Department of Industrial Engineering and Management

Servitization, strategy and platforms

Ville Eloranta

Aalto University

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Servitization, strategy and platforms

Ville Eloranta

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Abstract

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Abstract

Global competition and commoditization of product offerings have posed difficulties to the manufacturing industry in recent decades. Many companies have responded by "servitizing" – changing the business focus from manufacturing to service provision. This transition, which was already seen to be demanding, has grown more complex due to digitalization and increasing information intensity in service-driven manufacturing. New kinds of service offerings are made possible – but at the same time diversifying customer needs, complex inter-firm networks and rapid pace of technological development escalate the challenges.

The change emphasizes the relevance of strategy-related discourse, as different market conditions require different strategic approaches and related organizational structures. However, although there has been a great deal of research regarding servitization during the last three decades, systematic approaches from a strategy perspective remain scarce. In this study, a strategy approach is deployed with a systematic literature review and four qualitative multi-case studies.

It is found that service-driven manufacturers are moving toward a systemic perspective in service business. The strategic role of technological resources in solutions is decreasing. Complex socio-technical relationships are preferred. Service networks are seen to hold strategic potential related to forming new resource and capability combinations, and fostering co-specialization.

Furthermore, platforms are identified as potential offering and organizational structures to address the new strategic requirements. It is reported that organizing service networks with platforms provides firms a way to leverage network complexity. In addition, service-driven manufacturers seem to construct platforms to allow strategic flexibility in a dynamic environment.

Keywords service, servitization, service infusion, industrial services, strategy, competitive advantage, platform, digitalization

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Tiivistelmä

Globaali kilpailu ja tuotetarjoomien hyödykkeistyminen ovat viime vuosikymmeninä luoneet haasteita valmistavalle teollisuudelle. Monet yritykset ovat vastanneet tilanteeseen ”palvelullistamalla” liiketoimintaansa, eli siirtämällä painopistettä tuotteiden valmistamisesta palvelujen tarjoamiseen. Tämä jo aiemmin vaativaksi todettu muutos on kuitenkin viime vuosina tullut yhä monimutkaisemmaksi. Teollisten toimialojen digitalisaatio ja lisääntyvä tietointensiivisyys ovat mahdollistaneet aivan uudenlaiset tarjoomat - mutta samalla asiakastarpeet, yhteistyöverkostot ja kilpailukenttä ovat tulleet vaikeaselkoisemmiksi. Toimintaympäristö myös muuttuu yhä nopeammin.

Nykytilanne korostaa strategisen johtamisen tärkeyttä. Muuttuva ympäristö asettaa vaatimuksia yritysten strategioille sekä myös tavoille organisoitua strategian mukaisesti. Vaikka teollisten palveluiden tutkimus on ollut laajaa ja ansiokasta, palvelullistumisen strategiaperspektiiviä ja erityisesti kilpailuedun lähteitä ei ole toistaiseksi tarkasteltu yksityiskohtaisesti. Tässä väitöskirjatutkimuksessa aihealuetta lähestytään systemaattisen kirjallisuuskatsauksen ja neljän laadullisen tapaustutkimuksen avulla.

Tuloksista ilmenee, että tutkitut teolliset valmistajat ovat ottaneet systeemisen perspektiivin palveluliiketoiminnan kehittämiseen. Teknologisten resurssien strateginen rooli on vähenemässä, ja monimutkaisten sosioteknisten verkostojen merkitys vastaavasti lisääntymässä. Useista yrityksistä koostuvilla palveluverkostoilla nähdään potentiaalia uusien resurssi- ja kyvykkyysyhdistelmien luomisessa, sekä toimijoiden välisessä yhteiserikoistumisessa.

Alustamainen lähestymistapa tunnistetaan myös potentiaaliseksi tavaksi organisoitua muuttuneita strategisia vaatimuksia vastaavasti. Kohdeyritysten osalta selviää erityisesti, että alustamainen orkesterointi tarjoaa yrityksille tapoja hyödyntää yritysverkostojen kompleksisuutta. Tämän ohella alustoilla nähdään rooli strategisen joustavuuden edistämisessä.

Avainsanat palvelu, palvelullistuminen, teolliset palvelut, strategia, kilpailuetu, alusta, digitalisaatio

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My doctoral studies have given me far more than I could have ever anticipated. However, what truly excites me is the future. It is a priviledge to work in an industry in which asking new questions is the priority.

***

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Finally, my greatest thanks go to my reconstituted family—Eero, Kirsi, Liisa, Tuomo, Ossi, Olli, and Minna—and, most importantly, to my wife, Outi, and son, Joona. I love you.

Helsinki, April 15, 2016
Ville Eloranta

Contents

List of Abbreviations

IoT	Internet-of-Things
ICT	Information and communications technology
RBV	Resource-based view of the firm

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List of Publications

This doctoral dissertation consists of a summary and of the following publications.

1. Eloranta, V. and Turunen, T. (2015), "Seeking competitive advantage with service infusion: a systematic literature review". *Journal of Service Management*, Vol. 26 No. 3, pp. 394-425.

2. Finne, M., Turunen, T. and Eloranta, V. (2015), "Striving for network power: The perspective of solution integrators and suppliers", *Journal of Purchasing and Supply Management,* Vol. 21 No. 1, pp. 9-24.

3. Turunen, T., Eloranta, V. and Hakanen, E. (2015), "Leveraging big data in industrial service business – from protection to sharing and recombining", in: Zhao, X., Zhang, J. and Han, H. (Eds), *Proceedings of QUIS 14 – Accelerate the Impact of Service Research*, Shanghai, China, pp. 946-955.
(Honorable mention award winner)

4. Eloranta, V. and Turunen, T. (2015), "Platforms in service-driven manufacturing: Leveraging complexity by connecting, sharing, and integrating", *Industrial Marketing Management*.
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5. Eloranta, V., Orkoneva, L., Hakanen, E. and Turunen, T. (in review), "Using platforms to pursue strategic opportunities in service-driven manufacturing", *Service Science*. (minor revision submitted 4.2.2016)

Author's Contribution

Publication 1: Seeking competitive advantage with service infusion: a systematic literature review

The initial idea, theoretical reasoning, and writing were a joint effort by both of the authors with equal contribution.

Publication 2: Striving for network power: The perspective of solution integrators and suppliers

The initial idea, research design, case analyses, theoretical reasoning and writing were a joint effort by all authors. The author of this dissertation was responsible for the cross-case analysis, editing the article and clarifying the contributions.

Publication 3: Leveraging big data in industrial service business – from protection to sharing and recombining

The initial idea, theoretical reasoning, and writing were a joint effort by all the authors with equal contribution.

Publication 4: Platforms in service-driven manufacturing: Leveraging complexity by connecting, sharing, and integrating

The initial idea, theoretical reasoning, and writing were a joint effort by both of the authors with equal contribution.

Publication 5: Using platforms to pursue strategic opportunities in service-driven manufacturing

The paper was initiated by the author of this dissertation, who had a leading role in the development of theory, case research, and reporting.

1. Introduction

1.1 Background

The manufacturing industry has grappled with the challenge of global competition for the last decades. Commoditization in product business forces companies to search for alternative ways to create and capture value. Several manufacturers have responded to this by adopting the practice of “servitizing” or "service infusion"[1]. Servitization has been defined as adding service components to the offerings (Baines *et al.*, 2009; Wise and Baumgartner, 1999; Vandermerwe and Rada, 1988). The extant literature has perceived the transition from product business to value-added services as a potentially successful way to regain a competitive advantage (Eloranta and Turunen, 2015a). However, at the same time, the literature has asserted that the path toward service business is challenging. Many companies have been captured in a paradoxical situation with diversifying business but non-realized profits (Gebauer *et al.,* 2005). Fortunately, the literature has provided solutions to these challenges especially in the areas of marketing and operations (Lightfoot *et al.,* 2013). Thus, despite the challenges, servitization has been recognized as a viable strategy for commoditization-prone manufacturing industry.

In the last decade the complexity of servitization has further increased. The manufacturing industry is progressing further with digitalization especially through the “internet-of-things” (IoT) (Atzori *et al.*, 2010). In addition, technology, service and organizational platforms have gained traction (Kowalkowski *et al.,* 2013; Pekkarinen and Ulkuniemi, 2008). By digitalization, scholars refer to the "sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural" (Tilson *et al.*, 2010, p. 749). IoT, in turn, is defined as “a global infrastructure for the information society, enabling advanced services by interconnecting (physical and virtual) things based on existing and evolving interoperable information and communication technologies” (ITU-T, 2012, p. 1). The concept of a platform has no unified definition, but it is seen as an organizing framework for product and technology innovation management (Gawer, 2014; Gawer and Cusumano, 2014; Yoo *et al.*, 2012; Bresnahan and Greenstein, 1999), strategy and markets

[1] The terms *servitization* and *service infusion* are used interchangeably in this dissertation.

(Teece, 2007; Rochet and Tirole, 2006, 2003) and organizations (Ciborra, 1996; Kim and Kogut, 1996).

Digitalization has a disruptive effect on the organizational and competence structures (Barua and Mukhopadhyay, 2000; Kettinger *et al.*, 1994). Actors across organizations are enabled to efficiently communicate and cooperate with each other through digital infrastructures (Tilson *et al.*, 2010), especially in terms of resource discovery, exchange, and reconfiguration (Gawer, 2014). This implies that diversifying customer needs, changing power structures of complex inter-firm networks, and the constant need to seek new business opportunities have become the prevailing state of many companies (D'Aveni *et al.,* 2010; Wiggins and Ruefli, 2005; D'Aveni, 1994). Industrial service business has also faced the challenges of a high-velocity environment, characterized by rapid dissemination of disruptive technologies, increasing volatility of market structures and vagueness of industry boundaries.

The change in the whole business landscape emphasizes the relevance of the strategy-related discourse, as different market conditions require different strategic approaches and related organizational structures (D'Aveni *et al.,* 2010; Teece, 2007; Eisenhardt and Martin, 2000). However, although there has been a great deal of research regarding servitization during the last three decades, systematic approaches with a strategy perspective have been scarce. The servitization literature has identified several sources of competitive advantage enabled by the service business, and the justifications for these different sources depend on one's selected strategic perspective (Eloranta and Turunen, 2015a). However, the research is evolving rapidly and there seems to be an active paradigm shift regarding the sources of servitization induced sustainable competitive advantage. Following the evolution in the strategic management research stream (Teece, 2007; Teece *et al.*, 1997; Dyer and Singh, 1998; Barney, 1991; Porter, 1980), servitization research is beginning to recognize the growing role of networks, complementarities and ecosystems in an industrial service setting (Gebauer *et al.*, 2013; Agarwal and Selen, 2009; Spring and Araujo, 2009; Windahl and Lakemond, 2006).

