Canon and Lexmark both emphasize that “printing is transforming into services business” (Muukkonen 2004).

5.3 Normative pressures

The third source of isomorphic organizational change is normative and stems primarily from professionalization (DiMaggio and Powell 1983). When looking at the illustrative case examples, we can see that, the interviewees had very similar educational backgrounds (MBAs and engineering). In addition, they follow the academic management literature on, for example, the concentration on core competencies. Many of the interviewees mentioned Gartner reports as having an impact on the decision-making process. Gartner has researched, for example, the printing and document-handling businesses and states that they are the last remaining parts of IT that have not yet been discussed from the outsourcing perspective.

SKF participated actively in seminars related to industrial maintenance, giving talks on their experiences as a services provider. We argue that these maintenance seminars contribute to the normative pressures in the form of information exchange among professionals.

5.4 Economic Pressures

In addition to the coercive, mimetic, and normative pressures, we identified a fourth category named economic pressures.¹ These pressures stem primarily from the pressures to generate new revenue, to find businesses with higher margins, to ensure the maintenance, repair, and operations (MRO) business, and to protect the company against market fluctuations.

All the case companies experienced a need to find new sources of revenue, and they all saw services as an efficient way to do this. Revenue can be generated by providing services to products and, often, these services have longer life cycles than the products (Potts 1988). Similarly, the companies (e.g. SKF, Canon, and Lexmark) experienced low margins on their base-products, and they saw services as an efficient way of generating higher-margin business (Muukkonen 2004). This was evident also in the case of SKF (Penttinen and Palmer 2007). The company's core product, the bearing, was standardized, and providing the availability and runnability of bearings was seen as a much more attractive business.

In addition, moving to services-based concepts can be an efficient way of ensuring the MRO business.

"Printers and other related machines are often sold to customers at a very low margin. MRO business is most important to us. Service is a great way to ensure the MRO business" (Country manager of Lexmark Finland)

Services offer the manufacturing company an important means of protection against market fluctuations:

"When there is depression the overall demand for new ships and power plants will decline and therefore Ship Power and Power Plants will be affected in one or another way. The Service business is not as sensitive to market fluctuations as the Ship Power and Power Plants. The existing installations will still need maintenance. In addition to this, the expanded scope of

¹ This category of economic pressures has been discussed previously from the point of view of institutional isomorphism by, e.g., Granlund, Markus and Kari Lukka (1998), "It's a Small World of Management Accounting Practices.," *Journal of Management Accounting Research*, 10, 153-79. when examining the homogenization of accounting practices.

services is also diversifying the risks in service business due to market fluctuations." (VP of services division at Wärtsilä)

5.5 Summary

The following figure depicts the pressures. Coercive pressures turned out to be the most important ones. Many of them intertwine with economic pressures. However, we chose to keep the economic pressures as a distinct category because coercive pressures are by definition pressures that are exerted from the outside of the company (such as customer demands and legal pressures). Economic pressures are related to the competitive position of the company.

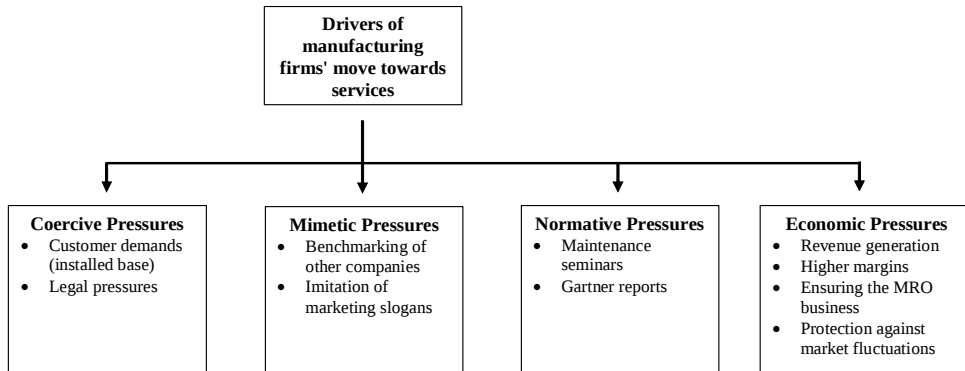


Figure 1. Explanatory mechanisms

6. Conclusions

The objective of this paper was to examine the drivers to the transition from products to services. Many manufacturing companies have recently repositioned their value proposition to include various kinds of services. They have bundled these products and services together to formulate an offering that is an extension in meeting their customers' needs. This paper provides insights concerning the mechanisms behind this transition. We use the theory of institutional isomorphism (DiMaggio and Powell 1983) and discuss the coercive, mimetic, and normative mechanisms. We provide illustrative case examples and

conclude that all of these mechanisms contribute and have explanatory power over this phenomenon. In addition, we find a fourth mechanism, economic pressures, affecting the transition from products to services in manufacturing firms.

The paper has several limitations to which we provide avenues for further research. The current research consists of only five case studies. We see the limited number of cases as a limitation and suggest that further research, perhaps a quantitative approach, might address this issue. However, a deep understanding of the mechanisms required a qualitative approach. For example, when asking about the mimetic mechanisms, many of the interviewees stated that their company was the pioneer and that imitation and consulting from outside the company cannot be seen as explanatory mechanisms for their company. Then, when the discussion got deeper, we found that the company did actually benchmark its operations against other successful companies in the industry. Similarly, the companies often used Gartner reports as the basis for their business restructuring decision-making process. However, it was only when the discussion got further that the use of these reports was made known.

All of the researched companies were large organizations with a relatively large installed base of machines. Further research could look at smaller companies and evaluate the changes in their market offerings. Providing these maintenance solutions might not be possible without the benefits of a large organization with an established base of customers.

Dividing these mechanisms into four categories is quite strict. Clearly, these pressures are interrelated. DiMaggio and Powell (1983) note that their typology of coercive, mimetic, and normative mechanisms is an analytic one and that the types are not always empirically distinct. However, as our objective was to provide a structured view to the mechanisms that drive manufacturing companies to integrate services to their core products, the use of these three mechanisms as an initial theoretical framework was useful.

