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Servitization in contract manufacturing – evidence from Polar business cases

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Abstract

Purpose – This paper aims to contribute to the scholarly debate on the origins and nature of industrial servitization. By resorting to contract manufacturing (CM) as an empirical case, it is posited that any product-service solution that a manufacturing firm is capable of delivering on a competitive basis mirrors its goals in value creation and capture, positioning within its value networks and the pool of assets and competences it holds.

Design/methodology/approach – To support this argument, a comparative case study of two CM firms that represent polar cases in the industry was conducted. The primary data were collected through participatory methodology, observations and semi-structured interviews of company representatives. The business experiences of an industry practitioner provided a distinct contribution to the content analysis and modelling.

Findings – It was concluded that servitization becomes endogenous as contract manufacturers aim for higher profitability through the insource of customer activities and hence extend their offering downstream in the supply chain. The findings suggest that the way out of the servitization trap is a shift toward original design and manufacturing business, where high value-adding modules are insourced and integrated into replicable solutions for various types of customers and market segments.

Research limitations/implications – The generalization of the conclusion is constrained by the limited focus on two cases only. More industry and company data are therefore required to further validate this argument. Particularly valuable will be the data on the intermediate business models between the two polar cases.

Originality/value – Building on contested business practices, this paper outlines the logic of competitive strategy in CM on the basis of specific characteristics and implications of the various

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business concepts. In this case, the principal drivers of servitization are the acquisition of supporting capabilities and insourcing of customer activities. The case study method integrates theory with academic observation and managerial experiences.

Keywords Innovation, Qualitative, Outsourcing, Competence, Risk management, Servitization, Performance management and benchmarking, Contract manufacturing, Value networks

Paper type Case study

1. Introduction

According to academic studies and industry reports, manufacturing companies are increasingly shifting their strategic focus from offering mere products to developing services and integrated product-service solutions to their customers (Baines *et al.*, 2009; Neely, 2008). This paradigmatic change has been widely connected with the term servitization as introduced by Vandermerwe and Rada (1988). Services aim to create competitive advantage in the global products markets (Grönroos and Helle, 2010; Wise and Baumgartner, 1999): by increasing product sales, lengthening customer relationships with the life-cycle approach, differentiating, balancing the effects of economic cycles and responding to changes in customer demand in the end products markets (Quinn *et al.*, 1990; Brax, 2005).

Owing to the stated benefits and drivers of industrial services, scholars have put relatively much attention to the topic. Servitization studies include various change-related concepts such as *move toward service orientation* (Martin and Horne, 1992), *moving downstream* (Wise and Baumgartner, 1999), *transition from products to services* (Oliva and Kallenberg, 2003), *trend toward integrated solutions* (Johnstone *et al.*, 2009) or *shift from selling product to selling product-service systems* (Baines *et al.*, 2009). The change here refers mainly to the manufacturer's internal change, whereby the organization enables its product-service offerings (Martinez *et al.*, 2010). The concept of change also includes aspects of organizational structures, delivery channels and marketing efforts and general business models (Quinn *et al.*, 1990).

It is a *stylized fact*, however, that the operative costs of newly introduced services are usually difficult to cover with the selling price. Some scholars have pointed out that servitization may even cause negative consequences for the firm's value (Fang *et al.*, 2008) and margins (Eggert *et al.*, 2011; Neely, 2008). On aggregate, the mixed evidence for the evolutionary features and profitability of service development may foster a *trap*[1] that hampers business development and innovation. As a response, many scholars have pointed out that industrial companies need to exploit the existing business of goods and services concurrently (Windahl and Lakemond, 2010) and emphasize the importance of traditional product and technological excellence (Salonen, 2011). This line of thinking is associated with the ongoing trend toward digital platforms (Ailisto *et al.*, 2015). In a similar vein, we assert that service development is viable when it is subject to a broader strategy and allows product-service concurrencies and product-based excellences to evolve from the firm's accumulated competences.

Drawing on contract manufacturing (CM) as an empirical case, we argue that any product-service solution that a manufacturing firm delivers on a competitive basis mirrors its goals on value creation and capture, positioning in the supply networks and the pool of assets and competences available to the firm. In our context, servitization is mainly driven by the outsourcing[2] of production and R&D-related activities by the customer firms which aim to enhance customer relationship and higher value added for

the customer and the supplier (Grossmann and Helpman, 2005; Mudambi and Tallman, 2010). Hence, servitization can be seen as a generic framework addressing the business relationship between the seller and the buyer, whereas the competence-positioning approach to product-service development links it to the resource-based and Porterian views of the origins of competitive advantage (Porter and Kramer, 2011; Porter, 2008; Wernerfelt, 1984; Barney, 1991; Teece *et al.*, 1998).

For the demonstration of our argument, the paper is constructed as follows. Chapter 2 briefly outlines the empirical case and methodology, while the key characteristics of the CM industry are presented in Chapter 3. Chapters 4 and 5 provide the key facts and historical milestones of the case companies to highlight the different development paths chosen by the firms. To illustrate the chain of logic and the role of services in the strategy of a CM firm, a more detailed analysis of the company differences is conducted in Chapter 6. The findings and their implications are discussed in Chapter 7.

2. Empirical case and method

Our methodological frame is a comparative case study (Yin, 2014, 2009, 2003; Stake, 1995), in which the choice of CM draws on specific industry characteristics. First, the fact that the CM is a manufacturing business *without own products* tends to fade away the distinction between manufacturing and service functions that are considered equally important in fulfilling the value proposition to the customers. This enables addressing the critical elements of servitization objectively and contributing to theory construction from cases (Eisenhardt, 1989). Second, the growth of services and other business activities in CM is predominantly driven by outsourcing of the corresponding customer activities (Mudambi *et al.*, 2010). Therefore, servitization builds on existing customer demand and the creation of new services markets by the clients[3]. We hypothesize that when a firm decides to include services and other intangibles in its offering on a competitive basis, it needs to acquire the matching competences in technology and the related human skills. In their absence, servitization is deemed to fail, and the firm falls short of business credibility in the eyes of the customers.

We highlight our argument with two electronic manufacturing services (EMSs) companies that represent *polar cases* in the CM industry. The method applied in this case study is theoretical, or purposive sampling. This implies that the cases are selected so that they are particularly suitable for illuminating and extending the relationship and logic among the constructs of the theory (Eisenhardt and Grabner, 2007). The selection of the cases was based on prior information of the companies' differing attitudes toward risks and growth. On the basis of the prior characteristics and *content analysis* (Krippendorff and Bock, 2008; Neundorf, 2002), that is, making inferences by objectively and systematically identifying specified characteristics on the basis of the company and industry data, the polar cases enabled identifying the key concepts and their causal relations in constructing a contract manufacturer's business logic. These concepts are: growth-risk preferences, value-adding target, scope of competences, supply chain approach, customer orientation and service orientation.

Our argumentation of the causalities in service development builds on primary and secondary data on the case industry. Most of the secondary data are sourced from annual reports, industry outlooks and databases (e.g. Orbis database), whereas the primary data are collected using participatory methodology and observations of two case companies. To enhance its networking and service competences, *Scanfil*, together with its academic partner

Aalto University, joined in a publicly funded research program in 2014. On the basis of action research methodology (Silverman, 2010) and a number of industry–academia workshops and interviews conducted in 2013-2015, a detailed view of Scanfil's business operations, its development needs and the solutions thereof was created. In case of *Elcoteq*, the primary data draw mainly on the personal experiences of the industry practitioner and one of the present authors, Timo Seppälä, who worked as an account director (2002-2007) of Nokia mobile phones for Elcoteq. The unique data from the company enable highlighting the evolutionary change from a standard EMS provider to a specialized original design manufacturer (ODM). In total, the data collection and analysis combine theoretical, observational and experiential approaches.

3. Industry characteristics and trends

In the CM industry, the manufacturer contracts with the industry customer, original equipment manufacturer (OEM)[4] for the delivery of specific components or products. In a standard case, this means *outsourcing* of the manufacturing and the related activities by the OEM. The operational driver for outsourcing is to enhance return on capital employed (ROCE) by means of specialization and utilization of the economies of scale and scope in manufacturing, in raw materials procurement and in pooling together resources. Outsourcing frees up customer assets such as inventories of products and equipment. Moreover, customers can focus on their core activities and respond to sudden variations in demand more quickly and efficiently.