In the service and management literature, the above-mentioned networks are, according to Gebauer *et al.* (2013), referred to as services networks (Henneberg *et al.*, 2013), strategic business networks (Möller *et al.*, 2005), value networks (Möller and Svahn, 2003), value constellations and business systems (Normann and Ramirez, 1993), business in networks (Håkansson and Snehota, 2006) and service systems (Maglio and Spohrer, 2008). Following the developments on the servitization domain, this research uses the term *service networks* proposed by Gebauer *et al.* (2013). According to the authors, service networks consist of "a loosely coupled collection of upstream suppliers, downstream channels to markets and ancillary service providers" (Gebauer *et al.*, 2013, p. 32; Ritter *et al.*, 2004).

In this study, the extant servitization literature is *analyzed from a strategy perspective*. The sources regarding *service networks-originated competitive advantages are identified*. The implications, especially regarding *inter-firm power* and *the role of strategic resources*, are investigated with multiple-case

studies. In addition, case studies are used to explore how *service networks could be organized with platforms* in order to gain *strategic benefits.*

1.2 Research questions

The study includes two main research questions, with the first one complemented by two sub-questions. The motivation for these research questions is elaborated on below.

1.2.1 Strategic benefits of inter-firm networks in servitization

Driven by the discourse regarding servitization, strategy, and digitalization, the first main research question of this study can be summarized as follows:

> RQ1: How do service-driven manufacturers attempt to benefit strategically from inter-firm networks?

The sub-questions guide the focus toward more detailed research gaps, regarding strategic power and shared resources. Research on strategic management posits that due to increasing inter-firm dependencies, strategic power is an important element in gaining and sustaining competitive advantage in inter-organizational networks (Gulati *et al.,* 2000). This is why it was decided to research how service-driven manufacturers strive for power in their solution networks:

> SQ1.1: How do providers of industrial services strive to attain strategic power in their respective solution networks?

The theoretical work of this study also emphasizes the role of resource sharing in industrial service networks. This motivated further elaboration on the decisions behind resource sharing versus possession as well the decisions' implications in regard to competitive advantage. Special attention was given to information-based resources as they have been identified as one of the most important strategic asset in industrial services (Ala-Risku, 2009). In order to avoid the biases resulting from incumbent companies' possible path dependencies, caused by e.g. sunk costs and investments in existing resources, the empirical study was performed within the context of new ventures.

> SQ1.2: How do the new ventures in the industrial service business see the strategic role of possessing and sharing information resources in inter-firm networks?

1.2.2 Platforms, service networks and strategy

Driven by the discourse regarding strategy and platforms, the second main research question of this dissertation is formed as follows:

> RQ2: What is the role of platforms in leveraging service networks for strategic purposes?

Both strategy and digitalization research emphasize the role of platforms in organizing networked businesses. Therefore, the interest in answering research question two was specifically motivated by better understanding how platform-enabled low coordination costs were leveraged in order to embrace the complexity of the extensive co-creation networks. In addition, the notions regarding the transience of competitive advantage in the turbulent and disruptive business environments made it interesting to explore how service-driven manufacturers try to design platforms that foster pursuing opportunities and constant change in service networks level.

1.3 Included articles

This dissertation consists of five articles. Their contents are briefly summarized as follows.

1. Eloranta, V. and Turunen, T. (2015), "Seeking competitive advantage with service infusion: a systematic literature review", Journal of Service Management, Vol. 26 No. 3, pp. 394-425.

In this paper it was analyzed how servitization research explains competitive advantage through services. The four strategic management theories – competitive forces, the resource-based view, dynamic capabilities, and relational view – were applied in the analysis. A systematic literature review forms the links between the service infusion and strategy literature.

2. Finne, M., Turunen, T. and Eloranta, V. (2015), "Striving for network power: The perspective of solution integrators and suppliers", Journal of Purchasing and Supply Management, Vol. 21 No. 1, pp. 9-24.

This paper explores how service-driven manufacturing companies strive for inter-organizational power in interlinked inter-firm networks. In a multi-case study, data were collected from companies operating in the marine, logistics, mining, and construction industries. Three of the six companies are integrators providing services. The other three supply subsystems and components for the integrators.

3. Turunen, T., Eloranta, V. and Hakanen, E. (2015), "Leveraging big data in industrial service business – from protection to sharing and recombining", in: Zhao, X., Zhang, J. and Han, H. (Eds), Proceedings of QUIS 14 – Accelerate the Impact of Service Research, Shanghai, China, pp. 946-955.

Strategy literature has recognized that resource-based strategies reach their boundary condition in high-velocity environments. However, servitization literature suggests that customer relationships and information resources can provide a resource-based competitive advantage even if the pace of technological development is high. The article investigates this dissent. With a multi-case study, six new ventures in the manufacturing sector were studied. Strategies of prioritizing data volume over exclusivity, leveraging information to develop the required capabilities, and using information sharing as a "currency" in value-based exchanges were identified.

4. Eloranta, V. and Turunen, T. (2015), "Platforms in service-driven manufacturing: Leveraging complexity by connecting, sharing, and integrating", Industrial Marketing Management. doi:10.1016/j.indmarman.2015.10.003

Service-driven manufacturing firms often rely on networks in service operations. However, to leverage the network approach, firms must address the challenges of managing and orchestrating complex inter-organizational relationships. In this article, it was identified how service-driven manufacturing companies in construction, logistics and marine industries aim to leverage network-related complexity in their operations instead of trying to reduce complexity. Five mechanisms of complexity harnessing were identified as well as three logics of organizing.

5. Eloranta, V., Orkoneva, L., Hakanen, E. and Turunen, T. (in review), "Using platforms to pursue strategic opportunities in service-driven manufacturing", Service Science. (minor revision submitted 4.2.2016)

Strategy research posits that, in dynamic environments, firms must base their strategies not on leveraging the past but on fostering constant change. This research explores how platforms can be used as semi-structures to pursue strategic opportunities in manufacturers' service networks. The research is based on empirical data from construction and engineering material producing industries. The cases include focal companies and 14 smaller service providers from the networks of the focal companies.

1.4 Articles and research questions

The articles address the research questions as shown in Table 1. The systematic literature review (Eloranta and Turunen, 2015a) provides insights into the first main research question. Article two (Finne *et al.*, 2015) informs sub-question 1.1. Article three (Turunen *et al.,* 2015) correspondingly addresses sub-question 1.2. The second main research question is informed by articles four (Eloranta and Turunen, 2015b) and five (Eloranta *et al.*, *in review*).

Table 1. Research questions and included articles.

	A1	A2	A3	A4	A5
RQ1: How do service-driven manufacturers attempt to benefit strategically from inter-firm networks?	X				
SQ1.1: How do providers of industrial services strive to attain strategic power in their respective solution networks?		X			
SQ1.2: How do the new ventures in the industrial service business see the strategic role of possessing and sharing information resources in inter-firm networks?			X		
RQ2: What is the role of platforms in leveraging service networks for strategic purposes?				X	X

1.5 Structure of the dissertation

The rest of this dissertation summary is structured as follows. The theoretical background regarding servitization, strategy, and platforms are introduced first. In the methodology section, the research approach, and details regarding the selected research design are described. In addition, the methodological details of each article are introduced. After the methodology part, the summary of the findings of this study is presented. Thereafter, in the discussion section, the findings are concluded and theoretical as well as practical implications are drawn. The conclusion section summarizes the study.

2. Theoretical Background

In this section, the theoretical background of the study is presented. First, the empirical phenomenon, servitization of the manufacturing firms, is introduced in terms of managerial importance as well as scholarly discourse. Then, the theoretical foundations of strategic management and the concept of competitive advantage are introduced. Thereafter, servitization research is viewed from the perspective of strategic management in order to elaborate on the characteristics of the strategic paradigm shifts developing in the servitization context. Finally, the theoretical discourse of platforms is presented.

2.1 Servitization as a field of research

During the last decades, many capital-intensive industries have faced increasing competitive pressures. The periods of market stability have grown shorter and turbulent conditions have prevailed (Thomas, 1996). In the manufacturing industry, companies have answered these developments by seeking new strategies and sources of competitive advantage. One particular approach in addressing the changing market situation has been to move away from commoditized product businesses and to seek strategic benefits from complex customer relationships (Lightfoot *et al.*, 2013; Baines *et al.*, 2009; Wise and Baumgartner, 1999; Vandermerwe and Rada, 1988). The strategy has materialized in the form of service and solution innovations, and related process, organizational structure and business model alterations.

Due to the fundamental importance of manufacturing for society, the transition process has gained a lot of traction in the academic debate. Since the introduction of the phenomenon to the scholarly discourse in the late 1980s, research in the area has been progressing rapidly, propelled forward by high managerial relevance. Research has been largely empirically driven: in addition to making theoretical contributions, it has focused strongly also on managerial discourses (Eloranta and Turunen, 2015a). The result is that the elaboration of the phenomenon is currently relatively fragmented in terms of methodologies, theories and also research domains. Therefore, scholars refer to the phenomenon with many different terms. In manufacturing context, the most common terms are “servitization” (Baines *et al.*, 2009; Vandermerwe and Rada, 1988) and “service infusion” (Brax, 2005). "Service-driven

manufacturing" (Gebauer *et al.*, 2012b), "service addition" (Matthyssens and Vandenbempt, 2010) and "service transition" (Fang *et al.*, 2008) have also been used to refer to the context. More seldomly used terms include also "high-value manufacturing" (MacBryde *et al.*, 2013), and "tertiarization" (Léo and Philippe, 2001), "service orientation" (Martin and Horne, 1992), "servicization" (Quinn *et al.*, 1990), and "servicizing" (Reiskin *et al.*, 1999). In addition, the scholars focusing on organizations and offerings are referring to "product service systems" (Baines *et al.,* 2007), "integrated solutions," "customer solutions," "total solutions," and "business solutions" (Nordin and Kowalkowski, 2010).

Notwithstanding the diversity of the terminology and focus areas of the research, scholars in all domains agree that the transition toward services is challenging. The companies are at risk of being trapped in the so-called service paradox, characterized by simultaneous scope extension, cost increase and margin decrease (Gebauer *et al.*, 2005). However, servitization has also provided promising results for many companies. The classic examples are e.g. Rolls Royce (guaranteed flying hours for aero engines), ABB (turnkey solutions in power generation) and Alstom (maintenance, upgrade and operation of trains and signaling systems) (Smith, 2013; Baines *et al.,* 2009; Davies, 2004; Miller *et al.,* 2002). Extant research agrees that being successful in the transition process of servitization requires that firms develop new resources, capabilities, processes, and business models. Organizations must also change their paradigms and mindsets related to value creation and capture (Lightfoot *et al.*, 2013; Baines *et al.*, 2009; Brax and Jonsson, 2009; Kindström and Kowalkowski, 2009; Oliva and Kallenberg, 2003; Mathieu, 2001a, b; Matthyssens and Vandenbempt, 1998). The change is comprehensive and disruptive – and has an effect on many functions of the organization. Therefore, studies have been conducted in many areas of the management research domain. Special focus has been given to innovation, sales (value-based exchange), marketing, organizational development and strategy.