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Exploring the Features of Successful E-Business Offerings

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Abstract

We have empirically studied how a business unit's market offering explains electronic business profitability. Initially, we gathered nine features, which were reduced to four dimensions using principal component analysis: (1) *quality*, (2) *customization*, (3) *ease of use*, and (4) *wideness of product/service offering*. Quality and wideness of product/service offering turned out to be the most important dimensions explaining profitability in the whole data set. Our further analysis revealed that customization had a positive effect on profitability for manufacturing units. We provide interpretations of the results in the conclusions.

Keywords: business model, market offering, electronic business, profitability, manufacturer, service

1. Introduction

Frequently, managers need to make decisions concerning their company's product/service offering. For example, what would be the optimal level of customization, how much should be invested in quality, and how wide should be the range of products and services offered to customers? Concrete strategic tools available for companies include, e.g., bundling, total quality management, and customization. The aim of this research is to find the most influential effects of strategic product/services offering decisions on electronic business profitability.

Earlier research has found several important factors that are critical for a successful offering [15]. They do not, however, form a coherent theoretical foundation for understanding their contribution to e-business performance. They, nevertheless, give a wide variety of perspectives to start with. Our objective in this

paper is to reduce the number of critical dimensions, and to investigate which of them are important in specific circumstances.

We begin by exploring the features of market offerings. We identify nine features which were derived from expert interviews and literature searches. We use a survey consisting of 111 responses from 60 companies. In the first phase, we validate the 9-item instrument, and we are able to summarize the information of the instrument using four principal components. In the second phase, we use the four principal components to explain the business unit's electronic business profitability. We find that *quality* and *wideness of product/service offering* have positive effect on electronic business profitability in general. In addition, we use the type of business unit (manufacturing-unit vs. service-unit), the type of customer (B2B vs. B2C), and the maturity of technology adoption (early vs. late) as contextual variables and analyze differences between respondent groups according to these variables. Based on the analyses, we find that, in addition to the *quality* and *wideness of product/service offering* components, *customization* has a positive effect on profitability for manufacturing units. We provide a more in-depth discussion on these findings at the end of this paper.

The paper is organized as follows. The second section briefly presents the literature related to business models and market offerings. In addition, we present the overall conceptual framework and operationalize the constructs used in this study. In the third section, we present the research methodology and describe the survey data. In the fourth section, we validate the initial measurement instrument and extract the four main features. In the fifth section, we develop the linear regression model to explain the business unit's electronic business profitability. Finally, we discuss the results, draw conclusions, and present the limitations to which we propose avenues for further research.

2. Literature Review and Development of Conceptual Framework

2.1 Business Model Literature

The market offering is an essential component of a company's business model [1, 10]. According to Weill and Vitale [26], "*the business model is a description of the roles and relationships among a firm's*

consumers, customers, allies, and suppliers that identifies the major flows of product, information, and money, and the major benefits to participants". Hedman and Kalling [10] introduce a generic business model framework including seven business model components: (1) customers, (2) competition, (3) offering, (4) activities and organization, (5) resources, (6) suppliers, and (7) scope of management. Of these components, the product/service offering is the component that is of great interest to companies for strategic repositioning. Therefore, in our study, we focus on the product/service offering and define it as consisting of goods and services.

2.2 Market Offering

For the purposes of our study, we collected determinants that relate to the company's market offering. Before conducting the survey, we gathered data for the study from various sources such as literature review, interviews, and the pilot testing of the questionnaire. The resulting nine features are: (1) "easy access to the offering", (2) "quality of the offering", (3) "economic pricing", (4) "easy to use", (5) "life cycle management", (6) "customer feedback utilization", (7) "targeted services", (8) "simple and clear features", and (9) "wide range of goods/services".

"Easy Access to the Offering": We define easy access to the offering as the accessibility of the goods and services through electronic business. More precisely, an easily accessible offering is made through multiple channels (such as the Internet or mobile devices) and is widely available geographically. Previous research has used availability [7], maximized access [15], accessibility [24], and extent of use [23] as features that influence the success of Internet commerce or electronic business.

"Quality of the Offering": Clearly, the quality of the business unit's offering is an important feature in the success of the business unit's electronic business activities. Earlier success-related studies present similar features: quality [8, 9, 16, 23] and product quality [14, 15, 24, 28].

"Economic Pricing": Price is a relevant part of an offering prescribing the amount of money transferred between various parties in the value chain. Saarinen [23] discusses the relation between price and

performance, whereas Weill and Vitale [26] define pricing management as one of the relevant features to follow in the business model context.

"Easy to Use": Especially in the electronic business context, ease of use has emerged as a feature that influences the success of Internet commerce. Other studies have included the easy-to-use feature [5, 6, 15, 23, 24, 26] while several other similar features have been taken into account such as user friendliness [23], clarity [23], fast and efficient service [26] as well as usability [7].

"Life Cycle Management": According to the product life cycle model, there should be a different kind of strategy [3, 17] and operative management focus [12] for each of the phases in the product life cycle in order to gain an optimized profit exploitation [20]. In the IS context, Saarinen [23] studies the effect of development phases.

"Customer Feedback Utilization": The efficient use of customer responses is crucial to improving the market offering to customers. Efficient customer feedback utilization enhances the business unit's understanding of its customers. Weill and Vitale [26] have used customer needs data capturing as a measurement factor.

"Targeted Services": The two primary sources of competitive advantage are product differentiation and cost leadership [21]. Companies can differentiate their offerings to the customers by increasing the level of personalization. In studying the impact of targeted services, DeLone and McLean [7] define personalization as a part of their model in evaluating success.

"Simple and Clear Features": Especially in the case of electronic commerce, the offering component should include features that are simple and clear to use. This is essential in marketing and selling the offering through an electronic means. Torkzadeh and Dhillon [24] use the feature "shopping convenience" with similar purposes.