CM is work without a product. As CM firms do not produce their own products, operations are more focused on quality management, cost control and customer orientation manifested in mass-tailoring. Manufacturing itself is usually organized as team-based services work (Lüthje, 2002). The key strategic competence of a CM is the expertise of *manufacturability* that guides the utilization of economies of scale and scope in production processes. This implies cost-based strategies (Porter, 2008, 1985), in which the goal is to minimize the overall costs of production, capital and the coordination of supply-chain activities. This necessitates flexible employment of labor and manufacturing assets, adoption of the latest production methods, low inventories with efficient supply-chain management and optimized allocation of production and resources across the manufacturing sites. Even for medium-sized suppliers with multinational clients, this implies global *offshoring* of production and service activities (Antràs *et al.*, 2005; Pyndt *et al.*, 2006; Baldwin and Venables, 2010)[5]. The location of plants is typically determined by low labor, asset and logistical costs with respect to the key suppliers, customers and their markets and the targeted markets.

According to the industry slogan, CM is *all about the service business*. The dynamics in customers' business environment, influenced by the changes in the end products' markets, the commoditization of technologies in different phases of the product life cycles, as well as the lack of the company's own manufacturing and service capacity, foster business innovations and repositioning in the value networks. In the conduct of CM business, it is important to see the dependencies between the customer's strategic goals, its operative actions in global offshoring and outsourcing and CM's competencies. The ability to correctly anticipate and adapt to the industry trajectories on the customer's side (McGahan, 2004) is influential on CMs' long-term success. CM is distinctively in co-evolution with the customers; typically, the customer is the master and the CM supplier is the servant (Seppälä, 2013a, 2013b).

In standard EMS cases, manufacturing and the related services are contracted out in the life-cycle phases where the value added and the selling price of the sub-system is the lowest. Usually, the customer approaches CMs with a manufacturing or service asset, product or service design or any other object that it intends to procure or outsource. Often the customer discusses with several possible candidates and puts the manufacturing contract out to a competitive tender. After the engagement of all the various stakeholders, the supplier for the outsourced object is decided on by the customer. When the object of the contract is a *new* product, the processes prior to the volume production include manufacturability assessments, prototyping rounds and ramp-up of the final product.

Customer strategies in CM may vary from a concentrated mode with only few customers to a diffused mode involving several customers and customer industries. As in every business, it is central to have a right composition of profitable customerships that fit the CM's overall business model. To build long-standing customer relations and loyalty, CMs offer various types of value-adding services that build on their core capability, the expertise of manufacturability and manufacturing services. Typical value-adding activities include design services in conceptual product development and engineering, as well as in mechanical, electrical and software design, assistance. Testing services include in-circuit, functional, environmental, agency compliance and analytical laboratory testing. In promoting an offering that also manifests the aim for building long-standing customer relationships, CM firms tend to follow a *life-cycle approach*, and signaling the capacity to offer a full range of services from the product design and development to maintenance and end-of-life services. This is highlighted in Figure 1.

An important dimension of CM strategy is the extent of *horizontal* (scope) and *vertical* (depth) integration into customer operations. Horizontal strategy increases the responsibilities and the scope of the CM's offering with respect to the customer, in other words, the number of sub-systems outsourced. Extensive horizontal growth usually implies a shift to a *systems operation* (Prencipe, 2011) model in which the production of the components of the insourced solutions is further contracted out by the CM (see

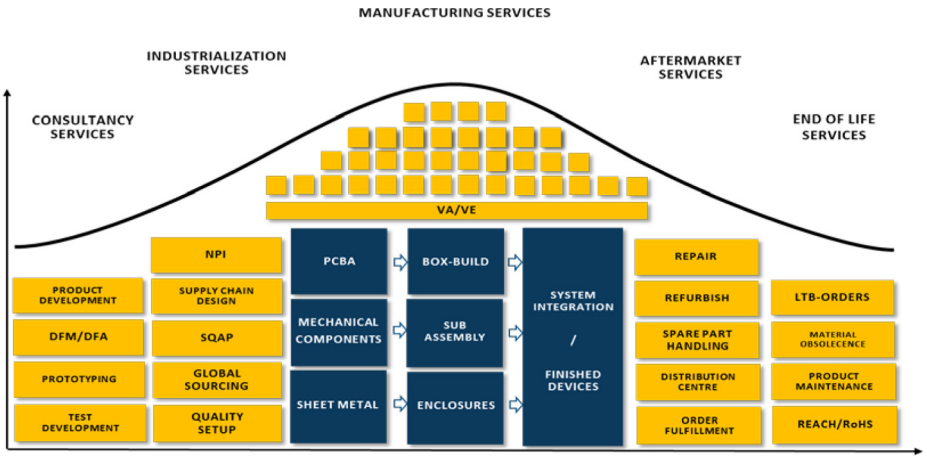


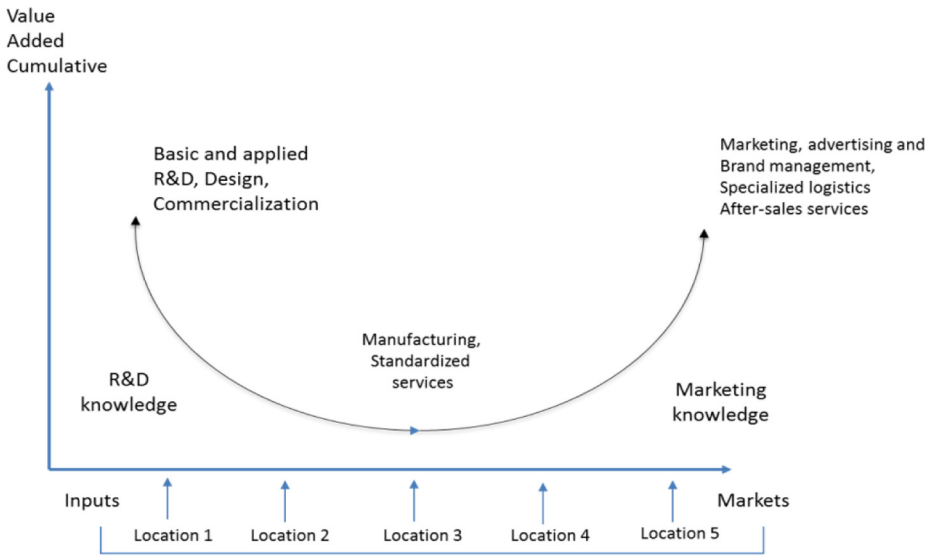
Figure 1.
The life-cycle approach in promoting CM service offering

Source: Scanfil (2016)

Chapter 6). As horizontal strategy involves a higher commitment to customer-specific solutions, it also sets limits to the number of viable market segments and customers for the CM.

Vertical integration (backwards), in contrast, implies a narrower scope of the offering and narrower product interface with respect to an individual customer. In vertical integration, the main parts of the components are typically produced in house. This enables production efficiency and specialization into standardized components and sub-systems that can be offered to several markets segments and OEMs. The differences in horizontal and vertical strategies reflect the key strategic choices of technologies and capabilities that are further manifested in the assets, products and services of a CM (see Chapter 6).

Generally, low-cost strategies – including vertical integration – are associated with limited opportunities for high profit margins and value added (Stahl and Grigsby, 1997; Porter, 2008; McGahan, 2004). In a similar vein, it is difficult to extract high value added from tangible products or standardized services (Maskell and Malmberg, 1999). However, when starting from a basic production-centered mode, there exists a continuum of value-adding options available for a manufacturing firm (Mudambi, 2008). This is highlighted by the firm's value chain activities depicted by the U-shaped curve in Figure 2. Accordingly, from the perspective of a manufacturing firm value, differentiation and opportunities for higher profitability can be enhanced by acquiring intangible capabilities and moving either towards downstream activities (right), including marketing, after-sales and brand management, or towards upstream activities (left) in which value is enhanced through R&D, design and new product introductions (NPI). The premises of the CM business linked to the value chain also explain the life-cycle approach adopted in marketing and promotion of services (see above).



Source: Mudambi (2008)

Figure 2.
The "smile curve" in value creation

Because CMs do not have their own products, the upstream and downstream activities in Figure 2 are, in standard cases, focused on auxiliary services that support OEM's product development and maintenance of the existing products. In the CM industry, the standard value-adding strategy is vertical integration and moving upstream services to customer's R&D, design and NPI. This also assumes the acquisition of respective technological competences and production technologies. While product development is primarily focused on the customer's offering, the upstream activities need to be adapted to the CM's own manufacturing processes, too. The value-adding services in moving downstream are, in turn, related to the delivery of the sub-systems, after-sales and maintenance.

In general, a shift to horizontal strategy that enhances CM's business responsibilities for customers' technological systems implies a more extensive leftward and rightward leap to the value-adding services than vertical integration with generic technologies and components. From a holistic perspective, the competence profile of the CM and its position in the customer's supply chain is defined jointly by the horizontal and vertical strategies and the associated technology space. This, in turn, creates differing opportunities to introduce and commercialize value-adding services by the CM.