In this study the servitization phenomenon is viewed from strategy and organizational structure perspective. The specific interest is in the shifts in the strategic foundations behind the manufacturing firms' decisions in progressing from product orientation to service focus. Servitization is perceived as a strategic level endeavor with far-reaching implications. Thus, the research takes a holistic and abstract perspective to the empirical phenomenon. This is also visible in the selection of terms by which the phenomenon is addressed: broad-level terms of "servitization", "service infusion" and "service-driven manufacturing" are preferred.

2.2 Theorizing the quest for competitive advantage

The strategic management discourse has formed a vivid narrative regarding both gaining and sustaining competitive advantage. There is a great deal of different theories and frameworks explaining and prescribing different

strategic approaches for different contexts. In order to view the strategy field from an abstract perspective, this study approaches the strategy domain from the viewpoint of *logical foundations of strategy* (Sambamurthy *et al.*, 2003; Eisenhardt and Sull, 2001; Lengnick-Hall and Wolff, 1999) i.e. on how the companies explain the effective strategic action (Lengnick-Hall and Wolff, 1999). In addition, to further clarify the distinctions between these *core logics*, this study analyzes them from the perspective of their underlying epistemological assumptions, that is, the position the logics take along the continuum between mechanistic and organic worldviews on strategy (Farjoun, 2002).

2.2.1 Core logics of strategy

According to Lengnick-Hall and Wolff (1999), the strategic management approaches can be divided to three distinct core logics: 1) capability logic, 2) guerilla logic, and 3) complexity logic. The logics are summarized in Table 2. The capability logic approach is based on the *internal resources or competencies and their interdependencies*, as well as creative application of and protection of those assets (Barney, 1991; Prahalad and Hamel, 1990; Wernerfelt, 1984). In the temporal focus, the firm maintains its position through strategic foresight. This approach is popularized by the resource-based view of strategy (Barney, 1991; Wernerfelt, 1984), as well as core competence approach (Prahalad and Hamel, 1990). The integrative and innovation routine views of dynamic capabilities research (Schreyögg and Kliesch-Eberl, 2007; Teece *et* al., 1997; Nelson and Winter, 1982) also follow this logic, focusing primarily on identifying and utilizing the key capabilities of the firm.

Guerilla logic, in turn, does not recognize the sustainability of the competitive advantage. It emphasizes the *speed, aggression and surprise* of strategic actions (D'aveni *et al.*, 2010; Wiggins and Ruefli, 2005; D'Aveni, 1994). The underlying assumption in this logic is that markets develop so rapidly that companies must cope with constant disequilibrium, characterized by short product life cycles, frequent entry of unexpected outsiders and radical redefinitions of market boundaries. Unlike a resource-based view, guerilla logic builds on repeated disruption, and leveraging highly context-dependent factors of the markets (D'Aveni, 1994). The foundations for these approaches were set by Bourgeois and Eisenhardt (1988) and further developed especially by hypercompetition-based approaches of D'Aveni (1994) and D'Aveni *et al.*, (2010).

The third approach, emerging from systems thinking, is complexity logic. In this view, strategy refers to *design of attractors, facilitation of desirable flows between strategic actions, fostering synergies and capitalizing on community* (Lengnick-Hall and Wolff, 1999). The collaboration, co-opetition, shared benefits, and enlarging the markets for all companies are preferred over fierce competition. This view gained a lot of interest among organization and strategy scholars in the late 1990s (Anderson, 1999; Brown and Eisenhardt,

1998; Stacey, 1995). Nowadays, the complexity logic is visible in the radical dynamization based approach (Schreyögg and Kliesch-Eberl, 2007) to dynamic capabilities (Eisenhardt and Martin, 2000), as well as in the relational view of strategy (Lavie, 2006; Dyer and Singh, 1998).

The original core logic categorization has been further developed by Eisenhardt and Sull (2001) and Sambamurthy *et al.* (2003) (with an information systems perspective). Eisenhardt and Sull (2001) form the core logic groups of 1) position, 2) resources and 3) simple rules. Sambamurthy *et al.* (2013) similarly refer to 1) positioning, 2) leverage, and 3) opportunity logics. Resource and leverage logics refer directly to the capability logic of Lengnick-Hall and Wolff (1999). The term "capability logic" is therefore used exclusively from here onwards. The first distinction of the works of Eisenhardt and Sull's (2001) and Sambamurthy *et al.* (2003) is that they combine both guerilla and complexity logics under the same umbrella ("simple rules" and "opportunity"). For clarity, this research adheres to this view, and hereafter primarily refers to the logics of "guerilla", "complexity", "simple rules" and "opportunity" with the term "opportunity logic". Secondly, by introducing position logic to the setting, Eisenhardt and Sull (2001) and Sambamurthy *et al.* (2003) address the shortcomings of Lengnick-Hall and Wolff's (1999) work—that is, neglecting Porter's (1980) industry architecture view to strategy. Thus, with position logic, the authors refer to the actions of *identifying and choosing an attractive competitive position, protecting it, and integration of activity systems* (Porter, 2001; 1980). Although Porter's original model has been widely criticized and challenged, it still is under active development, especially from the digitalization perspective (Porter and Heppelmann, 2014; Porter, 2001).

2.2.2 Epistemological assumptions of the core logics

The strategic management frameworks can be divided to two groups according to their epistemological assumptions (Farjoun, 2002). The first approach can be perceived as based on Newtonian mechanistics (ibid). It views strategy as a planned posture and prescriptive models, unified by a mechanistic view of the world. This approach includes disciplinary-based and stand-alone middle-range theories, focusing on the relationships between 1) strategy, conduct and performance (industry architecture model, Porter, 1980), 2) strategy, structure, and performance (contingency theory, e.g., Galbraith and Nathanson, 1978), and 3) strategy and resources (resource-based view as well as integrative and innovation routine approaches to dynamic capabilities (Schreyögg and Kliesch-Eberl, 2007; Teece *et al.,* 1997; Barney, 1991; Nelson and Winter, 1982). The strengths of the mechanistic approach lie in its managerial focus, especially the facilitation of communication, and generation and exchange of ideas (Farjoun, 2002).

However, as the nonlinear development and turbulence of the markets have increased, the mechanistic view of strategy has been criticized for its rigidities (D'Aveni *et al.*, 2010; Brown and Eisenhardt, 1998; D'Aveni, 1994). The field

of strategy has seen an emergence of so-called organic approaches to strategic management. These views are based on the natural and social sciences (Farjoun, 2002). The applications of the complexity theory to the strategy and organization research (e.g. Anderson, 1999; Brown and Eisenhardt, 1998) have specifically contributed to the organic views. More than the strategic choice, organic theories focus on strategic change. Theories materialize in the forms of strategy process research and process models, as well as interactive and integrative research. Organic theories include, e.g. radical dynamization focused versions of dynamic capability view (Schreyögg and Kliesch-Eberl, 2007; Eisenhardt and Martin, 2000), the relational view (Lavie, 2006; Dyer and Singh, 1998), theories based on the "edge-of-chaos" and co-adaption (Brown and Eisenhardt, 1998), and so-called hypercompetition approach, which denies the existence of sustainable competitive advantage (D'Aveni *et al.*, 2010; D'Aveni, 1994).

The differences between epistemological assumptions clarify and structure the discussion regarding core logics of strategy, helping to reach greater understanding regarding the different views of the logics different authors have adopted. Position logic (Sambamurthy *et al.*, 2003; Eisenhardt and Sull, 2001), focusing on posture and plan, leans heavily on the mechanistic end in the epistemological assumption continuum. Opportunity logic (Sambamurthy *et al.,* 2003; Eisenhardt and Sull, 2001), and Lengnick-Hall and Wolff's (1999) two versions of it, complexity and guerilla logics (Lengnick-Hall and Wolff, 1999), focus on strategic change and take their place in the organic extreme of the spectrum. Capability logic (Lengnick-Hall and Wolff, 1999) lies in the middle between the extremes, inheriting features both from mechanistic and organic perspectives.

Table 2. Core logics of strategy.

Core logic	**Epistemological assumption** (Farjoun, 2002)	**Description**	**Representative strategic management frameworks**
Position	Mechanistic extreme	Identifying and choosing an attractive competitive position, protecting it, and integration of activity systems.	Industry architecture, market forces (Porter, 1980)
Capability / (Resources, Leverage)	Combines mechanistic and organic perspectives	Benefiting from internal resources or competencies and their interdependencies, as well as from creative application of and protection of these assets.	Resource-based view (Barney, 1991), core competence (Prahalad and Hamel, 1990), integrative and innovation routine perspectives to dynamic capabilities (Nelson and Winter, 1982; Schreyögg and Kliesch-Eberl, 2007; Teece *et al.,* 1997)

Guerilla perspective to opportunity logic	Organic extreme	Does not recognize the sustainability of the competitive advantage. Emphasizes speed, aggression and surprise of strategic actions.	Hypercompetition-based approach (D'Aveni, 1994; D'Aveni *et al.*, 2010)
Complexity perspective to opportunity logic	Organic extreme	Avoids fierce competition. Designing attractors, facilitation of desirable flows between strategic actions, fostering synergies and capitalizing on community.	Radical dynamization perspective to dynamic capabilities (Eisenhardt and Martin, 2000; Schreyögg and Kliesch-Eberl, 2007), the relational view (Dyer and Singh, 1998; Lavie, 2006)

2.3 Servitization and competitive advantage

This section connects the approaches of the competitive advantage related discussion (in strategic management domain) and servitization discourse. As seen in the core logic discussion, the number of different frameworks for strategic management is extensive if not overwhelming. However, not all approaches are equal in their popularity and impact. Therefore, focus is first needed to identify the perspectives that can best inform this research. Thus, in light of this study, the most prevailing frameworks of strategic management frameworks are selected and described in this section. Thereafter, the results of a systematic literature study are presented, identifying how the approaches are reflected in the servitization discourse. The systematic study is reported with in detail in article one (Eloranta and Turunen, 2015a).

2.3.1 Focusing the strategic management discussion

In this research, the analysis is focused on four, most popularized strategic frameworks underlying the core logics of strategy: market forces (Porter, 1980), the resource-based view (Barney, 1991), dynamic capabilities approach (Teece, 2007; Teece *et al.,* 1997) and the relational view (Lavie, 2006; Dyer and Singh, 1998). The four frameworks were selected using the following criteria: 1) they were the most dominant frameworks of the respective core logics, and 2) following the assumption of servitization, they assume that strategy and management can impact acquiring competitive advantage (this rules out evolutionary theories). The selected frameworks are presented in Table 3.

To triangulate the strategic framework selection, in the systematic literature review on servitization (Eloranta and Turunen, 2015a) it was also analyzed which other frameworks had possibly been used in the servitization literature. The analysis revealed that anecdotal contributions had been made using the hypercompetition literature (D'Aveni *et al.*, 2010; D'Aveni, 1994). The so-called resource-advantage (R-A) theory (Hunt, 1997) was also used in one

study. However, the contributions reflecting hypercompetition did not use the actual theoretical framework reported in the strategy literature. R-A theory, in turn, is actually based on the resource-based view and has not gained significant support in the strategic management discourse. Therefore, this triangulation did not reveal information that would have extended the initial selection of four frameworks.