"Wide Range of Goods and Services": The last component in the set of market offering features discusses the wideness of range of an offering. Similarly, in previous research, Keeney [15] and Torkzadeh and Dhillon [24] have included the large range of product options as a factor influencing the success of Internet commerce.

2.3 Electronic Business Profitability

The concept of success has been studied in a wide range of academic literature. According to the Webster dictionary, success is defined as a favorable outcome. In discussing success, management researchers have studied the economic performance [9], the measurement of economic performance [9, 27, 28] and the measures of information technology value [11]. In all these studies, authors regard profitability as a relevant component to explain the degree of success.

In our research, we use electronic business profitability to evaluate the success of the business units studied. In the questionnaire all the respondents evaluated the profitability of their business unit by giving a Likert-value in the scale of 1 (poor profitability) - 7 (excellent profitability).

2.4 Contextual Variables

Type of business unit (manufacturing vs. service): To distinguish services from goods, the traditional services marketing literature uses notions such as intangibility, heterogeneity, inseparability of production and consumption, and perishability [29]. Today, rather than relying on these characteristics, services are viewed as the “*application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself*” [25]. In our study, we use this discussion on goods and services to make a distinction between manufacturing-units and service-units. More specifically, if the business unit’s output consists primarily of processes, instead of tangible goods, it is defined as a service-unit. We argue that manufacturing-units and service-units differ in their perception regarding the features of market offerings. Our objective is to examine these differences.

Type of customer (B2B vs. B2C): Similarly, a distinction is made between business units operating in the business-to-business (B2B) and the business-to-consumer (B2C) context. Compared to the B2C environment, the characteristics of B2B markets include, for example, a relatively small number of customers, long-term business relationships, and a high degree of interaction between the members of the supplier and the customer companies [13]. The information for this variable was gathered directly from

the survey data. We argue that the type of customer (either business or consumer) has an effect on the features of market offerings.

Technology experience (early adoption vs. late adoption): The third contextual variable distinguishes early adopters of information technology from late adopters. Lieberman and Montgomery [18] consider the advantages and disadvantages of first-movers. They conclude that mechanisms that promote first-mover advantages include proprietary learning effects, patents, preemption of input factors and locations, and development of buyer switching costs. First-mover disadvantages may result from free-rider problems, delayed resolution of uncertainty, shifts in technology or customer needs, and various types of organizational inertia. To get data on the maturity of the technology adoption of the business units, we included questions in the survey asking to specify the year of the launch of the EDI-based and the Internet-based solutions. Based on these answers, the business units were classified into early adopters and late adopters of technology. We argue that the business units that are early adopters of technology have differing features of market offerings than the late adopters.

The following figure presents the conceptual framework for the paper. Next, we proceed to the operationalization of the constructs used in the study.

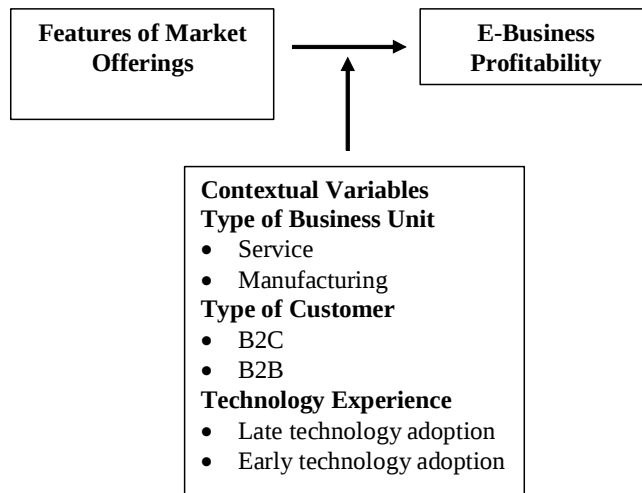


Figure 1. Conceptual Framework of the Study

2.5 Operationalization of the Constructs

The constructs used in this study are operationalized in the following table (Table 1). S/R informs the data collection method. Survey (S) means that the data were gathered from the survey questionnaire. Researcher (R) indicates that the data were produced by the researchers.

Table 1. Operationalization of the Constructs

Construct	S/R	Description and scaling	References
Features of market offerings			
"Easy access of offering"	S	"Our offering is easily accessible through electronic business and geographically widely spread". Question asked on LIKERT 1-7 scale	[7, 15, 23, 24]
"Quality of offering"	S	"The quality of our offering through electronic business is good" Question asked on LIKERT 1-7 scale	[8, 9, 14-16, 23, 24, 28]
"Economic pricing"	S	"We set the price for our offering at a profit" LIKERT 1-7 scale	[23, 26]
"Easy to use"	S	"Our electronic business processes and products are easy to use" Question asked on LIKERT 1-7 scale	[7, 15, 23, 24, 26]
"Life cycle management"	S	"We manage well our electronic business product portfolio in each of the life cycle stages" Question asked on LIKERT 1-7 scale	[3, 12, 17, 20, 23]
"Customer feedback utilization"	S	"We improve our e-business offering based on the feedback we receive from our customers" Question asked on LIKERT 1-7 scale	[26]
"Targeted services"	S	"We have a personalized e-business offering based on customer desires" Question asked on LIKERT 1-7 scale	[7]
"Simple and clear features"	S	"Our offering has simple and clear features" Question asked on LIKERT 1-7 scale	[24]
"Wide range of goods/services"	S	"We have a large range of e-business products and services" Question asked on LIKERT 1-7 scale	[15, 24]
Electronic business profitability	S	"Estimation of electronic business profitability" Question asked on LIKERT 1-7 scale	[22]
Type of business unit (manufacturing- vs. service-unit)	R	If the business unit's output consists primarily of processes, instead of tangible goods, it is defined as a service-unit. Dichotomy of manufacturing-unit vs. service-unit.	[13, 25]
Type of customer (B2B/B2C)	S	"What types of customers do you primarily serve? B2B or B2C?"	[13]
Technology experience	S	"What is the year of launch of your unit's Internet-based solutions?" "What is the year of launch of your unit's EDI-based solutions?"	
S/R: S = Survey data, R = Researcher interpretation			

3. Methodology

We developed the framework using various sources such as a literature review, expert interviews, the pilot testing of the questionnaire, and the subsequent survey. We began the empirical study with qualitative research methods by interviewing 17 employees from five companies in the fall of 2003. These companies represent different industries: paper, media, traveling, telecom, and logistics. The main purpose of these interviews was to identify the features of market offerings. At the same time, a literature

review was conducted analyzing features of market offerings found in the extant literature (academic journal articles).