4. Case Elcoteq

Founded as an EMS company, *Elcoteq* (1984-2011) became to be known as one of the leading ODMs in the communications technology field[6]. The company globally provided end-to-end solutions consisting of design, NPI, manufacturing, supply-chain management and after-sales services for the whole life cycle of its customers' products. In 2007, the company had operating revenue of €6bn, had operations in four continents in 15 countries and employed approximately 19,000 people. Since its foundation, Elcoteq became strongly oriented to telecom industry.

Towards the end of the 1980s, Ericsson and Nokia started looking for the expertise they needed outside their own companies and both decided to become customers of the microelectronics unit of Lohja Corporation, the precedent of Elcoteq. In 1991, the microelectronics unit, owned at that time by Metra Corporation, was sold to its executive management in an management buyout (MBO). This was the start of the company's history as an independent company.

The rapid growth of Elcoteq in the 1990s made it necessary to increase its management resources and obtain external financing. When market conditions were favorable, the company became listed on Helsinki Stock Exchange in November 1997. The years 1998-2000 saw rapid growth in the telecom industry. The goal of Elcoteq was to acquire the lion's share of the booming growth in outsourcing, and international expansion was essential for achieving that goal. The funds from the share issue were spent on establishing an international network of manufacturing plants. Within a couple of years, the company had increased its capacity many times over. In 1999, the network of plants covered more than ten countries in three key regions of economic growth: Europe, America and Asia. At the turn of the millennium, the growth of the telecom sector declined, fostering rivalry and excess capacity in the EMS business. With a radical cost-cutting program, Elcoteq built a modern and cost-competitive network of plants that employed the same consistent manufacturing methods. This strategy was unique and differed from the growth strategies pursued by most of the rival EMS manufacturers.

The conclusion of the strategic revision in 2002 was that the considerable expertise and experience of the company should not be wasted in the wireless communication *products*. Rather, the focus should be on the services of those customers whose products were ideally suited to the company's *know-how*. It was also made apparent that manufacturing, material services and logistics did not form a sufficiently broad service portfolio. Design, engineering and after-market services should also be added. The first steps toward increasing design expertise included the establishment of NPI centers. In 2002, Elcoteq acquired the mobile phone and telematics company Benefon's R&D team, which extended its services to engineering, R&D and software development. According to the firm's management, Elcoteq could then talk of having a full (technology-driven) service portfolio that laid the basis for business development towards the ODM concept.

The business risks of a concentrated market and customer strategy were recognized by the management already in the 1990s, and while attempts to expand into new customer segments in the industry electronics were made, the share of Nokia's mobile phones in the total revenues remained high. For the net profits, Nokia's share was even close to 100 per cent. Concentration was also fostered by the loss of Ericsson's production to an Asian competitor. Yet the company aimed to be the global leader in the mobile phone sector, which required constant increases in the manufacturing capacity. The business risks were enhanced by low profitability (relative to turnover) that remained close to zero in 1998-2010 (Orbis database). All these developments reflected Elcoteq's *high-risk–fast-growth strategy*.

The concentrated customer structure implied that the growth of business was increasingly reliant on Nokia's sales volumes and also the insourcing of R&D, manufacturing and related service activities from Nokia. This enabled development of the capabilities and knowledge base in the mobile phone technologies. Instead of integrating backwards to internalize the supply chain activities of the components and subsystems, which was the strategy of the main rivals in Asia, Elcoteq expanded its offering horizontally to the sub-systems of the mobile phone technologies (Seppälä, 2013b). Elcoteq became an ODM and systems integrator that coordinated and mobilized a wide range of complementary manufacturing activities and capabilities in the supply chain (Hobday *et al.*, 2005).

Insourcing, systems integration and capability development led to a new business trajectory where Elcoteq started to develop its own mobile phone products in parallel to being Nokia's systems' (ODM) supplier. Hence, the full service and competence portfolio that was originally designed and offered to the key customers, was increasingly used for developing its own mobile phone concept and introducing it to mobile network operators. The plans to become an independent ODM (or OEM) were, however, not realized early enough as Nokia switched to cheaper Asian suppliers. This wrecked the financial basis and led to the eventual bankruptcy of Elcoteq in 2011.

5. Case Scanfil

Scanfil is an EMS company with its headquarters at Sievi, Finland[7]. The stated mission of the company is to *help its customers to succeed by providing a reliable, effective way of making the product and organizing the supply chain*. Scanfil's customers include international operators in the automation, energy, data transmission and health technology sectors, as well as companies operating in fields related to urbanization. Typical products manufactured by Scanfil include equipment systems for mobile and

telecommunication networks, automation system modules, frequency converters, lift control systems, analyzers, game and slot machines and meteorological instruments (Annual Review, 2014). In 2014, the company had operating revenue of €215m, had operations in six countries and employed 1,782 people, of whom 1,545 in the company's units outside Finland. The share of employees working in China was 43 per cent[8].

Since its foundation in 1976 by Jorma J. Takanen, Scanfil focused on mechanical components for the electronics industries. After the first acquisitions in 1980, the company expanded to the production of electronics, which brought about higher credibility in providing CM services. The 1990s was the era of strong expansion, as the turnover grew from €5m in 1991 to over €220m by 2001. The plant of Oulu was established in 1990, and in the mid-1990s, Scanfil became a systems supplier for the telecommunication and electronics industry. As a response to the structural changes in the global CM industry and the main customer segments at the beginning of the 2000s, new kinds of strategic moves were initiated. In 2001, Scanfil started a rapid internationalization through acquisitions in the low-cost countries: China, Hungary and Estonia. These decisions were boosted by the respective moves of the main Finnish industry customers some years earlier, and in 2004, the number of the personnel outside Finland exceeded the number of personnel in Finland.

A central growth enabler was the merger with another Finnish CM, Wecan Electronics in 2002. Wecan was an international contract electronics manufacturer that produced and sold telecommunications products and services to telecom systems suppliers, in particular to the manufacturers of wireless (mobile) communications network systems. Wecan had 190 employees in Finland, 200 employees in the Estonian manufacturing unit and 85 employees in the manufacturing unit located in China. In addition to enhanced vertical integration to the upstream activities, the merger fostered expansion of the customer base and the supply network, as well as the utilization of economies of scale in manufacturing and logistics. On October 1, 2002, the new company Scanfil plc became listed on Helsinki Stock Exchange (Figure 3).

Another important decision in the 2000s was to shift from a concentrated to a diffused customer strategy. While Elcoteq became heavily reliant on Nokia's mobile phone business in the 1990s, a similar relationship developed between Scanfil and Nokia's telecom networks division. Until the beginning of the 2000s, the global growth

Figure 3.
Milestones in Scanfil's business history

Source: Scanfil (2015)

of the network operation business ceased and caused a marked decline in EMS orders. Owing to its generic and narrower technological focus in the EMS business as compared to Elcoteq, Scanfil was able to reduce its Nokia reliance and convert its services to more diffused markets segments. The successful transition was fostered by its global presence close to the key markets of the large Finnish and other international OEMs. Of the single customers, KONE became one of the most important ones, and unique features of that partnership have been adopted as benchmarks for the business model innovations at Scanfil[9].

In contrast to Elcoteq, the production system of which was focused horizontally, Scanfil's production system is vertically integrated (cf. Chapter 3). The benefits are highlighted by the top management's statement in the annual review 2014:

> […] vertically integrated production is at the core of our manufacturing operations. This means that most of the added value work in the product manufacturing chain is carried out *in-house* and is often centralized in one manufacturing location. The same plant can provide supply chain management, design and prototyping related to productisation, sheet metal mechanic components and electronics, such as assembled circuit and system boards, cable products and busbars, as well as the final assembly and testing of the product. We believe that this enables us to provide our customers with the best possible package based on competitive pricing, fast deliveries, flexibility and reliable operations.

To reduce customer risk and the impacts of cyclical fluctuations, Scanfil has actively expanded its customer base in the 2000s and 2010s to cover various industries. To meet the demands for global presence and short lead times, Scanfil invests constantly in its ability to control costs and supply products and services of the right quality at the right time, while managing risks in logistics chains that are becoming increasingly complex. As a medium-sized company with more limited resources to use economies of scale than Elcoteq, Scanfil has pursued a cost-cutting approach that assumes a continuous adaptation to the demand fluctuations. This is manifested, for example, by flexible hiring of labor force. Hence, in contrast to Elcoteq's fast growth policy, Scanfil has been following the *low-risk–moderate-growth strategy*.