Table 3. Summary of the selected strategic management theories.

Theory	**Sources for Competitive Advantage**
Market forces	The industry structure determines and limits the strategic choices and any available competitive advantage.
Resource-based perspective	Competitive interaction and entrepreneurial actions can be used to manipulate the market environment. The competitive advantage is based on the organizations' idiosyncratic and difficult-to-imitate resources.
Dynamic capabilities	Competitive advantage depends on a firm's ability to adapt, integrate, and reconfigure skills, resources, and functional competences in a dynamic environment
Relational view	Competitive advantage can only be gained through the joint idiosyncratic contributions of specific alliance partners and the service ecosystem.

The first framework identified was the *competitive market forces approach* (Porter, 1980). Based on the industrial organization thinking, this approach views market dynamics and structure as the prevailing factors that dictate the rules under which companies operate. According to the theory, firms aim to select an attractive industry, define the performance driver for a generic strategy, and strive for reducing intra-industry rivalry (Lewin and Volberda, 1999). Entry barriers, substitution threats, bargaining power of buyers and suppliers, as well as industry incumbent rivalry determine the foundations of profit potential and success of an industry (Porter, 1980).

In contrast to the competitive forces model, *resource-based strategies* posit that the performance variability between the firms is the result of resource and capability heterogeneity (Barney, 1991; Wernerfelt, 1984). By resources, the theory refers to "all assets, capabilities, organizational processes, firm attributes, information, knowledge, etc." valuable to the firm in terms of efficiency and effectiveness (Barney, 1991, p. 110). Firms achieve sustainability of the competitive advantage by accumulating complementary resources, and securing their inimitability, immobility and organization (Amit and Schoemaker, 1993). The resource-based theories, especially its most prevailing framework, the resource-based view (RBV) (Barney, 1995; 1991), primarily uses a single firm as the unit of analysis. This has lead to criticism and also facilitated formation of theory extensions (e.g. Kraaijenbrink *et al.*, 2010; Eisenhardt and Martin, 2000). As a result, the resource-based discourse has begun to look beyond the firm boundaries. The most well-known extensions of the RBV include e.g. knowledge-based view (Grant, 1996) and, most importantly, the dynamic capabilities view (Teece, 2007; Teece *et al.*, 1997).

In the *dynamic capabilities* approach, the firm secures the sustainability of the competitive advantage by adapting, reconfiguring and innovating in rapidly changing market conditions (Hobday, 1998; Roberts, 1998; Quinn, 1985). Dynamic, entrepreneurial approaches are emphasized (Zahra *et al.,* 2006). The strategic foundations have been formalized as the managerial and organizational capabilities of sensing the environment, seizing the possibilities and reconfiguring the resources (O'Reilly and Tushman, 2008; Teece*,* 2007). In the dynamic capabilities research of the last decades, the discourse has been evolving to adopt a systems perspective to the capabilities and resources, especially in the fields of innovation (Chesbrough, 2003), organizational learning (Powell, 1998) and creation of output (Shan *et al.*, 1994). New value-enhancing combinations are sought for, involving the firm, its suppliers, alliances and the whole industry ecosystem (Teece*,* 2007). Coordination and orchestration aspects have been given a high priority (Wales *et al.,* 2013), as well as the role of new technologies (Bernoider *et al.,* 2014).

The fourth identified framework, *the relational view*, advances the perspective further toward the inter-firm networks (Dyer and Singh, 1998). The argument is that idiosyncratic linkages between the firms may be a source of competitive advantage (Lavie, 2006; Dyer and Singh, 1998). In contrast to a resource-based view, the focus is on complementary resource-endowments between the firms, dyadic network routines and processes, governance methods as well as information sharing (Grant, 1996). Sustainability of the competitive advantage is secured by isolation mechanisms based on different instantiations of social complexity (Dyer and Singh, 1998). During the last decade, the discussion regarding to the implications of relational view has been extended to the domains of supply networks (Choi and Krause, 2006; Lee, 2004; Lamming *et al.*, 2000), value networks (Stabell and Fjelstad, 1998) and business ecosystems (Adner and Kapoor, 2010; Teece, 2007; Iansiti and Levien, 2004; Moore, 1993).

2.3.2 Reflections of strategy in extant servitization literature

After summarizing the major theories of strategic management, article one reports how the servitization literature reflects the strategic frameworks (Eloranta and Turunen, 2015a). According to the systematic literature review, there has been a gradual evolution in the service infusion literature in terms of how transition from goods orientation to service orientation is justified to create competitive advantage (Gebauer *et al.*, 2013; Spring and Araujo, 2013; Kindström *et al.*, 2013; Ulaga and Reinartz, 2011; Vandermerwe and Rada, 1988). The discussion has followed the paths directed by strategic management scholars (D'Aveni *et al.*, 2010; Teece, 2007; Dyer and Singh, 1998; Teece *et al.*, 1997; Barney, 1991; Wernerfelt, 1984; Porter, 1980). A summary of the literature is presented in Table 4.

Table 4. Strategic perspectives in the servitization literature.

Strategy framework	Service rationale	Representative research
Market forces	Service offerings enhance the strategic fit between the external environment and the organization. With services, a firm can capture its desired market position and build strategic barriers to competition.	Vandermerwe and Rada (1988), Gebauer (2008), Neely (2008)
Resource-based perspective	Services promote the identification and development of VRIO resources (and capabilities), thereby providing causal ambiguity and social complexity. These resources include, e.g., installed bases, service-enhanced relationships, and unique and complex product-service offerings.	Oliva and Kallenberg (2003), Fang *et al.*, (2008), Gremyr *et al.* (2010), Ulaga and Reinartz (2011)
Dynamic capabilities	There are two approaches: specific service-related capabilities provide a sustainable competitive advantage, and specific capabilities are required to organize service-related resources to leverage the competitive advantage.	Hobday et al. (2005), Fischer et al. (2010), Den Hertog *et al.* (2010), Gebauer (2011), Gebauer *et al.* (2012a), Kindström *et al.* (2013)
Relational view	The relationships in service or solution networks are sources of a sustainable competitive advantage. Specific capabilities are required for initiating, maintaining, and capitalizing on these relationships.	Mathieu (2001b), Windahl and Lakemond (2006), Hakanen and Jaakkola (2012), Gebauer *et al.* (2013), Kowalkowski *et al.* (2013), Spring and Araujo (2013)

The earliest contributions to the servitization literature viewed services as the manufacturer's answer to the evolving industry architecture. A service offering was designed in order to avoid commodization by creating competitive barriers and increasing the value in customer offerings (Vandermerwe and Rada, 1988). This rationale refers to the strategy literature's perspective on competitive market forces and the industry-structure approach (Porter, 1980), in which the unit of analysis is the single firm's offering and its relation to the market structure. Thus, at this stage a great deal of research has been done to understand and conceptualize the different types of service concepts that manufacturers can offer.

In the 2000s, the service infusion stream moved from the level of offering towards firms' abilities to change the markets by means of their service-related resources (Gebauer *et al.*, 2011). This mode of thought originated from the resource-based approach (Barney, 1991; Wernerfelt, 1984), arguing that

differences between firms are primarily the result of the resource and capability heterogeneity among companies. However, in response to criticism regarding firm boundaries and the level of analysis, this stream of research has broadened its views to also include shared resources. From the point of view of the unit of analysis, the theory was still primarily concerned with a single firm's actions in developing and protecting its resources: i.e. installed base (Ulaga and Reinartz, 2011; Oliva and Kallenberg, 2003), complex offerings enabled by internal resource combinations (Ulaga and Reinartz, 2011; Gremyr *et al.*, 2010) and relationships with the customers (Nordin and Kowalkowski, 2010; Davies et al., 2007; Tuli *et al.*, 2007).

The need to stay competitive in a rapidly changing environment led servitization scholars to turn their attention toward a dynamic capability approach to strategy (Gebauer *et al.*. 2012a; Teece *et al.,* 1997). According to the servitization research, the dynamic capabilities view has had an important role in organizing and reconfiguring service related resources for constantly changing customer needs (Fang *et al.,* 2008). The approach is specifically prominent in the areas of service innovation (Den Hertog *et al.,* 2010; Fischer *et al.,* 2010). Ambidextrous resource exploiting and exploration is seen as one of the results of leveraging the dynamic capability view (Fischer *et al.*, 2010). The problem with the servitization research is that the reflections of the theoretical discourse regarding dynamic capabilities are often imprecise. With the exception of the works of Kindström *et al.* (2013), Gebauer (2011) and Den Hertog *et al.* (2010), the linkages to the dynamic capability ontology are weak. In addition, the strategy stream's diversity with regard to the different views to the nature of dynamic capabilities (Schreyögg and Kliesch-Eberl, 2007) is not precisely identified.

Due to the increasing criticism about firm boundaries, the most recent studies of service infusion have shifted the focus outside the focal organization, toward gaining competitive advantage from inter-organizational relationships and networks. A great deal of this discourse has been held under the domain of dynamic capabilities, as the latest developments of the theory emphasize the ability to integrate, build, and reconfigure both internal and external competencies (Teece, 2007). There are plentiful contributions in these directions (Gebauer *et al.*, 2013; Kindström *et al.*, 2013; Fischer *et al.*, 2010; Den Hertog *et al.*, 2010; Agarwal and Selen, 2009). Service infusion scholars also adhere to the later themes of strategy stream focusing on the role of systems perspective, emphasizing the connections between the firm and the ecosystem (Adner and Kapoor, 2010; Teece, 2007; Iansiti and Levien, 2004; Moore, 1993) it occupies. Moreover, the latest service infusion literature seeks competitive advantage directly from new, value-enhancing combinations of actors (Gebauer *et al.*, 2013; Kowalkowski *et al.*, 2013; Windahl and Lakemond, 2006). This moves the discourse towards a relational view of strategy (Lavie, 2006; Dyer and Singh, 1998) and further emphasizes the role of inter-firm networks and relationships as the unit of analysis.

The previous part of the theory section provided the background and motivation for primary research question number 1:

How do service-driven manufacturers attempt to benefit strategically from inter-firm networks?

2.4 Organizing businesses with platforms

The identified paradigm shift in strategy-related servitization research toward 1) leveraging resources and capabilities in service networks, as well as 2) prioritizing strategic opportunity pursuing and addressing dynamic environment highlight the need for flexible and dynamic organizational structures (Gulati *et al.*, 2012; Galunic and Eisenhardt, 2001). The research on strategy (Gawer and Cusumano, 2008; Teece, 2007; Rochet and Tirole, 2006, 2003), organization (Ciborra, 1996; Kim and Kogut, 1996), information systems (Bresnahan and Greenstein, 1999) and product innovation (Gawer, 2014; Gawer and Cusumano, 2014) recognize the role of "platforms" as a structure meeting the demands.