After the interviews and literature review, the number of the items on the initial list of features was reduced by a careful analysis. As a result, we had a list of features that we decided to include as variables in the survey. The list of features was presented so that the respondents could evaluate the importance of each feature on a scale from 1 (not important) to 7 (extremely important). Common questions related to demographic data of the respondents as well as their companies were included. The questionnaire was pilot-tested with ten experts representing both practitioners and academics. After final revisions, the questionnaires were sent to the 450 respondents by mail.

3.1 Data Collection and Sample

The respondents were chosen from Finnish international companies using two criteria: 1) the company is among the top 30 Finnish companies according to their revenue and/or 2) the company is listed among the top 100 online brands in Finland. This produced a list of 61 companies from various industries including traditional large companies as well as some of the most successful small electronic commerce and portal companies. We chose a sample of 450 people, and they received the questionnaire by mail. All the respondents were practitioners both on managerial and operational levels of an organization, and they all were working at electronic business issues. The total number of responses amounted to 111 out of the 450 initial questionnaires, which yields a 25-percent response rate. We received properly filled questionnaires from 60 companies including 111 business units. Even though we had many respondents from the same firm, they were originated from different business units. Thus, the units of our analysis are independent business units.

3.2 Demographics

From these 111 responses, 63 percent represent service units; whereas 37-percent, manufacturing units (see Table 2). The respondents worked primarily (46%) on the managerial level of the organization or as

directors (29%). Forty-five percent of the respondents had five to nine years of valid electronic business experience, while 23 percent had as much as ten years or more of electronic business experience. These respondents were typically from the companies that have utilized EDI in their operations since the 1980s. Most companies in the sample had a long tradition of using EDI in their business operations. In many traditional manufacturing companies, EDI is still seen as a crucial component of electronic business. Eighty percent of the companies had started using EDI before 1993, and the Internet was used by 95 percent of the companies.

Table 2. Company sample (111 business units)

GENDER	%
Male	73
Female	27
POSITION OF RESPONDENTS	%
Manager	46
Director	30
Top management	10
Specialist, consultant	8
Employee	6
E-BUSINESS EXPERIENCE	%
Over 30 years	2
20-29 years	5
10-19 years	16
5-9 years	46
0-4 years	31
INDUSTRY	%
<i>Service units, total</i>	63
Logistics	14
Finance	10
Telecommunication	10
Media	8
Energy	6
Insurance	3
Retailing	3
Wholesale	3
Electronic	2
Construction	1
Others	3
<i>Manufacturing units, total</i>	37
Pulp and paper	12
Metal	10
Conglomerate	5
Electronic	4
Chemical	4
Groceries	2

4. Instrument Validation

Any statistical analysis, for example the hypothesis testing, is irrelevant if the data are collected with measures that have not been proven to provide reliable and valid data and results [19]. In this study, we use widely adopted psychometric approaches to develop multi-item measures. This method is recommended by Churchill [2] in order to avoid the most common measurement difficulties. A psychological construct can be seen as the abstract of a theoretical variable explaining some phenomenon which is of interest to academics and practitioners. Our instrument validation consists of four parts: reliability, content validity, predictive validity, and construct validity testing.

4.1 Reliability

Reliability is the degree of internal consistency of the measure answering the questions of how well a measuring instrument measures the intended constructs and whether the measure provides the same results every time it is used. Typically, the internal consistency is performed using Cronbach's alpha. The 9-item measurement instrument including the independent variables of the offering component achieved a reliability of .81. The coefficient can be regarded as sufficient according to Nunnally [19].

4.2 Content Validity

An instrument has content validity if the sample of items in its construct is representative of all the relevant items that might have been used in the larger domain of knowledge and skills. Moreover, the instrument should include constructs or items that have been previously tested, emphasize related and relevant material, and require appropriate skills of expertise. In short, content validity gives an answer to the question of whether the items on the scale adequately sample the domain of interest. In our study, the content validity was confirmed by employing experts in the field familiar with the content of the multi-item instrument [4]. First, a careful literature review relating to the features yielded appropriate items for the instrument. Second, the interviews among five companies completed the list of independent variables related to the business model component of the offering. Finally, we used a control group of ten experts

representing both academics and practitioners to provide feedback by pre-testing the questionnaire. These three steps certainly improved the content validity, but were still inadequate. However, the instrument validation in terms of content validity was continued by analyzing Pearson correlations. Table 3 shows that the item-to-profitability correlations ranged from .03 to .35, which produced a significance level between .00 and .39. Thus, the results strengthen content validity in the instrument validation.

Table 3. Correlations Between Items

VARIABLES OF THE OFFERING COMPONENT	N	Mean	Standard deviation	Corrected item-to-total correlation	Item-to-profitability correlation
"Easy access of offering"	108	5.61	1.20	.58***	.35***
"Quality of offering"	108	5.98	.88	.67***	.29***
"Economic pricing"	108	5.34	1.09	.55***	.22**
"Easy to use"	108	6.14	.90	.44***	.03
"Life cycle management"	108	4.90	1.45	.53***	.18**
"Customer feedback utilization"	108	5.86	.98	.45***	.22**
"Targeted services"	108	5.63	1.05	.51***	.22**
"Simple and clear features"	108	5.99	.90	.51***	.15*
"Wide range of goods/services"	108	4.65	1.49	.40***	.28***
Total	9	5.57	-	-	.34***
Legend: Profitability = Perceived Electronic Business Profitability Significance levels: *** $p = <.01$, ** $p = <.05$, * $p = <.10$					

4.3 Predictive Validity

In psychometrics, predictive validity can be seen as the predictive power of a scale over the unobservable construct that it is intended to measure. High correlations refer to adequate predictive validity when new scales are redundant measuring the same information. In our study, correlation between the scale of the offering component and the item-to-profitability reached .34 with the significance level of .01 (Table 3).