In line to the company's traditional business concept, Scanfil's in-house product development programs have not formed a significant part of the company's cost structure, and product development has been mainly conducted in collaboration with the key customers. The traditional focus in EMS operations is also reflected in the company's approach to services, which stresses vertical linkages of activities and the life-cycle aspect in the delivery of components and sub-systems. To quote:

> […] the key element in Scanfil's operations is the provision of a comprehensive service package to the customers. Scanfil's services include sourcing and purchasing, planning of production processes and technologies, manufacture of prototype series, transfer to serial production, diversified and flexible production of electronics and mechanics, product testing as well as comprehensive logistics management.

6. Comparative analysis

6.1 The logic of CM business strategy

On the basis of the industry characterization and the descriptions of the case companies, this section discusses in more detail the distinctions between the two approaches to CM business and the conceptual linkages between value creation, capabilities and

servitization. Moreover, the purpose is to highlight how the issue of servitization in the context of existing demand and outsourcing by the customer (see Chapter 1) is involved in the logic of a CM's business strategy. Instead of being exogenously and disjointedly decided on by the top management, servitization tends to follow endogenously from the more fundamental business decisions, starting from the company's risk-profitability preferences. The discussion of the company distinctions here builds more on Elcoteq's standpoint as the systems operation model with the ODM concept represents an extension to the basic manufacturing model (EMS) adopted by Scanfil.

The chain of logic in CM business planning and the characteristic differences between the case companies are summarized in Table I. The planning process is guided by decisions regarding growth, risks and expected profitability. Based on high-risk tolerance and scale-intensive growth, Elcoteq's goal was to expand to higher value-adding business activities to enhance long-term profitability. This, in turn, assumed the acquisition of complementary, systems-related competences. From the value-adding target and the competence requirement follow other attributes of the operating model, namely, the supply-chain approach (systems integration in Elcoteq), customer orientation (concentrated in Elcoteq) and service orientation (full service portfolio in Elcoteq). All the three characteristics aforementioned influence the potential for generating revenues and profits which, in the case of Elcoteq, was eventually not realized as expected. The actual business performance is influenced, for example, by managerial skills, their alignment with the operating model and the extent to which the risks (e.g. insourcing and customer concentration) are realized.

6.2 Value-adding target

In pursuing its high value-added goal, Elcoteq expected its operating profit to rise. Furthermore, Elcoteq expected that its customers would rely more extensively on its product-service offerings. All main competitors in the 2000s followed traditional strategies focusing more on various low-technology component manufacturing processes and assemblies, that is, lower added-value activities. The value-adding target, which is contingent on OEMs' willingness to outsource and the credibility of the CM's

		Elcoteq	Scanfil
1	Growth, risk preferences	High risk, scale-intensive	Low risk, cost control
2	Value-adding target	Expansion to high value-added activities	Limited to low value-added activities
2	Scope of competences	Systems related	Manufacturing related
3	Supply chain approach	Horizontal; systems integration	Vertical; component integration
3	Customer orientation	Concentrated (focused)	Diffused
3	Service orientation	ODM: full service portfolio	EMS: product-related services
4	Business performance	Low (in this case)	Moderate (in this case)

Table I.
The key causalities in business planning and the role of services in CM

competences, involves specific congruencies in the business concepts and responsibilities. The business responsibility that is associated with higher value-added business concepts implies better opportunities for entrepreneurial innovation and thus potential for higher profitability. The various business concepts and their implications for the value-adding service offering are highlighted in Figure 4.

The basic *EMS concept* is based on the print-to-build contract. Print-to-build is a process in which a manufacturer produces products, equipment or components according to the customer's exact specifications[10]. It involves collaborative design for manufacturability and manufacturing of mechanics, electro-mechanics and engines, i.e. placing components with different types of surface-mount technologies into ready-made printed circuit boards and further integrating mechanics and electro-mechanics sub-assemblies to it, and running testing for different types of manufacturing failures. The *cDesign* (collaborative design) *concept* involves hiring specific engineering resources and competencies of CM to the customers' research and development programs. In cDesign, CM is only responsible for delivering technical competences (employees) under full customer supervision.

In the *cODM concept* (collaborative original design and manufacturing), CM sells an entire technology module (including industrial design, software, hardware, mechanics) typically for a fixed price to the customer that holds and provides the original design and/or industrial design. In the cODM concept, CM has a higher degree of freedom in constructing the complete solution and hence influencing its business profitability. To a higher extent, this holds for the *ODM concept*, too. In the ODM concept (original design and manufacturing), CM delivers industrial design, original design and manufacturing, i.e. selling a complete product including hardware, software and possibly industrial design for a fixed price, covering also the responsibilities of after-sales, including warranty repair and spare parts delivery, i.e. a complete product with life-cycle services. In summary, to appropriate the benefits (higher profitability) of the higher value-added business concepts, new managerial competences, entrepreneurship and risk-taking capacity to complement technical competences are required.

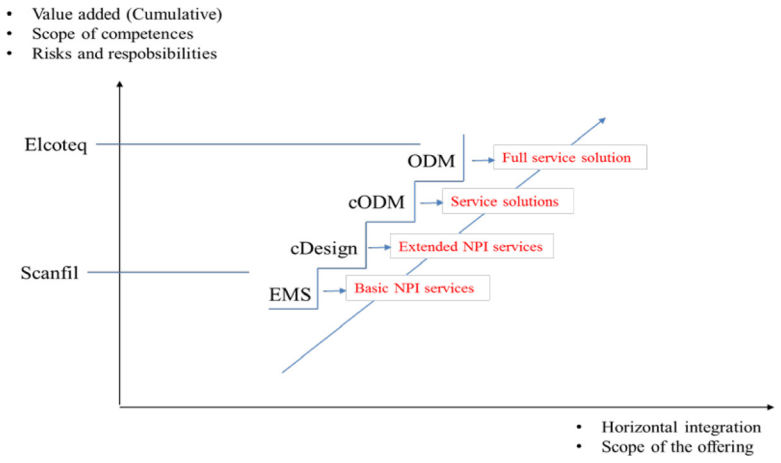


Figure 4.
Value added, risks and responsibilities in CM business concepts

6.3 Scope of technical competences

In an ideal case, CM competencies are instantly balanced with the customer's outsourcing strategy of tangible and intangible assets. Along with insourcing the competences directly from the customer, the CM's credibility to offer horizontally integrated solutions competitively can be enhanced by acquiring the competences via acquisitions, recruitment and continuous upgrade of the personnel's skills. For instance, Elcoteq invested proactively in research and design capabilities by acquiring Benefon's design unit at Salo in 2002. Through this acquisition, Elcoteq was able to serve a new portfolio of customers and shift from lower added-value manufacturing projects to higher added-value technology and design projects.

Technical and related competences can also be enhanced through learning and knowledge accumulation during the manufacturing contracts. Elcoteq's first customer in design was the Siemens mobile phone business unit. The design of Siemens' GSM mobile phone was based on its operating system MAT. In 2005, Siemens' mobile phone business was acquired by BenQ, a Taiwanese ODM, which led to the termination of the Elcoteq–Siemens agreement. Yet, the Siemens case was central in enhancing Elcoteq's capabilities in hardware and software of different communication technologies at various levels of the technology stack and also in sourcing, supply chain management and contract law. Figure 5 illustrates technical competence building in the case companies[11].

During the same period and earlier, Elcoteq designed mobile phone accessories for the Nokia Automotive business unit in Germany. Furthermore, Elcoteq had its first mobile phone design project for the Nokia Copenhagen product creation center. Later Elcoteq supported Nokia's CDMA business unit in San Diego, and the Nokia Enterprise business unit in Finland. Before the launch of Elcoteq' own mobile phone products, however, Nokia terminated all mobile phone programs with Elcoteq.