The research on platforms has progressed simultaneously in different research streams, inhibiting establishing a common definition (Thomas et al., 2014). However, the perspectives of different research communities converge to an argument that the platforms address the complexities of the environment by decoupling the core components (low variety, long-lived) and complements (high variety and high rates of change) of the business system (e.g. organization, product, technology) (Thomas *et al.*, 2014; Baldwin and Woodard, 2008). This is achieved through the practices of modularization and architectural design (Thomas *et al.*, 2014; Jacobides *et al.*, 2006). The underlying aim is to create a structure that makes it possible to maintain the necessary amount of variety in the system to meet the demands of the environment. The architectural innovation perspective also stresses the role of leveraging the platform structure for the benefit of central actors in the ecosystem (Thomas *et al.*, 2014).

2.4.1 Different perspectives to platforms

In the *product innovation domain*, platforms were initially used in the intra-firm context to describe modular product families, allowing simultaneous scale and scope benefits through addition, removal, or substitution of product features (Meyer and Utterback, 1993; Wheelwright and Clark, 1992). With similar intentions, the specific focus of information systems research has been on technological products and software, enabling systems integration, scalability and control through architectural specifications (Bresnahan and Greenstein, 1999). This research also spans to the inter-firm context, especially in its technology platform (Bresnahan and Greenstein, 1999) and supply chain platform related incarnations (Gawer and Cusumano, 2014). At industry wide -level, the technological systems may achieve sufficient

popularity to become dominant designs (Utterback and Suarez, 1993). In recent decades, the possibility of technologies evolving to industry platforms or industry ecosystems has been also discussed (Gawer, 2014). Shortened product cycles have increasingly forced firms to tap into the external source of innovation, as well to share technological foundations with each other. This has been achieved through federating large inter-organizational systems of complementary actors, gravitated together with key resources to which platform orchestrators have at least partial control (Gawer, 2014; Gawer and Cusumano, 2014).

Economics and strategy research regarding platforms has been developing with its own paradigms, and until lately, without strong links to the engineering legacy (Gawer, 2014). In this context, platforms have been referred to as a "two-sided markets", or "multi-sided markets" (Rochet and Tirole, 2006, 2003). These platforms have become specifically associated with products, services, firms, and institutions that mediate transactions among a number of actors in a business ecosystem (Hagiu, 2009; Eisenmann *et al.*, 2006; Rochet and Tirole, 2006, 2003). The interest has been focusing on marketplace characteristics (e.g. pricing mechanisms) (Gawer, 2014), demand-side economies of scale (Katz and Shapiro, 1986) and direct and indirect network effects (Rochet and Tirole, 2006, 2003) of platforms. Network effects have been perceived to have a substantial effect on platform-related businesses (Gawer, 2014), as the effects result often to a "winner-take-all" phenomenon (Eisenmann *et al.*, 2006). Along the marketplace related discussions, there has also been analysis in the industry architecture level. In this discourse, the focus is not only on market mediation, but defining a division of labor for the whole industry with platforms (Jacobides *et al.*, 2006).

In *organization research*, the platform approach refers to identifying and developing core assets that the organization can leverage context-independently (Ciborra, 1996; Kim and Kogut, 1996). Thus, the core assets provide the firm with strategic flexibility and adaptability, and help the firm pursue and benefit from strategic opportunities (Eisenhardt and Sull, 2001). The assets can be, but are not limited to, technologies or capabilities (Teece, 2007; Kim and Kogut, 1996). In organizational research, a platform is perceived as more abstract and less precisely defined concept than in engineering, technology, strategy, and economic domains. In addition, the organizational approach to platforms has been largely developing in isolation from other platform discussions, with no proper cross-linking between the research streams (Thomas *et al.*, 2014). Only very recently, the different domains have started to converge, as industry platform discussion has started to perceive industrial platforms as meta-organizations (Gawer, 2014).

Finally, platforms have also been elaborated in the *service marketing* domain. In this stream of research, platforms have been perceived as systems that aim to deliver services regarding some resource the company possesses, or even engaging different stakeholders to collaboration and value creation (Breidbach *et al.*, 2014; Ramaswamy, 2009; Sawhney *et al.*, 2005). According

to this view, platforms usually materialize in the form of ICT environments (e.g., websites, applications, marketplaces or virtual spaces). Due to the rising popularity of Internet-based services during the last decades, this perspective has gained a lot of traction in the practitioner discussions.

2.4.2 Strategic core logics in platforms

The proliferation of platform discourse has not helped form a consensus regarding the nature of the concept. However, when the different approaches to platform concept are viewed from the perspective of the core logics of strategy (Sambamurthy *et al.,* 2003; Eisenhardt and Sull, 2001; Lengnick-Hall and Wolff, 1999), the variety of perspectives begin to settle into a clearer continuum. There seems to be divergence among the different platform approaches especially at the level of epistemological assumptions. The conclusions of this analysis, as well as elaboration on the whole platform theory, are presented in Figure 1. On the vertical axis the platform types are set on a continuum according to their scale (i.e., stakeholder involvement). On the horizontal axis the platform types are categorized according to the core logic of strategy they primarily represent. The "inter-organizational" and "ecosystem" perspectives of organizational platforms (Ciborra, 1996; Kim and Kogut, 1996) (rightmost in the figure) have been added for completeness; however, thus far, they have gained only anecdotal support (Gulati *et al.,* 2012) in the platform literature.

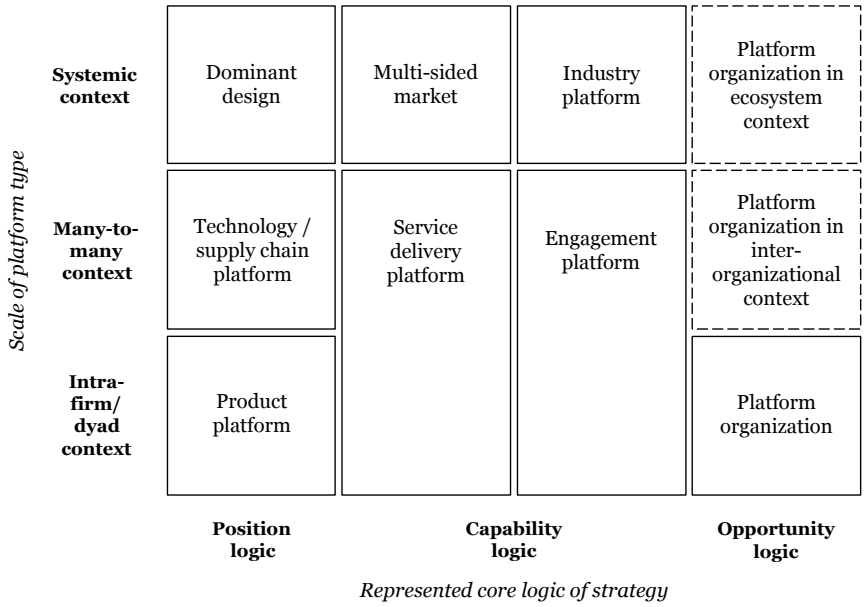

Figure 1. Different approaches to platforms.

Product, product family, and technological system perspectives of the product innovation research seem to emphasize control and integration (Meyer and

Utterback, 1993; Wheelwright and Clark, 1992). The integration of independent modules (in products and technologies) and architectural control (in product family, supply chain and dominant design level) define the strategic decisions and provide an equilibrium-seeking approach. This follows the positioning logic of strategy (Sambamurthy *et al.,* 2003; Eisenhardt and Sull, 2001) and emphasizes the mechanistic approach in terms of epistemological assumptions of strategy (Farjoun, 2002).

A step away from the purely mechanistic extreme involves leveraging a resource that the company possesses for an increased added-value. Here the platform's role is to coordinate transactions that benefit from the resource. Of the presented platform approaches, this applies to service (value-added) delivery platforms (Kowalkowski *et al.,* 2013; Brax and Jonsson, 2009). The resource that the additional value is provided to can be e.g. a product family, certain technology, or an installed base. If more scale is sought, the approach extends to the direction of being a mediator between different resources and actors, that is, a multi-sided market (Rochet and Tirole, 2006, 2003). Within a slight nudge towards the organic end of the epistemological assumption spectrum, lies the engagement platform approach (Breidbach *et al.*, 2014; Ramaswamy, 2009; Sawhney *et al.*, 2005) in which the dominative role of platform leader morphs to the role of federator, emphasizing influence over domination. The same applies to an industry platform (or ecosystem) view (Gawer, 2014), in which the federation is the only action possible for the platform operator due to the extensiveness of the network involved in the platform. In all of the mentioned approaches, the aim is to get scale to the resources that the platform operator possesses through formation of resource complementarities either within supplier-customer dyads, networks of firms, of across industries. Thus, these approaches can be said to use the capability-logic of strategy (Sambamurthy *et al.*, 2003; Eisenhardt and Sull, 2001; Lengnick-Hall and Wolff, 1999).

At the organic extreme end of the continuum of epistemological assumptions lies the organizational approach to the platforms. In organizational platforms, the aim is to foster responsiveness to a rapidly changing internal and external environment (Ciborra, 1996; Kim and Kogut, 1996). Kim and Kogut (1996) specifically position organizational platforms within the hypercompetition regime. The key action for the platform organization is to promote autonomous synergy seeking and adaptive capabilities. The strategic orientation is thus strongly organic at the epistemological level (Farjoun, 2002). However, the strategic core logic applied depends on the unit of analysis. Inside the organization and meta-organizations (Gulati *et al.*, 2012) leveraging the platform approach for similar intentions, the logic is of complexity (Lengnick-Hall and Wolff, 1999). However, between primarily competing systems, a guerilla logic is applied (Lengnick-Hall and Wolff, 1999). However, both approaches follow the logic of pursuing opportunities (Sambamurthy *et al.*, 2003; Eisenhardt and Sull, 2001).

2.4.3 Platforms in servitization research

Discussions of platforms have also been present in servitization research; however, these have appeared only sporadically. Furthermore, there are few studies in which servitization-related platforms are the primary target of analysis. Thus, the extant knowledge of platforms is, with some exceptions, based on anecdotal and descriptive examples from studies focusing on other topics. Nevertheless, the perspectives adopted by the servitization literature revolve around the use of platforms in service modularization (Pekkarinen and Ulkuniemi, 2008), service delivery (Kowalkowski *et al.,* 2013; Brax and Jonsson, 2009), and the orchestration of service innovation and provision networks (Gebauer *et al.*, 2013; Den Hertog *et al.,* 2010).

A logical progression from the product platform and product family heritage (Meyer and Utterback, 1993; Wheelwright and Clark, 1992) in the service direction has been the route of developing *modularized service platforms* (Pekkarinen and Ulkuniemi, 2008). From this perspective, a platform refers to a foundation with which the companies can develop, organize, and provide modularized service offerings.

Den Hertog *et al.* (2010), in turn, approach platforms from an *organizational perspective* (Ciborra, 1996; Kim and Kogut, 1996). The roles of core capabilities and platforms are emphasized, since these provide foundations for the solution offerings. Along a similar vein, Spring and Araujo (2013) mention that a manufacturer's factory is a collection of productive opportunities and knowledge resources that provide a platform for services.