4.4 Construct Validity

Construct validity is concerned with the relationship of the measure to the underlying attributes it is expected to assess. We chose the two most common techniques to confirm the construct validity: correlations and principal component analysis. The corrected item-to-total correlation refers to the correlation between the score on the item and the sum of the scores on all other (i.e. eight items) items

varying between .40 and .67 and being significant with $p < 0.01$. The analysis of the construct validity was continued with principal component analysis and varimax rotation. First, we ensured the usability of factoring with Kaiser-Meyer-Olkin measure of sampling adequacy resulting in .758 and the Barlett's test of sphericity giving the significance level of .000. The results indicated that a principal component analysis might be useful with the collected data. The principal component analysis resulted in loadings on four components that generated an appropriate cumulated variance (76.34%) that alone is sufficient for retaining most of the information in the original variables. All the loadings are listed below in Table 4.

Table 4. Principal Component Analysis

VARIABLES OF THE OFFERING COMPONENT	Components			
	QUAL	CUST	EASY	WIDE
"Easy access of offering"	.631	-.007	.276	.426
"Quality of offering"	.719	.160	.351	.159
"Economic pricing"	.624	.115	.253	.208
"Easy to use"	.436	.008	.778	-.181
"Life cycle management"	.847	.287	-.109	.019
"Customer feedback utilization"	.186	.887	.089	-.016
"Targeted services"	.153	.862	.156	.170
"Simple and clear features"	.033	.364	.767	.326
"Wide range of goods/services"	.212	.113	.023	.915
Eigenvalue	3.728	1.268	0.976	0.898
Percent of variance explained	41.4%	14.1%	10.8%	10.0%
Extraction Method: Principal Component Analysis, Rotation Method: Varimax with Kaiser Normalization.				

In reviewing the results, we find four components. *Quality* (QUAL) component has high loadings with variables "easy access of offering", "quality of offering", "economic pricing", and "life cycle management". *Customization* (CUST) items "targeted service" and "customer feedback utilization" were separated onto the second component. "Easy to use" and "simple and clear features" form the third component named *ease of use* (EASY). "Wide range of goods/services" is extracted as its own component *wideness of product/service offering* (WIDE).

5. Findings

In this section, we use those four principal components to explain the electronic business profitability of a business unit. We apply a linear regression model for this purpose. As contextual independent variables,

we use dichotomous variables: *type of business unit*, *type of customer*, and *technology experience* (see Figure 2).

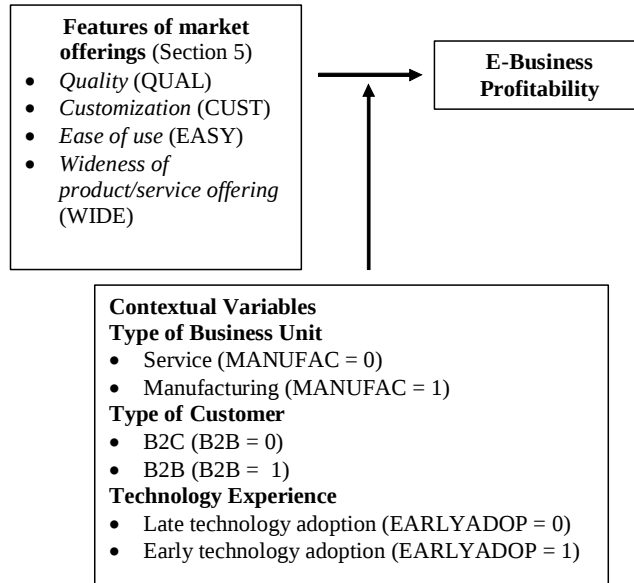


Figure 2. Regression Testing

Initially, we run a linear regression model with electronic business profitability as the dependent variable and the four principal components as the independent variables. The multiple determination is $R^2 = .153$ ($n = 104$) which is significant at even risk level 1%. The detailed results are in Table 5.

Table 5. The Linear Regression Model Using the Principal Components

	Regression Coefficients		<i>t</i>	Sig.
	<i>b</i>	Std. Error		
(Constant)	4.654	.100	46.530	.000
QUAL	.258	.105	2.456	.016
CUST	.165	.104	1.582	.117
EASY	.024	.099	.243	.808
WIDE	.289	.099	2.925	.004

The principal components are uncorrelated in the whole data set ($n = 108$), and thus they are also nearly uncorrelated in the subset where $n = 104$ (the dependent variable has a missing value in four cases). From

Table 5, we may conclude that the variables *customization* (CUST) and *ease of use* (EASY) can be omitted (risk level 5%) from the model, when no contextual variables are included.

5.1. Full Model

We assume that the contextual variables: type of business unit (MANUFAC: 1 for manufacturing units and 0 for service units), type of customer (B2B: 1 for business-to-business and 0 for business-to-consumer), and technology experience (EARLYADOP: 1 for early adopters and 0 for late adopters), provide us with a deeper understanding of the effect of the features of market offerings on electronic business profitability. To this purpose, we will analyze the impact of contextual variables on intercepts and slopes. The model is as follows:

$$y = \beta_0 + \beta_1*QUAL + \beta_2*CUST + \beta_3*EASY + \beta_4*WIDE + \sum (\beta_{0i}*I_i + \beta_{1i}*I_i*QUAL + \beta_{2i}*I_i*CUST + \beta_{3i}*I_i*EASY + \beta_{4i}*I_i*WIDE) + \varepsilon, \quad (5.1)$$

where I_1 = MANUFAC, I_2 = B2B, and I_3 = EARLYADOP. The results of the model are given in Table 6.