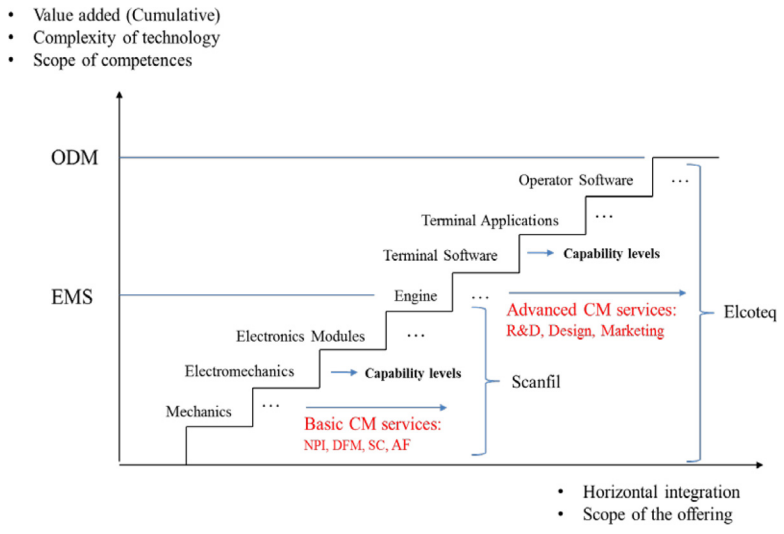


Figure 5.
The ascending levels of technical competences in the CM business concepts

6.4 Supply-chain approach

Business evolution toward higher value-adding activities and the parallel transition from EMS to the ODM concept is associated with a respective move from a *vertically* (backward) to a horizontally (forward) integrated operating model. The actual consequences of the two different approaches in Elcoteq and Scanfil to value creation and supply chain management can be highlighted with simple statistics. The percentage share of value added of the operating revenue, VA/OR is an index that measures the relative importance of internal value creation of the firm to its external purchases in generating revenues. High index values indicate manufacturing orientation or a vertically integrated model, whereas the opposite indicates systems integration where externally sourced sub-systems and components are central in the firm's value-creation processes. In 2000s, the average value of VA/OR has been 24 per cent for Scanfil and 9 per cent for Elcoteq (Orbis database).

In general, horizontal integration is more risk exposing, as more business risks are assumed for the customer in comparison to vertical integration. Owing to lesser outsourcing by the customer, EMS and cODM concepts are more *risk adverse* and hence less business risk is anticipated for the supplier. Through the adoption of the ODM concept, Elcoteq became one of the first EMS manufacturers, being responsible for manufacturing the mobile phone from start to finish. This was based on a new *relationally* oriented mode of collaboration with the customers and suppliers labelled as *co-evolution*.

The guiding principle in co-evolution was to continuously improve the performance of an Elcoteq-operated *ecosystem* which the constituent firms supplying the sub-systems commit to. The commitment was facilitated by the managerial view that if the ecosystem as a whole works better than the competitors' supply chains, each link in that chain will profit and be successful (Orbis database). Such a relational approach differs radically from Scanfil's *transactional* approach, in which a high number of standard components are procured from competitive global markets. Hence, in addition to the technical competences, horizontal integration requires supplementary capabilities related to advanced sourcing and procurement practices by the CM. These competences are involved and characterized in the conceptualization of the systems integration approach (Prencipe, 2011)[12].

6.5 Customer orientation

The number of customers and customer segments served by a CM is influenced by its value-adding goal and further the supply-chain model. In contrast to Scanfil, where the customer industry structure was deliberately diversified in the early 2000's[13], Elcoteq's ODM concept became increasingly focused on the mobile phones industry and Nokia. This led to cumulative customer risks in the overall CM business. In the early 2000s, Elcoteq had tens of CM customers ranging from consumer electronics to industrial electronics. After divesting industrial electronics in 2004, Elcoteq focused on fewer customers divided into three different business segments: Nokia Mobile Phones, other consumer electronics customers and telecommunication equipment manufactures. In 2005 and 2006, the significance of Nokia Mobile Phones in Elcoteq's customer portfolio peaked. At the end of 2005, it represented approximately 60 per cent of the company's revenues and more than 100 per cent of the operating profit and cash flow. At the end of 2006, the Elcoteq Nokia Business Unit was running the Nokia Mobile Phone

business with negative working capitals. To appropriate the benefits of a concentrated customer structure while being a strategic player in a powerful OEM's ecosystem sets high requirements for the negotiation skills and the capability to foresee the industry trajectories.

6.6 Service orientation

The proactive role in supporting customer technology and product management enabled Elcoteq to move away from the commoditized manufacturing (EMS) concept toward ODM with enhanced technological base and higher value-adding capacity in research, design and production technologies. Value-adding capacity is embedded in different elements of labor and investments both in tangible and intangible assets, and the expectations for rents and operating profit. As indicated in Figure 1, the horizontal strategy in Elcoteq implied a wider scope of service offering ranging from research to design, from design to manufacturing, from manufacturing to aftermarket services and from after-market services to recycling. Scanfil, in contrast, adopted a narrower focus with a deeper involvement in specific sub-systems, their supply-chain management and life-cycle requirements.

In the standard vocabulary of the CM industry, the transition to cODM and ODM concepts is interpreted mechanistically as deepening servitization, where the horizontal scope of the offering is increased with new technological modules and production responsibilities outsourced by the customers. From the service research standpoint, however, such an interpretation is not unequivocal as the outsourced object is typically a technological system whose value is composed of intangible activities (e.g. design) and tangible objects. Hence, the industry slogan that CM is *all about services* needs to be elucidated by the inter-dependencies between the technological system delivered and the value-adding activities that support the technological system through its life cycle. This inter-dependence defines the degree of service-orientation highlighted in Figure 6.

In the standard EMS and the cDesign concepts, the role of value-adding services is principally to promote the sales of manufacturing services[14] to customers. In such cases, the CM's supply of services is predominantly external, driven by the customer's product specifications, with CM having limited business responsibility for the customer's product. While some of the service categories at both ends of the smile curve in Figure 6 may be offered in the EMS and cDesign concepts too, services are characteristically *standardized* and build on the *narrow* manufacturing competences and business logic of the CM. In this case, the main focus in value-adding services is more on the pre-manufacturing (the left) side of the smile curve. The differences between Elcoteq and Scanfil can be highlighted, for example, by means of innovation activity and brand management. In the 2000s, the number of acquired *technology patents* in Elcoteq amounted to 39, and it held three *trademarks* for the developed products, whereas the corresponding figures for Scanfil were 3 and 0 (Orbis database).

In *deepened servitization* with a parallel shift to cODM and ODM concepts, the role of design becomes pronounced. When the business responsibility and the value added of the customer's product is increased through the CM's own design and engineering, the other pre-manufacturing services [e.g. R&D and supply chain management (SCM)] become more systematically used and focused on the CM's own production. In other words, an increasing part of the externally offered value-adding capacity is transformed to internal functions to support CM's value creation. If the transition toward ODM is

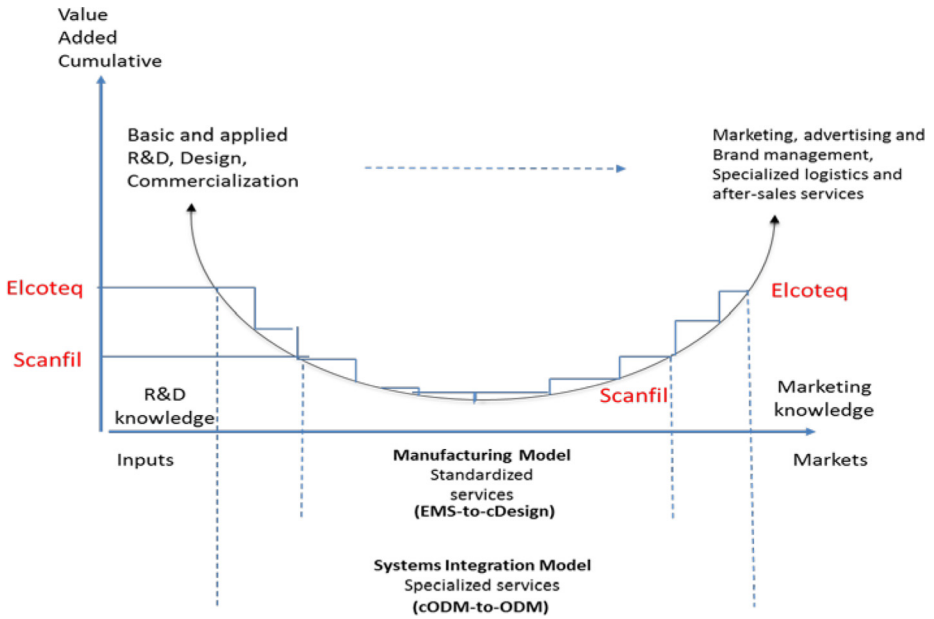


Figure 6.
Illustration of service orientation in the case companies

strategically viable (e.g. with respect to customer risks and the scope of technological competences), the overall value-adding capacity of the pre-manufacturing services can be enhanced. A proportion of the knowledge-intensive service outputs is embedded in the solution delivered, and the other part, building on technologically more advanced offering, can be supplied or sold directly to the customers. In a similar vein, the transition (assuming strategic viability) enables advanced and partially embedded services in the post-manufacturing phase. The dotted line in Figure 6 indicates that technical competences enhancing pre-manufacturing services create a platform to develop post-manufacturing services.