Proceeding to the inter-organizational perspective, Palo and Tähtinen (2011) advance toward a platform domain by calling for new ways to share resources and cooperate in a service context. This thinking is also behind Gebauer *et al.*'s, (2013) views when they use the term of platform in referring to bases of actors potentially available to form solution offerings.

In the servitization literature, platforms are also discussed in the context of *service delivery and marketing* (Ramaswamy, 2009; Sawhney *et al.*, 2005). Brax and Jonsson (2009) and Kowalkowski *et al.* (2013) refer to service platforms when elaborating on the service provision, especially with integrated solutions. Kowalkowski *et al.* (2013) further analyzed two concrete roles of platforms in this setting. The first role is that of an operative platform, through which third parties can be involved in value creation. The second is that of a "customer-to-customer intermediary" (pp. 25), which enables independent transactions between the supply and demand side, changing the role of the service company to an intermediary. The second option clearly extends the discussion in the servitization domain toward a marketplace approach of platforms (Rochet and Tirole, 2006).

The research on platforms is still in its early phase within the servitization research community. The breadth of possible platform implementations is yet to be seen as the research progresses. However, it can already be seen that there is a movement from intra-firm platforms toward the leveraging of platforms in inter-firm contexts, especially in the areas of agile network orchestration and mediation.

The previous part of the theory section provided the background and motivation for primary research question number 2:

What is the role of platforms in leveraging service networks for strategic purposes?

3. Methodology

The purpose of the methodological section of this dissertation is to provide the required transparency regarding 1) the perspective on epistemological and ontological issues applied and 2) the methodological practices used in the study. Thus, the underlying assumptions affecting this research, as well as concrete decisions made when planning, conducting and reporting the research are described. The aim is to render the research contestable in proper context, as well as to define the level of explanatory power the study is able to provide.

This section is structured as follows. First the ontological and epistemological stance of this research is described. Then, the interests of the empirical approach are described. Furthermore, the specific concepts and constructs are introduced related to the research approach. Thirdly, the suitability of the chosen perspectives is assessed with regard to the field of strategy and service research. Finally, the companies that have informed this study, as well as the methodological processes used in this study are discussed.

3.1 Interrelation between ontological and epistemological foundations

This research employs a critical realist approach with regard to the philosophy of science. The critical realist approach does not refer to any particular methodology (Danemark *et al.*, 2002, p. 150), but aims to perform an “under laboring” function for many fields of research (Mutch, 2010, p. 508). Critical realism adopts an inter-relational view to ontology and epistemology (Miller and Tsang, 2011). It builds on realist ontology, adhering to the view that the world exists independent of researchers knowledge of it (Bhaskar, 2013; Miller and Tsang, 2011; Mutch, 2010). Critical realism posits that the world is differentiated and stratified, and the objects (such as organizations, people, relationships, attitudes, resources), as well as the structures they comprise, "have powers and liabilities capable of generating events" (Easton, 2010, p. 120). However these structures may not necessarily create regular patters of events, as they are influenced by other structures (Easton, 2010; Sayer, 1992). Thus, critical realism accepts that there is a “true world out there”, but at the same time, the approach recognizes the inherent complexity of the empirical phenomena.

In terms of epistemology, critical realism adopts a fallibilism approach (Bhaskar, 2013). This means that due to the complexity of the world, we can only gain provisional knowledge about reality "through our fallible conceptual apparatus" (Mutch, 2010, p. 507). According to this view, a researcher's knowledge is necessarily socially produced, and also human limitations impair the claims of objective knowledge (Miller and Tsang, 2011). The researcher's conceptions of the world are also always theory-laden (Easton, 2010; Sayer, 1992). However, critical realism accepts that although the knowledge researchers gather is incomplete, "ontological realism provides some hope of achieving greater precision over time through testing our theories" (Miller and Tsang, 2011, p. 153). By accepting the existence of reality independent of researchers and informants, "knowledge claims may be challenged and their merits assessed logically and empirically" (Miller and Tsang, 2011, p. 144). As Bhaskar (2013, p. 33) puts it, "To be a fallibilist about knowledge, it is necessary to be a realist about things."

3.2 Differentiation and stratification of reality

According to critical realism, the world is differentiated and stratified. It consists of events, objects, and object structures, (Sayer, 1992) and these are divided into three distinct stratum (or domains) of reality: real, actual, and empirical (Bhaskar, 2013; Easton, 2010). The real domain "is concerned with the generative mechanisms that produce actual events manifested in empirical sensations" (Mutch, 2010, p. 509). However, the term "mechanism" is problematic in the perspective of critical realism as the term refers to a clear structure of operation (Easton, 2010). On the contrary, critical realists are interested in the "power of extrinsic and intrinsic contingencies that lead to the correlation between observed phenomena" (Mir and Watson, 2001, p. 1171).

In an actual domain, mechanisms enable (or prevent) change and give rise to events. Events may or may not be experienced through direct and indirect observation (Miller and Tsang, 2011). Furthermore, the mechanisms can be interlinked and therefore enhance and suppress themselves. The mechanisms may exist even if there is no event in the actual and empirical domain (Tsang, 2006). Thus, the challenge for the researchers is to uncover the mechanisms and increase understanding of the phenomena under study. Although the results gathered from the empirical level are always provisional, they can be an important part of the analysis (Mutch, 2010).

3.3 Retroduction

The described interdependent approach toward ontology and epistemology, as well as fundamental level goal of progressing toward "truth" poses important prerequisites for research design. From the perspective of critical realism, neither hypothetical-deduction oriented methods prescribed by the positivists, nor inductive methods suggested by interpretivists are sufficient alone

(Danemark *et al.*, 2002). Both approaches are needed in the research process that benefits from the temporal dimension, that is, the ever-continuing progress of gathering knowledge regarding empirical phenomena, exposing it to replicative processes, and continuously correcting it. The approach the critical realists are using is a combination of deduction and induction, and can be labeled "retroduction". Retroduction is defined as a "mode of inference in which events are explained by postulating (and identifying) mechanisms which are capable of producing them" (Sayer, 1992, p. 107). The term retroduction is not very well established in the management research. Instead, the term "abduction" is used when referring to the systematic combination of deductive and inductive approaches (Dubois and Gadde, 2002). The methodological discourse converges to the argument that retroduction and abduction are interchangeable terms (Chamberlain, 2006; Richardsson and Kramer, 2006; Chiasson, 2005). To maintain methodological clarity, this study adheres to Easton's (2010) view of abduction as a practical form of retroduction, "appropriate for case research" (Easton, 2010, p. 123).

3.4 Motivation for critical realism in this study

In the social sciences, including management and strategy domains, research is very diverse in terms of its philosophical approaches. Although there is a lively debate on the most suitable theoretical perspectives, the management and strategy literature asserts that phenomena can be described with many research approaches (Miller and Tsang, 2011), and different theories may coexist (Rajagopalan and Spreitzer, 1997). Multiple theoretical lenses, as well as diverse ontological and epistemological foundations, and especially the conflicts between them, are seen as catalysts for new theory development, providing novel explanations for management related phenomena (Miller and Tsang, 2011).

However, different theoretical approaches are suitable to different contextual settings of the research. For this study, the critical realist stance was applied intentionally over e.g. positivist, constructivist and pragmatic approaches. The constructivist perspective (Mir and Watson, 2000) was rejected due to the overwhelmingly multi-faceted, and multi-layered nature of the discourse on the concept of digitalization. The context-driven aspect of the constructivist approach is powerful in terms of exploring new strategic concepts (Mir and Watson, 2000). However, the pervasiveness of digitalization (Yoo *et al.*, 2012), and the proliferation of the platform concept (Thomas *et al.,* 2014) provide the researchers so much different contextual data that the constructivist approach easily leads to an exceedingly complex picture of the phenomena, without usable conclusions. This is an important restriction: critical realism does not aim for a generative focus of a constructive approach. In turn, the aim of critical realism is, despite the fallibilist stance on epistemological questions, to strive for formalizations of the underlying reality, especially taking into account its layered nature (Mir and Watson, 2000).

To focus on the practical relevance and normative stance, it would have been possible to adopt a pragmatic approach to research (Powell, 2002). However, the disruptive nature of the empirical phenomenon could, with the pragmatic approach, possibly lead to bias toward an incremental and linear approach in terms of contributions. As seen in the literature review section of this study, the existing belief systems are relatively strong in the empirical field of manufacturing. This legacy may cause inertia for disruptive change. The intention of this statement is not to say that the change in servitization must necessarily be disruptive in all cases. However, the argument is that a pragmatic stance might prefer incremental over radical approach due to the inertia, and also due to the latency of seeing practical results for radical approaches.

A positivist approach (Wicks and Freeman, 1998; Donaldson, 1996) was not adopted because of the emergent phase of both construct development as well as theory building on the research area. In the areas of strategic management, and especially in the field of servitization, there is not a "grand theory" that would provide researchers the constructs to assess the reality with a positivist stance. It is also of specific importance that the expanding openness of service networks is making it increasingly complex to follow the “closed system” emphasis that is after all embedded in a positivist approach. The change from dyadic to many-to-many relationships in service networks may make it increasingly difficult to assess the complex reality with a positivist stance, especially if the approach is more on the dogmatic end of the spectrum. Thus, it seems that the empirical context itself also calls for a more “critical” approach to realism.

3.5 Materialization of critical realism in this study

Critical realism does not dictate any specific research method. The imperative is that the chosen method is compatible with the nature of the studied phenomenon. A distinction is, however, made with extensive and intensive research methods. The former refers to large-scale horizontal studies searching for regularities and patterns, while taking entity categories as given. The latter, in turn, takes a vertical focus and focuses on causal relationships of individual groups (Easton, 2010; Sayer, 1992) - and is more compatible with the approach of critical realism.

The empirical articles included in this dissertation strongly take an intensive approach. However, the study starts with a systematically reviewed and defined theoretical domain, in order to clearly define the area of study (Easton, 2010). In the following section, the research design of this study is presented in detail. First, the methodology of the systematic literature review reported in article one (Eloranta and Turunen, 2015a) is presented. Then, the focus shifts to individual empirical articles.

3.5.1 Systematic literature review

A systematic literature review reported in article one (Eloranta and Turunen, 2015a) provided the theoretical background for the empirical studies of this dissertation. The review aimed to analyze the existing literature on servitization from the perspective of strategic management, especially from the stance of how servitization is used to gain and sustain competitive advantage. Competitive forces (Porter, 1980), the RBV (Barney, 1991), dynamic capabilities (Teece, 2007) and the relational view (Dyer and Singh, 1998) were selected as strategic management frameworks to be used in the review. Further elaboration regarding these frameworks was provided in the theoretical background section of this study.