Table 6. The Results of Linear Regression Model (5.1)

$R^2 = 0.325$	Regression Coefficients		t	Sig.
	b	Std. Error		
(Constant)	4.775	0.220	21.695	0.000
QUAL	0.751	0.248	3.033	0.003
CUST	-0.170	0.207	-0.819	0.415
EASY	-0.093	0.239	-0.389	0.698
WIDE	0.258	0.197	1.308	0.195
MANUFAC	-0.200	0.256	-0.781	0.437
MANUFAC*QUAL	0.101	0.249	0.408	0.685
MANUFAC*CUST	0.506	0.311	1.625	0.108
MANUFAC*EASY	0.152	0.260	0.585	0.560
MANUFAC*WIDE	-0.311	0.263	-1.182	0.240
B2B	-0.219	0.269	-0.814	0.418
B2B*QUAL	-0.724	0.299	-2.421	0.018
B2B*CUST	0.207	0.312	0.664	0.508
B2B*EASY	-0.125	0.257	-0.489	0.626
B2B*WIDE	0.318	0.289	1.101	0.274
EARLYADOP	0.109	0.219	0.499	0.619
EARLYADOP* QUAL	0.060	0.242	0.249	0.804
EARLYADOP* CUST	0.029	0.258	0.114	0.910
EARLYADOP* EASY	0.283	0.227	1.245	0.217
EARLYADOP* WIDE	-0.177	0.219	-0.810	0.420

From Table 6, it is very hard to extract relevant variables for the final model. Therefore, we take another approach. We consider the indicator variables one at a time, and then build the final model by summarizing the results from these different models. Finally, we compare the final model to the full model in Table 6 and test whether all relevant information is included in the reduced model.

5.2. *Separate Models for Contextual Variables*

Hence the model for the units with $I_j = 0$ is as follows:

$$y = \beta_0 + \beta_1*QUAL + \beta_2*CUST + \beta_3*EASY + \beta_4*WIDE + \varepsilon, \quad (5.2)$$

and for the units with $I_j = 1$ is

$$y = (\beta_0 + \beta_{0j}) + (\beta_1 + \beta_{1j})*QUAL + (\beta_2 + \beta_{2j})*CUST + (\beta_3 + \beta_{3j})*EASY + (\beta_4 + \beta_{4j})*WIDE + \varepsilon \quad (5.3)$$

We will investigate the hypotheses of the type

$$H_0: \beta_i = 0 \text{ for } i \in \{1, 2, 3, 4\} \text{ and } \beta_{ij} = 0 \text{ for } i \in \{0, 1, 2, 3, 4\} \text{ and } j \in 1, 2, 3.$$

Primarily we are interested to find out if there are any differences in the intercept or the regression coefficients of the principal components in the groups of the contextual variables. The analysis for each contextual variable is reported in more detail in Appendix. The summary of the results is as follows:

First, consider the type of business unit. The “best” linear regression models ($R^2 = 0.218$) for manufacturing and service are found to be as follows:

for **manufacturing**:

$$y = 4.66 + .293*QUAL + .264*WIDE + .500*CUST, \quad (5.4)$$

and for **service**:

$$y = 4.66 + .293*QUAL + .264*WIDE \quad (5.5)$$

In both business groups, the electronic business profitability depends on the principal components *Quality* (QUAL) and *Wideness of Product/Service Offering* (WIDE), but, in addition, the manufacturing firms also depend on *Customization* (CUST) (for more details, see Appendix).

Second, in the same way, we analyze the type of customer. In this case, the “best” linear regression lines ($R^2 = 0.246$) for the both types of customers (B2B and B2C) are as follows:

For **B2B**:

$$y = 4.65 + .257*QUAL + .295*WIDE + .284*CUST, \quad (5.6)$$

and for **B2C**:

$$y = 4.65 + .257*QUAL + .295*WIDE. \quad (5.7)$$

The models (5.6) and (5.7) are almost identical with the models (5.4) and (5.5) with one exception: the estimate of the regression coefficient *CUST* in model (5.6) is clearly smaller than in model (5.4).

Third, we analyze the effect of the technology adoption (EARLYADOP) and end up with the same model structure as before. Our final estimated lines ($R^2 = 0.193$) for late technology adoption and early technology adoption are as follows:

For **early technology adoption**:

$$y = 4.64 + .256*QUAL + .305*WIDE + .336*CUST, \quad (5.8)$$

and for **late technology adoption**:

$$y = 4.64 + .256*QUAL + .305*WIDE. \quad (5.9)$$

The estimates of the regression coefficients in models (5.8) and (5.9) are almost identical with the previous models (5.4) - (5.7).

5.3. Final Model

When we summarize the information in the models (5.4) – (5.9), we will get the model in

Table 7. Combined Model

R ² = 0.219	Regression Coefficients			
	<i>b</i>	Std. Error	<i>t</i>	Sig.
(Constant)	4.664	0.097	48.068	0.000
QUAL	0.297	0.103	2.874	0.005
WIDE	0.262	0.098	2.684	0.009
B2B*CUST	-0.078	0.212	-0.367	0.715
MANUFAC*CUST	0.551	0.263	2.100	0.038
EARLYADOP* CUST	0.033	0.225	0.149	0.882

From Table 7, we noticed that in addition to QUAL and WIDE only the regression coefficient of variable CUST is significant in the manufacturing group. When the results are compared to models (5.4) – (5.9), we can state that CUST is significant in the two other groups (B2B and EARLYADOP) as well. However, when all those three groups are analyzed together, only the manufacturing group turns out to be significant. Thus our conclusion is that customization is important only in the manufacturing group. The other results follow from the correlations between the indicator variable for the manufacturing group and the indicator variables for the two other groups.