6.7 Business performance

Depending on strategic consistency, or risk management (operational and customer structure) and managerial capabilities more generally, the transition to cODM and ODM concepts involves higher *potential* for enhanced profitability in solution sales and in value-adding services. The standard EMS concept *print-to-build* implies that prices, most of the costs of the contracted object, and the sub-suppliers are usually defined by the customer and hence the actual profitability of the EMS contracts is predetermined and transparent to both parties. This leaves limited opportunities for entrepreneurship and innovation to enhance profitability and the ROCE.

The cDesign concept supplements the EMS concept by means of external sales of design services by hiring out the CM's engineering resources. This is often based on an hourly fee contract that typically generates (close to) zero profit to the CM. In cODM and to a higher extent in ODM concepts, the delivery price of the contracted solution is usually predefined in mutual negotiations, while most of the production costs and methods are variables to be decided by the CM. Through this *entrepreneurial leverage*,

there is a higher degree of freedom – and financial incentives – for the CM managers to influence the profitability of the firm.

In light of financial figures, the potential of higher entrepreneurial leverage in Elcoteq was not realized, however. The flip side of the coin in extensive insourcing and moving toward ODM is enhanced product (operational) risk and the risk of concentrated customer structure. Intuitively, this should be reflected in higher short-term volatility[15] in the annual profitability, which is also visible in Elcoteq's performance in the 2000s (Figure 7). Except for the year 2010 in the focused time span, Elcoteq's profitability never exceeded the profitability levels of Scanfil, which owes much to the scale-intensive growth policy, deficient managerial competences to master rapid growth and Nokia's strong negotiation power that was exerted on its suppliers.

Scanfil, on the other hand, has conducted its risk-adverse business strategy (in operations and customer structure) more successfully, as indicated by the smoother development of ROCE at moderate levels of profitability in the focused time span (Figure 7). Commitment to the vertically integrated EMS concept has, however, fostered the *servitization trap* as highlighted in Figure 6, and therefore, geared the focus in entrepreneurial innovation and growth mainly to the existing business areas. As pointed out here, the way out of the trap is to proactively invest in design/engineering competences to create a solid and credible basis for the development of pre-manufacturing service activities that support internal product development and external service sales to the outsourcing customers.

Balancing optimally the capacity of design services between internal use and external sales tends to be a critical issue for both case companies and a particular challenge in the EMS-ODM transition. In 2000-2003, Scanfil had a design business unit Scanfil Engineering that was closed as a response to its low profitability and the company's orientation to the basic EMS concept. Building on the acquired capabilities of Benefon (see above), Elcoteq Design Center Ltd. was a distinctively unprofitable business unit throughout the 2000s. Whereas the financial performance of design services reflects the managerial capability to capture the value-adding potential in the CM business more generally, the main function of the other value-adding services in CM is to build customer loyalty that generates profitable customerships in the long run.

7. Summary and discussion

The drivers and outcomes of service development in the manufacturing sector have been a topic of scholarly debate for over two decades. Managers and industry

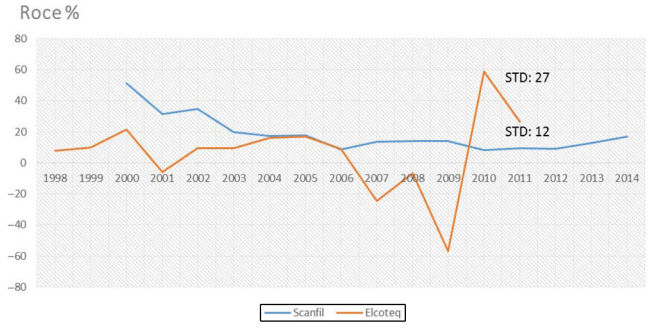


Figure 7.
The development of ROCE in the case companies

Source: The authors

practitioners see that services are viable as long as they create synergies and economies of scope with the product and thus contribute to positive net income, while academic scholars search for generic patterns to explain servitization, particularly its evolutionary character. In this paper, we point out that the processes and the characteristics of a supplier's offerings alone are insufficient to explain profitable growth in service business. Taking a more pragmatic view of competitive advantage, we argue that any product-service solution that a manufacturing firm delivers on a competitive basis, mirrors the firm's *objectives* with regard to its positioning in the value networks, profit-risk preferences and the existing pool of *competences* manifested in the value-adding activities, technological assets and the human skills.

To avoid the traditional dichotomy between products and services, we highlight our argument in the CM industry, where firms typically lack their own products, intellectual property rights (IPRs) and brands. In the CM business, all activities in the firm's value chain (from purchases to sales) are harnessed to serve the customer, the OEMs. To make our point concrete, we examined two Finnish CM companies, Elcoteq and Scanfil, which represent *polar* cases in the CM industry. The differences in their business concepts became pronounced since the beginning of the 2000s as Scanfil adopted a traditional low-risk EMS model, whereas Elcoteq focused increasingly on the high-risk ODM concept. Based on the industry characteristic and the case data, we identified two different business approaches to the positioning in the industrial value networks and highlighted the linkages between value creation, competences and servitization more generally. The detailed comparative analysis shows how the issue of servitization in the context of existing demand and outsourcing by the customer is actually involved in the CM's logic of business planning. Instead of being exogenously and disjointedly decided by the top management, servitization follows endogenously from the more fundamental decisions, starting from risk-profitability preferences. The comparison of polar cases enabled identifying the key causalities in CM strategy that is highlighted in Figure 8.

In the outsourcing process that enables deepening servitization, the role of *design* becomes pronounced. When the CM's responsibility for the customer's products and value creation increases and builds on its own design and engineering competences, the other pre-manufacturing services (such as R&D and supply chain management) become more systematically operated and focused to support the CM's manufacturing

Figure 8.
The role of services in the CM's business planning

processes. Accordingly, a major part of the externally offered value-adding capacity to the customers is transformed to internal service functions to facilitate the CM's own value-creation process. If the transition towards ODM proves strategically viable (e.g. with respect to customer risks and the scope of competences), the value-adding capacity and performance of the pre-manufacturing services can be enhanced. A proportion of the higher value-added service outputs are *embedded* in the contracted solution, whereas the other part that builds on technologically more advanced solutions and competences can be offered and sold *directly* to the customers. In a similar vein, the transition enables embedded and higher value-added services in the post-manufacturing phase.

In parallel with the servitization studies that boomed in the 1990s and in the 2000s, there was an upswing of servitization projects in the Finnish manufacturing industry. Except for a few cases where the installed base has brought about evident economies of scale particularly in maintenance (e.g. Kone, Metso and Wärtsilä), service development has proved mixed of meager financial results in manufacturing business[16]. The operative service costs are difficult to cover with the selling prices, notably when the firms have earlier offered the same services for free. Our findings of CM support the hypothesis that the business impacts of value-adding services should not be assessed with their short-term profitability only. A more important, indirect benefit of the value-adding services, *pre-manufacturing R&D and design*, in particular, derives from enhanced customer loyalty and relationality, which means a higher retention rate and hence lowered costs of finding new profitable customerships. Actually, these long-term benefits for the CM business can be substantially higher than the low or negative net income of service sales in the short run (Viitamo, 2012).

The profitability of individual service modules becomes an even lesser concern when shifting from EMS to ODM business concepts. As the CM's business responsibility for the customer's product is enhanced and, at the same time, the offering becomes a solution constructed with manufacturing, pre-manufacturing and post-manufacturing services, the need for selling the value-adding services externally to the customers is diminished. Because the ODM concept implies a partial internalization of the value-adding services, the coverage of price-cost accounting in the solution sales is extended, respectively. On the basis of internalized R&D, design and engineering, there is higher potential for technology-based patents and trademarks, which enable higher credibility and negotiation power *vis-à-vis* the customers and opportunity for higher profit margins. In such a case, a respective leverage can be used in the value-adding services (pre- and post-manufacturing) that are provided directly with the customers. On aggregate, technical competences create the basis for insourcing and horizontal integration, whereas complementary managerial skills, entrepreneurship, systems integration and proactive sales are required to make it a profitable business (Teece, 1986).

What kinds of recommendations does the Scanfil–Elcoteq case then provide for business development more generally? In balancing between value-adding targets and risk management perspectives, we hypothesize that *the optimum approach to CM business can be found along the continuum linking the two polar cases*. For a traditional manufacturing services provider (EMS), the general message is clear: expand to cODM and ODM concepts with specialized competences and internalize part of the design and R&D services. At the same time, seek proactively for new growth opportunities in the related market segments and customer partnerships and balance them with the

hierarchy of business concepts (EMS-to-ODM) and the supply network requirements (vertical integration-to-systems integration). The customer-/market-specific services and enhanced network positions in CM are enabled by digital platforms that integrate internal and external competences with the boundary-spanning activities of the CM (Carlile, 2002; Aldrich, and Herker, 1977). To appropriate the value-adding potential, direct R&D and design on early involvement in the customers' product development process and standardization and replicability that enables technology transfers across market segments[17].