The literature review was conducted in the following stages. First, a high number of terms associated with the phenomena of manufacturers moving into services were identified. The most appropriate ones were selected, according to their popularity and theoretical legacy. "Servitization", "service infusion", "service orientation", "service addition", "service-driven manufacturing" as well as different versions of the term "solution" were the ones chosen. Then, the Thomson Reuters Web of Science (WOS) and SciVerse Scopus search tools were used to gather a set of articles matching with the selected terms. According to the research focus of the literature study, the results were limited to also match either of the keywords "competitive advantage" or "strategy". Focus was also limited to journal articles only. This decision was made to maintain the rigor of the review.

In order to verify the completeness of the result set, several methods were used. Additional searches were performed in the most popular outlets identified in the WOS and Scopus results. This was done because at the time the literature searches were done, the outlet-specific tools provided more detailed results than the general search engines. The outlets to which these additional queries were targeted, were Industrial Marketing Management, Journal of Service Management and International Journal of Production Management. Thereafter, the results of the literature searches were compared to the existing literature reviews on servitization (Lightfoot *et al.*, 2013; Baines *et al.*, 2009). Ten strategy-related articles were identified as missing from the dataset and these were added. In order to verify that the so-called seminal articles are included in the review, it was also determined which articles the servitization writings were referring to when defining the servitization phenomenon. Three articles were added (Oliva and Kallenberg, 2003; Vandermerwe and Rada, 1988; Wise and Baumgartner, 1999). Finally, the first article rigorously addressing the connection of strategy and servitization (Matthyssens and Vandenbempt, 1998) was added to the dataset. After completing all these stages, the entire dataset consisted of 79 articles.

After the searches and verifications, the content of the literature was analyzed as follows. The articles were first read in full. Strategy-related constructs and actions related to seeking competitive advantage with servitization were identified. The searched constructs included: 1) industry

and offering (market forces), 2) resources and capabilities (RBV), 3) capabilities that build competencies, promoting strategic flexibility (dynamic capabilities), and 4) relationships between actors (relational view). The searched strategic actions were, 1) positioning in industries and differentiating the offering (market forces), 2) controlling and protecting resources and capabilities (RBV), 3) developing and reconfiguring internal and external competencies and resources to address rapidly changing environments (dynamic capabilities), and 4) leveraging idiosyncratic inter-firm linkages and sharing resources (relational view). The analysis resulted in a categorization of servitization articles according to the strategic framework used, thus providing the foundation for the identification of dominant themes in the strategy-related servitization literature.

3.5.2 Empirical studies

The empirical studies included in this dissertation employ qualitative multi-case study approaches (Yin, 2009). This approach was selected because the research area is still emerging; the phenomena studied are conceptually vague, and research questions are novel – thus explorative research is needed (Yin, 2009; Eisenhardt, 1989). The phenomena had to be studied in their natural context as deep understanding and great detail was needed for theoretical contributions (Eisenhardt and Graebner, 2007; Meredith, 1998). A high number of cases were preferred in many studies as it allows comparison (Eisenhardt, 1989).

Sampling. Theoretical sampling was used in the studies to select the cases (Yin, 2009; Eisenhardt, 1989; Miles and Huberman, 1984). Thus, sampling was done according to the "basis of concepts in order to further develop those concepts" (Corbin and Strauss, 2014, p. 141). In the study reported by article two (Finne *et al.*, 2015), the sampling criteria used was related to the network power sources used, company success (based on public reports), the case company's position in the supply network, and offering type. In research reported in article three (Turunen *et al.*, 2015), sampling criteria were set to focus on companies without manufacturing industry -related path dependencies: offering type and company involvement in manufacturing industry was used. In regard to the study of article four (Eloranta and Turunen, 2015b), sampling criteria revolve around a company being in the manufacturing industry, aiming to provide industrial services in inter-firm networks, and referring its orchestration strategies with the term platform or aiming towards platforms in network organizing. In the research related to article five (Eloranta *et al.*, in review) case selection was led by the theoretical interest toward companies that face a high level of commoditization toward their product but face difficulties in servitization as they have no fleet to provide services to. In this study, several companies operating in the industrial networks of the selected focal companies were also included in the cases to obtain a more through representation of the phenomenon under investigation. Table 5 shows the list of the companies investigated in this study.

Table 5. Companies in cases.

Company	Industry	Offering	Informants	No. of interviews	In article
TechProjects	Multiple (e.g., metals, mining, pulp & paper)	Products, services, and technologies related to many industries.	Managers, specialists. (Suppliers and customers).	11(+8)	#2
RoofCo	Construction	Installation services together with the company's own necessary components, based on technology it has developed.	Directors, managers, specialists. (Customers).	9(+6)	#2, #4
ComCo	Supplies for many industries (e.g., foods, metals, logistics)	Specialized technology and transactional services. Products are built with standard technological components.	Directors, managers. (Partners).	6(+12)	#2
ProsCo	Pulp and Paper	Wide selection of products, services, and technologies.	Managers, specialists.	17	#2
MinCo	Mining and Construction	Wide selection of products, services, and technologies related to mining.	Managers, specialists. (Suppliers).	12(+6)	#2
Tech-Assemblies	Multiple (e.g., manufacturing of industrial equipment)	Installation services together with the company's own necessary components, based on technology it has developed.	Managers. (Partners).	10(+5)	#2
MarineCo	Marine technologies	Components, services, and automation systems.	Vice president, directors.	6	#4
LogisticsCo	Logistics solutions	Intelligent material-handling solutions and services.	Managers, field service personnel.	14	#4

MaterialCo (in article #4) ConstructionCo (in article #5)	Building construction	Materials and components for construction applications.	Senior vice presidents, vice presidents, managers, directors.	16	#4, #5
EngineeringCo	Construction	Material items, components, and systems.	Directors, managers.	5	#5
Companies I-IX in Construction-Co's / MaterialCo's industrial network. (Six of companies labeled A-G in article #3).	Construction ICT, design, building automation, security	Information-intensive products and services.	CEOs, managers.	10	#5 (all) #3 (sub-set of six com-pa-nies)
Companies A-D in EngineeringCo's industry network	Design, ICT, consulting	Information-intensive products and services.	Directors, managers, experts.	4	#5

Data gathering. Data were gathered primarily with semi-structured interviews (Patton, 1990) and secondarily from company material (annual reports, product material, white papers, internal memos, IT systems and company presentations). The selection of the data gathering methods was done with the intention to investigate rather unexplored phenomena. The flexibility of the interview method allowed including topics that would have been otherwise missed, as well as to further investigate themes that emerged during the interviews (Yin, 2009). Interview data were tape-recorded in the majority of the interviews. When recording was not possible, detailed notes were taken. Using both interview data and company material provided the possibilities of triangulation (Diefenbach, 2009).

In selecting the informants, the guiding principle was to gather data from many diverse sources as well as levels of organizations in order to gain detailed insights into the studied phenomena (Wacker, 1998). The informants included front-line workers, managers, directors, vice presidents, CTOs, CEOs, and for some companies also suppliers, partners and customers. Details of the interviewed positions in individual studies are shown in Table 6.

The interview themes were selected based on the theoretical interest. In article two (Finne et al., 2015), questions were about value offering, power focus, demand and supply network, power related risks, power-aiming actions and the established power position in inter-firm networks. Article three (Turunen *et al.*, 2015) focused on the role of information in a company's business, information collection and processing, the strategic role of information, other sources of competitive advantage and protection of information-related assets. In article four (Eloranta and Turunen, 2015b), the topics revolved around the definition of platform strategies, the purpose of a

platform approach, benefits of platforms, platform-related plans and actor involvement in platforms. The study of article five (Eloranta *et al.*, in review) explored the themes of service operations in the company, relationships and competition of the company's industry, strategic challenges, and the potential of platforms. In all studies, the interviews were continued until the information informants gave became repetitive (Corbin and Strauss, 2014)

Analysis. The data were first analyzed for individual cases to distinguish company-specific findings. Then the data were elaborated on at the cross-case level in order to identify variations and recurring phenomena. In the analysis of the data, a thematic approach was used (Fereday and Muir-Cochrane, 2008). The aim was to find patterns that reflected the theoretical constructs identified. During the analysis, different sources of qualitative data were used (Yin, 2009). Adhering to the abductive approach (Dubois and Gadde, 2002) of the study, the interplay of empirical data and theoretical background was also prevalent in the analysis phases. In the studies reported in articles two (Finne *et al.*, 2015), four (Eloranta and Turunen, 2015b) and five (Eloranta *et al.*, in review), the results of the analysis were discussed with the key informants of the cases in order to verify the findings. The summary regarding cases, data and analysis is provided in Table 6.

Table 6. Cases and individual articles.

	Article 2	**Article 3**	**Article 4**	**Article 5**
Unit of analysis	Company division	Company	Company	Focal company and its industry network
Number of cases	6	6	4	2
Sampling approach	Theoretical. Criteria: 1) network power sources used, 2) company success (based on public reports), 3) company's position in the supply network, 4) and offering type.	Theoretical. Criteria: focus on companies without manufacturing -industry-related path dependencies: offering type and company involvement in manufacturing industry was used.	Theoretical. Criteria: company must 1) be in the manufacturing industry, 2) aiming to provide industrial services in inter-firm networks, 3) and referring its orchestration strategies with the term platform or aiming towards platforms in network organizing.	Theoretical: Criteria: 1) high level of commoditization toward their product but 2) face difficulties in servitization as they have no fleet to provide services to.

Companies involved (Acronyms)	ProsCo, MinCo, Tech-Assemblies, TechProjects, RoofCo, ComCo	A, B, C, D, E, F, G (corresponds to cases I, II, III, etc. of article #5)	MarineCo, RoofCo, LogisticsCo, MaterialCo	Focal company ConstructionCo (MaterialCo in article #4) and companies I-IX in focal company's industrial network. Focal company EngineeringCo and companies A, B, C and D in focal company's industrial network. (do not refer to A-G in article #3)
Data collection method	Primary: semi-structured interviews. Secondary: company materials.	Semi-structured interviews.	Semi-structured interviews.	Primary: semi-structured interviews. Secondary: company materials.
Collected data (themes)	1) Value offering, 2) power focus, demand and supply network, 3) power related risks, 4) power-aiming actions and 5) the established power position in inter-firm networks.	1) The role of information in a company's business, 2) information collection and processing, 3) the strategic role of information, 4) other sources of competitive advantage and 5) protection of information-related assets	1) The definition of platform strategies, 2) the purpose of a platform approach, 3) benefits of platforms, 4) platform-related plans and 5) actor involvement in platforms	1) Service operations in the company, 2) relationships and competition in the company's industry, 3) strategic challenges, and 4) the potential of platforms.
Total no. of interviews	102	6	42	34
Analysis method	Thematic	Thematic	Thematic	Thematic

3.6 Limitations

When analyzing, interpreting, and generalizing the results of this study, it is important to acknowledge its limitations. The biggest concerns are related to the transferability (Lincoln and Guba, 1985) of the results. During the time this research was conducted (i.e., 2012 to 2015), manufacturing industries were facing significant challenges related to digitalization. In addition, the commoditization in product business and the transition toward service business had not been resolved within manufacturing organizations. Thus, the target industry was facing two enormous and simultaneous transformations,

which naturally affected related research. In many cases, the research had to rely on cross-sectional data regarding aims and plans, since longitudinal data on working solutions were not available. Therefore, the setting allowed only an explorative approach aiming to make sense of the dynamically changing situation in its natural context. For this reason, the majority of the results rely primarily on informants' subjective statements, and a significant number of factors (e.g., unclear and inconsistent logic and vague term usage) may have affected the informant-originated data. The generalizability of the results of this study must be interpreted through the lens of these contextual factors.