We verify the results by testing the models (5.4) – (5.5) against the full model in Table 6. The test is based on the F-test:

$$F^* = \frac{\frac{(SSE_R - SSE_F)}{(df_R - df_F)}}{\frac{SSE_F}{df_F}}, \quad (5.10)$$

where $SSE_F = 82.061$ refers to the error sum of squares of the full model (5.1) (Table 6), and $SSE_R = 95.039$ refers to the error sum of squares of the reduced model, where only QUAL, WIDE, and MANUFAC*CUST are in the model as independent variables. The degrees of freedom associated with the sums of squares are $df_F = 104 - 20 = 84$ and $df_R = 104 - 4 = 100$, respectively. Because $F^* = [(95.039 - 82.061)/(100-84)]/(82.061/84) = .830 < F(0.95, 16, 84) = 1.77$, we conclude H_0 . This means that we can accept as the final model the one where only QUAL, WIDE, and MANUFAC*CUST are independent

variables. Thus we conclude that the model given in (5.4) and (5.5) is sufficient to explain *electronic business profitability*.

6. Discussion

Our results indicate that - overall - the *quality* of the market offering has a positive effect on the electronic business profitability of the business unit even when controlling for the contextual variables. In other words, a business unit, which has a high quality product or a high quality service, can conduct electronic business with better profitability than units with low quality products and services.

Customization has no significant explanatory power over the overall model. However, we found a strong positive effect on the manufacturing units', B2B firms', and early adopters' electronic business profitability when each contextual variable was analyzed separately. However, when the contextual variables were all in the model, customization was significant only for the manufacturing units. It means that manufacturing units can derive higher electronic profitability by customizing their market offering to customer companies. Our statistical analysis did not provide support for our hypothesis that customization is important also for B2B firms and early adopters. This dependence was clear in the models, where each group variable at a time was in the model, but not in the model where all group variables were in the model together.

According to our results, *ease of use* of the offering did not have explanatory power over the profitability construct. This is rather surprising because, in previous research, especially in the electronic business context, ease of use has emerged as a feature that influences the success of Internet commerce [15, 24, 26]. These previous studies used consumer data in determining the electronic business success factors, whereas we used empirical data from companies. This is reflected in our results. Clearly, consumers are more concerned about the usability issues, whereas companies providing these electronic business products and services prioritize quality and customization issues.

Wideness of product/service offering has a positive effect on electronic business profitability. Again, as with the quality component, this was consistent through all the contextual variables. Our results suggest that if a business unit wants to succeed, it needs to have a wide range of products and services to offer to the market. This finding is consistent with [24] who found that Internet product choice has a significantly positive effect on Internet commerce success. They regarded Internet product choice as a measure of means objective with items such as "I like broad choice of products" and "I like the ease of comparison shopping".

7. Concluding remarks

In this paper, we set out to examine the features of market offerings and their effect on electronic business profitability. Also, we explored the differences between manufacturing units and service units, between B2B firms and B2C firms, and between late and early adopters of technology. In the first phase of our study, we constructed and validated a 9-item instrument consisting of market offering features. This was done based on expert interviews, a literature review on success factors, pilot-testing of the questionnaire, and survey data. Using principal component analysis, we were able to present the information from these initial features using four principal components. These components were named as *quality*, *customization*, *ease of use*, and *wideness of product/service offering*.

In the second phase of our study, we used these four components to explain the business unit's electronic business profitability. Overall, *quality* and *wideness of product/service offering* explain the electronic business profitability of a business unit. *Customization* has explanatory power in the case of manufacturing units. We did not find that *ease of use* had explanatory power on electronic business profitability.

7.1 What have we learned?

It was interesting to observe that for electronic business performance, no matter what the business context, it is essential to be successful at least in two dimensions, *quality* and *wideness of product/service offering*. *Quality* as perceived by the supplying companies is seen as the sum of several factors describing the value to the customer. This is in accordance with the trend to move from product focus to service focus and toward complete product/service offerings. On the other hand, *customization* seems to be important only for manufacturing companies. It may be that services in all channels are at least somewhat customized compared to products. Products, in traditional terms, are standardized having a specific form. In the electronic channel, it is possible to add customized features to products making them differentiate from those of the competitors. It was really surprising to find out that, at least, in our sample *ease of use* had no impact on performance. *Ease of use* has been found to be one of the critical features for adoption at an individual level, but does not play a role in the offering.

7.2 Limitations and Possibilities for Further Research

Like most survey studies, this study is subject to limitations. First, the sample consisted only of Finnish firms operating in local and international markets. Hence, a larger sample with cross-cultural data could give a richer picture of the subject matter. This could lead to more generalizable results. Second, the sample consisted of 60 firms and 111 respondents. Although we find the sample size adequate for this type of exploratory research, further research could collect data from a larger group of companies. Third, when categorizing the business units into manufacturers and service-providers, the researchers had to make decisions regarding the borderline cases such as electricity providers and conglomerates such as Nokia. This problem was solved by taking the business unit as the unit of analysis. Therefore, the responses from companies such as Nokia and KONE were classified according to the offering of the business unit in question. Fourth, although we sent out an equal number of questionnaires to large companies (top 30 Finnish firms), the number of responses received from the companies varies. However, we believe that our findings may be generalized with certain care. Fifth, data were collected from supplier

companies, and the customers' perspectives were analyzed based on perceptions of key informants in these supplier companies. When repeating the same study in customer companies, we expect, for example, the *ease of use* to emerge as a more important feature.

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APPENDIX

A.1 Analyzing the Type of Business Unit: Manufacturing vs. Service Industry

We study the model (5.1), when type of business unit (MANUFAC) is the only contextual variable. When we run the model, we obtain the multiple determination which implies that the regression relation is significant at risk level 1% ($n = 104$). The regression coefficients of the full model are given in Table 8.