In addition to the clarified role of services in the overall business strategy (see in Figure 8), our findings provide managerial implications on how the servitization paradox (trap) can be avoided by shifting from the manufacturing business logic to *solution sales logic* (Storbacka, 2011), in which individual services and products are priced and embedded in the overall product-service offering. Accordingly, we hypothesize that: to enhance competitiveness and profitability in the specific products-service markets, it is not sufficient for the CM to re-bundle the insourced product-service modules to customer-specific, horizontally integrated solutions that utilize the pool of competences across the firm's functions. In particular, the solutions should be based on *cross-functional innovations* by the CM that enable:

- higher value added to the customer;
- differentiation and adaptive replication of the solutions in other customer contexts; and
- credible demonstration of the CM's competences to the customers.

In the both case companies, a credible signaling of competences was carried out upon the acquisitions.

The findings of our case study imply that the actual decisions on whether and how to servitize are intertwined with higher goals that define a firm's business and competitive position (Porter, 2008; McGahan, 2004). Service development cannot be isolated from the wider reconfiguration of a firm's value chain that involves complex inter-dependencies between functional units: manufacturing, R&D, assembly and the boundary-spanning functions (sourcing, sales). Accordingly, intra-organizational aspects should assume a higher status in the service development literature (Viitamo, 2012, 2014). Value chain configuration is, in turn, inseparable from the strategic decisions on positioning in the wider networks and ecosystems, and the extent to which this requires relationality in systems integration (Prencipe, 2011, Hobday *et al.*, 2005). The proven dependency between product-service design (Windahl and Lakemond, 2010) and the operative models of managing supplier networks (Halldorsson *et al.*, 2007) is particularly appealing and calls for more integrative approaches to the topic.

In summary, the industry case illustrates that the issue of servitization is reducible to the more fundamental discussion of industry evolution (Chandler, 1990), ways of surviving in global rivalry and the future drivers of competitive strategy. In avoiding the traditional dichotomy between the structuralist or Porterian approach and the resource-based view, the integrative approach (Viitamo, 2008, 2012) suggests that competences and positioning go hand in hand and need careful balancing before any strategy implementation[18]. While also involved in the CM's chain of business logic, the integrative approach calls for further operationalization and validation in the

succeeding industry studies. Particularly contributory would be case studies that focus on the iterative processes of supply and demand in developing new CM services. This would provide more information on the relative importance of outsourcing and the internal R&D of the supplier for the overall servitization process.

Notes

1. Previously, scholars have argued on behalf of servitization by addressing the *commodity trap* (Ulaga and Reinartz, 2011). Here the discussion is turned into respective possibility of *servitization trap*. Similarly, the term *service paradox* has been coined (Gebauer *et al.*, 2005) to depict an absence of expected benefits when diversifying into service activities. While several authors suggest a lack of managerial attention and skills to effectively manage service activities to explain this phenomenon, the nature of the underlying service business model might play a crucial part, as well. To the extent that services become more independent, experiencing economies of scope might become more difficult. On the other hand, the service paradox may be alleviated by the ongoing digitalization of service that, via higher productivity and service reconfiguration, works for enhanced profitability.
2. More generally, companies having strengths in other areas may contract out data processing, legal, manufacturing, marketing, payroll accounting or other aspects of their businesses to concentrate on what they do best and thus reduce average unit cost. Outsourcing is often an integral part of downsizing or reengineering. See www.businessdictionary.com/definition/outsourcing.html#ixzz3zTf5kwDA
3. This contrasts with the main cases of servitization, in which service development is *more supplier-driven* and the challenge is to find customers for new service introductions.
4. An ODM is a company that designs and manufactures a product which is specified and eventually branded by another firm for sale. Such companies allow the brand firm to produce (either as a supplement or solely) without having to engage in the organization or running of a factory (http://rockleighindustries.com/oem-odm-manufacturing.html).
5. By definition when a company offshores, it shifts the location of a service or production of a part to a location abroad. See www.mtholyoke.edu/~kahan20r/classweb/globalization/off-out.html
6. The main secondary data sources in this section are annual reports and the Orbis-database https://orbis.bvdinfo.com).
7. The main data sources in this section are annual reports, company interviews and Orbis-database (https://orbis.bvdinfo.com).
8. The overview of Scanfil's business history here extends to mid-2015. In fall 2015, Scanfil made an acquisition (Partnertech), which moved it closer to Elcoteq's operation model (see www.taloussanomat.fi/porssi/2015/05/25/scanfil-ostaa-ruotsalaisen-partnertechin/20156564/170).
9. KONE–Scanfil partnership shows similar features as the co-evolution concept in Nokia–Elcoteq collaboration (see Chapter 6).
10. Typically, an engineer provides drawings and the manufacturer is responsible for producing the part or piece of equipment to spec, using the correct materials. The design specifications often include performance and quality requirements. Print-to-build falls under the general category of contract manufacturing, and is occasionally referred to as build to suit (www.arcpacific.com/build-to-print).

11. Note that the term *engine* in Figure V refers generally to an assembled product or devise, which in case of Elcoteq is a mobile phone.
12. Systems integration necessitates technical competences to deal with unpredicted interactions between the components and uneven development of the underlying technologies. It requires capacity to design and test systems with new architectures, as well as knowledge of the technological fields of the sourced components and sub-systems (Brusoni *et al.*, 2001). There is also need for additional integrative knowledge that is characteristically *social*. Social capabilities are related to ways in which contractual and relational governance are co-employed to create trust, that is, to make the suppliers deliver the sub-systems and mobilize the required capabilities.
13. Regardless of KONE's central role as a single customer to Scanfil's revenues and innovation, its sales are relative evenly distributed over four market segments: urban applications, energy and automation, telecom networks and medi-tech.
14. This involves the underlying expertise in manufacturability.
15. In Figure VII, volatility is measured by standard deviation (STD).
16. The focus on low value-added services along with the profitability issues are reflections of the servitization trap discussed above.
17. Reflective of these ideas, Scanfil acquired a Swedish CM company Partnertech in Fall 2015. This acquisition extends Scanfil's competences particularly in ODM, systems integration and R&D and design.
18. Integrated approach acknowledges that strategy (re)design may be initiated either by the competences or the goal itself. In the CM case discussed here initiation is distinctively Porterian, i.e. whether and when it makes sense to expand from the traditional EMS concept to ODM business, and reposition downstream in the value network. The construct in Figure VIII involves, however, the implicit assumption that also competence requirements need to be settled in the design phase of a competitive CM strategy.

References

Ailisto, H., Mäntylä, M. and Seppälä, T. (2015), "Finland – the silicon valley of industrial internet", Government's Analysis, Assessment and Research Activity, 2015/10, Helsinki.

Aldrich, H. and Herker, D. (1977), "Boundary spanning roles and organization structure", *The Academy of Management Review*, Vol. 2 No. 2, pp. 217-230.

Antràs, P., Garicano, L. and Rossi-Hansberg, E. (2005), "Offshoring in a knowledge economy (No. w11094)", National Bureau of Economic Research, Massachusetts.

Baines, T.S., Lightfoot, H.W., Benedettini, O. and Kay, J.M. (2009), "The servitization of manufacturing: a review of literature and reflection on future challenges", *Journal of Manufacturing Technology Management*, Vol. 20 No. 5, pp. 547-567.

Baldwin, R. and Venables, A. (2010), "Relocating the value chain: offshoring and agglomeration in the global economy", NBER Working Papers 16611, National Bureau of Economic Research, Massachusetts.

Barney, J. (1991), "Firm resources and competitive advantage", *Journal of Management*, Vol. 17 No. 1, pp. 99-120.

Brax, S.A. (2005), "A manufacturer becoming service provider – challenges and a paradox", *Managing Service Quality*, Vol. 15 No. 2, pp. 142-155.

Brusoni, S. and Prencipe, A. (2001), "Unpacking the black box of modularity: technology, products and organization", *Industrial and Corporate Change*, Vol. 10 No. 1, pp. 179-205.

Carlile, P.R. (2002), "A pragmatic view of knowledge and boundaries: boundary objects in new product development", *Organization Science*, Vol. 13 No. 4, pp. 442-455.

Chandler, A.D. (1990), *Scale and Scope, The Dynamics of Industrial Capitalism*, The Belknap Press of Harvard University Press, Cambridge, MA, London.

Eggert, A., Hogreve, J., Ulaga, W. and Muenkhoff, E. (2011), "Industrial services, product innovations, and firm profitability: a multiple-group latent growth curve analysis", *Industrial Marketing Management*, Vol. 40 No. 5, pp. 661-670.