Table 8. The Initial Model for the Effect of the Type of Business Unit

$R^2 = 0.247$	Regression Coefficients			
	b	Std. Error	t	Sig.
(Constant)	4.730	.125	37.939	.000
MANUFAC	-.244	.214	-1.137	.258
QUAL	.366	.151	2.414	.018
CUST	-.133	.141	-.945	.347
EASY	.069	.124	.555	.580
WIDE	.294	.127	2.321	.022
MANUFAC*QUAL	-.142	.210	-.674	.502
MANUFAC*CUST	.653	.213	3.062	.003
MANUFAC*EASY	.023	.214	.106	.916
MANUFAC*WIDE	-.140	.201	-.698	.487

We pick significant variables QUAL, WIDE, and MANUFAC*CUST and study whether it is sufficient to use the model where only those variables are in the model; i.e., we formulate the following hypotheses:

$$H_0: \beta_{MANUFAC} = \beta_{CUST} = \beta_{EASY} = \beta_{MANUFAC*QUAL} = \beta_{MANUFAC*EASY} = \beta_{MANUFAC*WIDE} = 0$$

$$H_1: \text{at least one } \beta \neq 0.$$

To test the hypotheses, we use the F-test (5.10), where $SSE_F = 91.556$ refers to the error sum of squares of the model in Table 8, and $SSE_R = 95.039$ refers to the error sum of squares of the restricted model where only QUAL, WIDE, and MANUFAC*CUST are in the model as independent variables. The degrees of freedom associated with the sums of squares are $df_F = 104 - 10 = 94$ and $df_R = 104 - 4 = 100$, respectively. Because $F^* = [(95.039 - 91.556)/(100-94)]/(91.556/94) = .596 < F(0.95, 6, 94) = 3.34$, we conclude H_0 . It means that we can accept as the final model the one where QUAL, WIDE, and

MANUFAC*CUST are the only independent variables. The estimated regression lines are given in (5.4) and (5.5)) and detailed results in Table 9.

Table 9. The Final Model of the Effect of the Type of Business Unit

$R^2 = 0.246$	Regression Coefficients			
	<i>b</i>	Std. Error	<i>t</i>	Sig.
(Constant)	4.663	.096	48.738	.000
QUAL	.293	.101	2.912	.004
WIDE	.264	.095	2.784	.006
MANUFAC*CUST	.500	.150	3.335	.001

All regression coefficients are significant at risk level 5%.

A.2 Analyzing the Type of Customer: B2B vs. B2C

Next, we analyze the effect of the type of a customer (B2B). Because $R^2 = 29.947/121.54 = 0.246$, the regression relation is significant (at risk level 1%) ($n = 104$). The regression coefficients of the full model (5.1) are given in Table 10.

Table 10. The Initial Model for the Effect of the Type of Customer

$R^2 = 0.246$	Regression Coefficients			
	<i>b</i>	Std. Error	<i>t</i>	Sig.
(Constant)	4.790	0.203	23.608	0.000
B2B	-0.260	0.237	-1.097	0.275
QUAL	0.680	0.229	2.967	0.004
CUST	-0.142	0.194	-0.734	0.465
EASY	0.141	0.162	0.871	0.386
WIDE	0.179	0.174	1.034	0.304
B2B*QUAL	-0.556	0.257	-2.158	0.033
B2B*CUST	0.436	0.227	1.921	0.058
B2B*EASY	-0.181	0.205	-0.884	0.379
B2B*WIDE	0.120	0.214	0.558	0.578

The regression coefficients for QUAL and B2B*QUAL are significant, but the result is difficult to explain. That is why we would like to study if we could use the general structure where QUAL and WIDE are significant generally, and CUST only for one of those groups. Thus, we study the use of variables QUAL, WIDE and B2B*CUST in the model.

According to our hypothesis, we construct the reduced model, where independent variables are QUAL, WIDE, and B2B*CUST. To test the hypothesis, we compute $F^* = [(100.042 - 91.592)/(100 - 94)]/(91.592/94) = 1.445 < F(0.95, 6, 94) = 2.20$, when lead to conclusion H_0 . The estimated regression lines are given in (5.6) and (5.7), and all detailed results in Table 11. All regression coefficients are significant at risk level 5%.

Table 11.The Final Model of the Effect of the Type of Customer

$R^2 = .177$	Regression Coefficients		t	Sig.
	b	Std. Error		
(Constant)	4.649	.098	47.394	.000
QUAL	.257	.103	2.493	.014
WIDE	.295	.097	3.039	.003
B2B*CUST	.284	.120	2.359	.020

A.3 Analyzing the Technology Experience: Early adopters vs. Late adopters

Finally, we analyze the effect of the technology adoption (EARLYADOP). The multiple determination $R^2 = 23.47/121.54 = 0.193$, which implies that the regression relation is significant (at risk level 1%) ($n = 104$). Initially, n was 95. We replaced the missing values by generating randomly 0/1 –variables by using the probabilities obtained from the original binomial distribution of EARLYADOP. The regression coefficients of the full model are given in Table 12.

Table 12.The Initial Model for the Effect of the Technology Adoption

$R^2 = 0.193$	Regression Coefficients		T	Sig.
	b	Std. Error		
(Constant)	4.696	.153	30.777	.000
EARLYADOP	-.120	.205	-.585	.560
QUAL	.322	.176	1.833	.070
CUST	-.015	.157	-.098	.922
EASY	-.084	.187	-.446	.656
WIDE	.323	.165	1.960	.053
EARLYADOP*QUAL	-.088	.220	-.398	.691
EARLYADOP*CUST	.379	.214	1.770	.080
EARLYADOP*EASY	.204	.223	.913	.364
EARLYADOP*WIDE	-.025	.208	-.118	.906

In this model, none of the variables is a clear candidate. We will consider the model where variables QUAL, WIDE, and EARLYADOP*CUST are used. The multiple determination for this model is $R^2 = 0.178$, which is significant (risk level 5%). When this model is tested against the full model (5.1), we obtain $F^* = [(99.892 - 98.069)/(100-94)]/(98.069/94) = 0.291 < F(0.95, 6, 94) = 3.34$. The coefficients of the model are given in Table 13 and the estimated regression lines are described in (5.8) and (5.9). All coefficients are significant at risk level 5%.

Table 13. The Reduced Model of the Effect of the Technology Adoption

$R^2 = 0.178$	Regression Coefficients			
	<i>b</i>	Std. Error	<i>t</i>	Sig.
(Constant)	4.643	.098	47.330	.000
QUAL	.256	.103	2.485	.015
WIDE	.305	.097	3.144	.002
EARLYADOP*CUST	.336	.141	2.393	.019

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