Eisenhardt, K.M. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14 No. 4, pp. 532-550.

Eisenhardt, K.M. and Grabner, M.E. (2007), "Theory building from cases: opportunities and challenges", *Academy of Management Journal*, Vol. 50 No. 1, pp. 25-32.

Fang, E., Palmatier, R.W. and Steenkamp, J.B.E.M. (2008), "Effect of service transition strategies on firm value", *Journal of Marketing*, Vol. 72 No. 5, pp. 1-14.

Gebauer, H., Fleisch, E. and Friedli, T. (2005), "Overcoming the service paradox in manufacturing companies", *European Management Journal*, Vol. 23 No. 1, pp. 14-26.

Grönroos, C. and Helle, P. (2010), "Adopting a service logic in manufacturing: conceptual foundation and metrics for mutual value creation", *Journal of Service Management*, Vol. 21 No. 5, pp. 564-590.

Grossmann, G. and Helpman (2005), "Outsourcing in a global economy", *The Review of Economic Studies*, Vol. 72 No. 1, pp. 135-159.

Halldorsson, A., Kotzab, H., Mikkola, J.H. and Skjoett-Larsen, T. (2007), "Complementary theories to supply chain management", *Supply Chain Management: An International Journal*, Vol. 12 No. 4, pp. 284-296.

Hobday, M., Davies, A. and Prencipe, A. (2005), "Systems integration: a core capability of the modern corporation", *Industrial and Corporate Change*, Vol. 14 No. 6, pp. 1109-1143.

Johnstone, S., Dainty, A. and Wilkinson, A. (2009), "Integrating products and services through life: an aerospace experience", *International Journal of Operations & Production Management*, Vol. 29 No. 5, pp. 520-538.

Krippendorff, K. and Bock, M.A. (Eds.) (2008), *The Content Analysis Reader*, Sage, Thousand Oaks, CA.

Lüthje, B. (2002), "Electronics contract manufacturing: global production and the international division of labor in the age of the internet", *Industry and Innovation*, Vol. 9 No. 3, pp. 227-247.

McGahan, A.M. (2004), *How Industries Evolve, Principles for Achieving and Sustaining Superior Performance*, Harvard Business School Press, Boston, MA.

Martin, C.R., Jr. and Horne, D.A. (1992), "Restructuring towards a service orientation: the strategic challenges", *Journal of Service Management*, Vol. 3 No. 1, pp. 25-25.

Martinez, V., Bastl, M., Kingston, J. and Evans, S. (2010), "Challenges in transforming manufacturing organizations into product-service providers", *Journal of Manufacturing Technology Management*, Vol. 21 No. 4, pp. 449-469.

Maskell, P. and Malmberg, A. (1999), "Localised learning and industrial competitiveness", *Cambridge Journal of Economics*, Vol. 23 No. 2, pp. 167-185.

Mudambi, R. (2008), "Location, control and innovation in knowledge-intensive industries", *Journal of Economic Geography*, Vol. 8 No. 5, pp. 699-725.

Mudambi, S. and Tallman, S. (2010), "Make, buy or ally? Theoretical perspectives on knowledge process outsourcing through alliances", *Journal of Management Studies*, Vol. 47 No. 8, pp. 1434-1456.

Neely, A. (2008), "Exploring the financial consequences of the servitization of manufacturing", *Operations Management Research*, Vol. 1 No. 2, pp. 103-118.

Neundorf, K.A. (2002), *The Content Analysis Guidebook*, First Edition, Cleveland State University, Sage Publication, Thousand Oaks.

Oliva, R. and Kallenberg, R. (2003), "Managing the transition from products to services", *International Journal of Service Industry Management*, Vol. 14 No. 2, pp. 160-172.

Porter, M.E. (1985), *Competitive Advantage: Creating and Sustaining Superior Performance*, Free Press, New York, NY.

Porter, M.E. (2008), "The five competitive forces that shape strategy", *Harvard Business Review*, Vol. 86 No. 1, pp. 79-93.

Porter, M.E. and Kramer, M.R. (2011), "Creating shared value", *Harvard Business Review*, Vol. 89 Nos 1/2, pp. 62-77.

Prencipe, A. (2011), "Corporate strategy and systems integration capabilities: managing networks in complex systems industries", in Prencipe, A., Davies, A. and Hobday, M. (Eds), *The Business of Systems Integration*, Oxford University Press, Oxford, pp. 114-132.

Pyndt, J. and Pedersen, T. (2006), *Managing Global Offshoring Strategies - A Case Approach*, Copenhagen Business School Press, Copenhagen.

Quinn, J.B., Doorley, T.L. and Paquette, P.C. (1990), "Beyond products: services-based strategy", *Harvard Business Review*, Vol. 68 No. 2, pp. 58-67.

Salonen, A. (2011), "Service transition strategies of industrial manufacturers", *Industrial Marketing Management*, Vol. 40 No. 5, pp. 683-690.

Seppälä, T. (2013a), "Tracking offshoring and outsourcing strategies in global supply chains", in Bals, L., Jensen, P.O., Larsen, M.M., and Pedersen, T. (Eds), *The Offshoring Challenge: Strategic Design and Innovation for Tomorrow's Organization*, Springer in the Production and Process Engineering Series, New York, NY.

Seppälä, T. (2013b), "Transformations of global mobile telecommunication supplier networks", in Bals, L., Jensen, P.O., Larsen, M.M. and Pedersen, T. (Eds), *The Offshoring Challenge: Strategic Design and Innovation for Tomorrow's Organization*, Springer in the Production and Process Engineering Series, New York, NY.

Silverman, D. (2010), *Doing Qualitative Research*, Third Edition, Sage Publications, London, Thousand Oaks, New Delhi.

Stahl, M.J. and Grigsby, D.W. (1997), *Strategic Management: Total Quality and Global Competition*, Blackwell, Oxford, Cambridge, MA.

Stake, R.E. (1995), *The Art of Case Study Research*, Sage Publications, New York, NY.

Storbacka, K. (2011), "A solution business model: capabilities and management practices for integrated solutions", *Industrial Marketing Management*, Vol. 40 No. 5, pp. 699-711.

Teece, D.J. (1986), "Profiting from technological innovation: implications for integration", *Collaboration, Licensing and Public Policy, Research Policy*, Vol. 15 No. 6, pp. 285-305.

Teece, D.J., Pisano, G. and Shuen, A. (1998), "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18 No. 7, pp. 509-533.

Ulaga, W. and Reinartz, W.J. (2011), "Hybrid offerings: how manufacturing firms combine goods and services successfully", *Journal of Marketing*, Vol. 75 No. 6, pp. 5-23.

Vandermerwe, S. and Rada, J. (1988), "Servitization of business: adding value by adding services", *25 European Management Journal*, Vol. 6 No. 4, pp. 314-324.

Viitamo, E. (2008), "On service productivity – strategic management perspectives", Lappeenranta University of Technology, LUT, Research Report 205, Faculty of Technology Management, Department of Industrial Management, Lappeenranta.

Viitamo, E. (2012), *Productivity as a Competitive Edge of a Service Firm – Theoretical Analysis and a Case Study of the Finnish Banking Industry*, Aalto University, School of Science, Aalto.

Viitamo, E. (2014), 'Service productivity, technology and organization - converting theory to praxis', The Research Institute of The Finnish Economy, ETLA Working Papers, (26) 4, ETLA, Helsinki.

Wernerfelt, B. (1984), "A resource-based view of the firm", *Strategic Management Journal*, Vol. 5 No. 1, pp. 171-180.

Windahl, C. and Lakemond, N. (2010), "Integrated solutions from a service-centered perspective: applicability and limitations in the capital goods industry", *Industrial Marketing Management*, Vol. 39 No. 8, pp. 1278-1290.

Wise, R. and Baumgartner, P. (1999), "Go downstream: the new profit imperative in manufacturing", *Harvard Business Review*, Vol. 77 No. 5, pp. 133-141.

Yin, R.K. (2003), *Case Study Research: Design and Methods*, Third Edition, Sage Publications, Thousand Oaks.

Yin, R.K. (2009), *Case Study Research: Design and Methods*, Fourth Edition, Sage Publications, Thousand Oaks.

Yin, R.K. (2014), *Case Study Research, Design and Methods*, Fifth Edition, Sage, Newbury Park.

Further reading

David, F. (1989), *Strategic Management*, Merrill Publishing Company, Columbus.

Grant, R.M. (1991), "The resource-based theory of competitive advantage: implication for strategy formulation", *California Management Review*, Vol. 33 No. 3, pp. 114-135.

Porter, M.E. (1998), "On competition", *A Harvard Business Review Book*, Harward Business School Publishing, Boston.

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