The challenges related to transferability have been compensated in the areas of dependability and credibility (Lincoln and Guba, 1985). With regard to dependability, the number of cases and informants involved in this study is fairly high, and the findings have been triangulated with a wide variety of company materials. In terms of credibility, the results published in the articles have been discussed extensively within the key case companies, as well as more broadly in service-driven manufacturing- and platform-related interest groups consisting of industry professionals and academics. However, neither the triangulation nor the discussions have been systematic; thus, they address the issues of dependability and credibility only partially.

The study's confirmability (Lincoln and Guba, 1985) is closely related to the discourse regarding the chosen research approach of critical realism. According to this approach, not only is the researcher's knowledge socially produced (Miller and Tsang, 2011), but his or her conceptions of the world are theory-laden (Easton, 2010; Sayer, 1992). Thus, the researcher's results always mirror, to some extent, the existing theory-based assumptions, especially in studies exploring an emergent phenomenon. In this study, this was the reason why the chosen research approach was described in relatively detailed way. This provides the required transparency to the role of the researcher in the study.

4. Results

In this section, the results of the study are presented. First, research question one is addressed: *How do service-driven manufacturers attempt to benefit strategically from inter-firm networks?* The issue is further analyzed with two sub-questions: 1) *How do providers of industrial services strive to attain strategic power in their respective solution networks,* and 2) *How do the new ventures in the industrial service business see the strategic role of possessing and sharing information resources in inter-firm networks?*

After elaborating on the first questions, the focus shifts more specifically to the role of platforms in the service networks context. Findings related to research question two are presented: *What is the role of platforms in leveraging service networks for strategic purposes?* The structure of the findings section is illustrated in Figure 2.

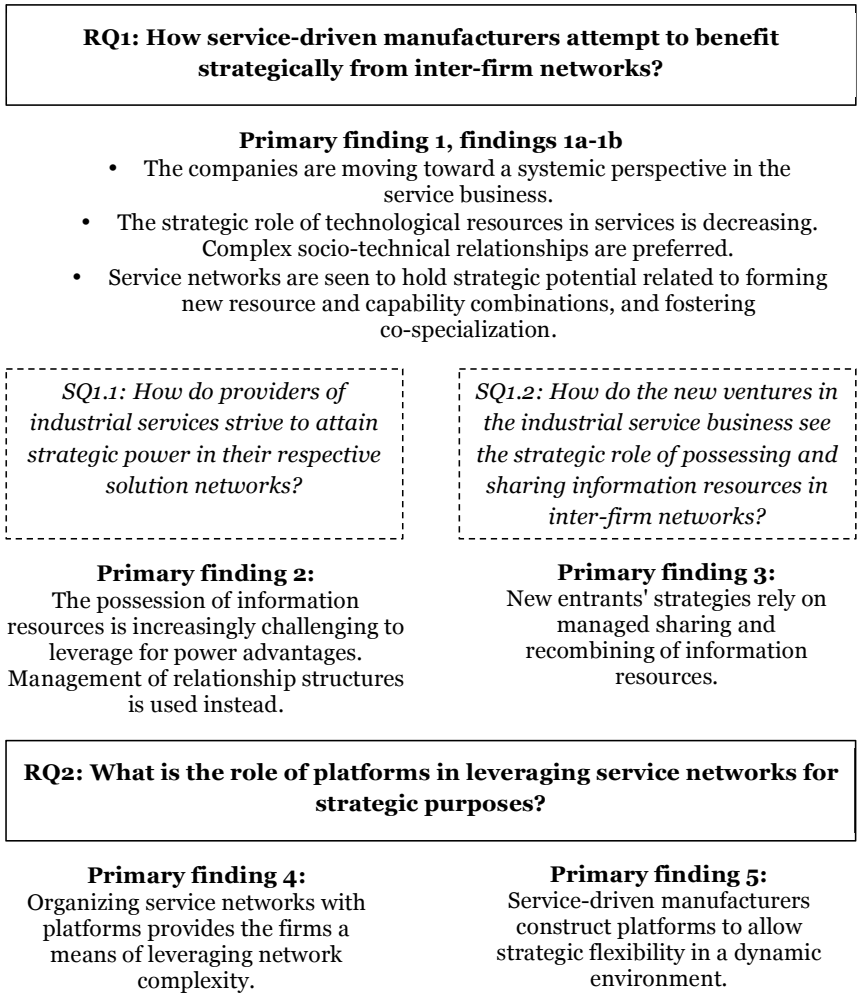

Figure 2. Summarizing the findings.

4.1 Findings related to benefiting strategically from inter-firm networks

Research question 1: How do service-driven manufacturers attempt to benefit strategically from inter-firm networks?

The systematic literature review on servitization as a strategy (Eloranta and Turunen, 2015a) functions as a theoretical background to answer research question 1. The primary finding of the review is that the companies are progressing toward leveraging the inter-firm networks strategically by adopting a *systemic perspective to the service business*. A solution business that has been dyad-dominant is now focused on many-to-many relationships. The socio-technical systems involve organizations, people, products, resources, and capabilities. The motivation behind a systemic focus is that the

systemic relationships between many value co-creating actors are more complex to imitate than those involving just a provider and customer. The shortcoming of this perspective is that the orchestration of such networks is challenging. Therefore, new structures for organizing the systems are needed, with special emphasis on low transaction and search costs. In addition, new relational capabilities are required due to the volatility of the relationship structures.

> **Primary finding 1: Companies are moving toward a systemic perspective in the service business.**

The literature study also shows that the strategic role of technological resources (installed-base, installed-base information, product information, and technological expertise) in solution business is decreasing. The reason for this is that *technology resources are increasingly vulnerable to competitive threats*. Therefore, there is movement toward forming complex socio-technical relationships. The change has been prevalent for some time in basic services, as the technological resources have been relatively simple to imitate in that context. However, now more advanced services are under the same pressures.

> Finding 1a: The strategic role of technological resources in services is decreasing. Complex socio-technical relationships are preferred.

There is also anecdotal evidence of increasing resource and capability specialization in service networks. This provides possibilities to form novel asset *combinations*. Internalization and externalization opportunities of resources and capabilities, as well as potential for *co-specialization* between the actors have increased. This suggests that service networks increasingly hold potential for parties that can master the network orchestration processes in inter-organizational level. Digitalization is helping to form these processes and structures.

> Finding 1b: Service networks are seen to hold strategic potential related to forming new resource and capability combinations, and fostering co-specialization.

Sub-question 1.1: How do providers of industrial services strive to attain strategic power in their respective solution networks?

The results of the second article (Finne *et al.,* 2015) show how the power sources of integrators and suppliers of integrated solutions are affected on three levels: organization, relationship, and network. The findings indicate that not only integrators but also suppliers of integrated solutions can achieve structurally powerful network positions by skillfully focusing their development efforts on fostering the power source complementarities. The integrators and suppliers have different power sources, but what is common is

that information resources are increasingly challenging to use for power purposes. Instead, the management of relationship structures is emphasized.

> **Primary finding 2: The possession of information resources is increasingly challenging to leverage for power advantages. Management of relationship structures is used instead.**

Adhering to the extant literature, the findings reveal that the solution integrators build long-term relationships with their customers and try to use information resources in order to gain power-advantage in their networks. However, confronted with existing views, the integrators find it increasingly challenging to gain the desired power advantage through information resources. Information gathering and protecting have priority in the integrators' agenda, and they try to block suppliers' access to the information sources. However, according to case evidence, the integrators' efforts do not result in satisfactory results. Suppliers are able to construct systems that could circumvent the integrators' resource-position barriers.

The findings indicate that in order to cope with the changing situation, the integrators are moving toward other power sources. The power source of interconnection is emphasized. Building mutually beneficial relationships with both the customer and suppliers is preferred over exclusive access to relationship-related resources. However, the integrators still try to use some command-and-control based mechanisms toward all stakeholders. Contractual obligations and demand-share allocation are used extensively.

> Finding 2a: Solution integrators attempt to mitigate suppliers' actions to increase their power through contractual obligations, allocating customer demand between different suppliers, and/or, fostering mutually beneficial business in the supplier network.

The evidence shows that the suppliers are also able to accumulate inter-organizational power. The suppliers aim to build relationships through a specialized offering applicable to multiple industries and applications. This enables them to balance the power disadvantages caused by the downstream network position by increasing the number of alternative delivery channels. However, the diversity of technological solutions requires an extensive partner network to deliver the services. The suppliers find it challenging to build these networks.

The primary implication of this is that the power structures in the solution provision do not necessarily follow the logic in which the companies are organized in the supply chains. Both integrators and suppliers can attain structurally powerful positions in their respective networks. The democratized access to customer information through new technologies seems to be a key factor enabling this. Both integrators and suppliers can get real time feedback regarding the use value of their contributions. The integrators' efforts are coordinated to make the stakeholders relationships more extensive, whereas suppliers try to expand their network with regard to delivery channels. The

player with the greatest advantage in this game seems to be the party that can most efficiently build relationships in the industry networks.

> Finding 2b: Suppliers of integrated solutions can achieve structural power through a specialized offering applicable in multiple industries and applications. However, this requires specialized capabilities.

> Finding 2c: In solution networks, the strategic power structures do not follow the structures of supply chains. The democratized access to customer information seems to be driving this change.

Sub-question 1.2: How do the new ventures in the industrial service business see the strategic role of possessing and sharing information resources in inter-firm networks?

In article three (Turunen *et al.*, 2015) the strategic motivations with regard to resource sharing versus possession of the actors in the industrial services business were assessed. The case data were collected from new ventures. Thereby the biases that might result from incumbent companies' possible strategic path dependencies can be avoided. The findings indicate that the new ventures' strategies rely on information sharing, collaboration and continuous learning. Instead of focusing on information resource possession, as many extant servitization studies prescribe for acquiring strategic benefits, case companies are preferring volume over data access exclusivity, combining different and novel sources of data, and developing capabilities with shared data. According to the case evidence, sharing-based strategies foster combinatory innovations, potentially leading to co-specialization and even shared competitive advantages.

> **Primary finding 3: New entrants' strategies rely on managed sharing and recombining of information resources.**

Furthermore, the companies do not perceive that data possession and exclusive access provides any kind of a competitive advantage – the data merely creates a market in which the companies can operate. What is prioritized is data volume, even if it requires sacrificing information resource monopoly. In practice, this means sharing data with different actors in order to scale up the amount of data that can be accessed.

> Finding 3a: Mere exclusive access to data is not perceived as a source of competitive advantage. Companies prefer data volume to exclusive access.

Contradicting many servitization studies, the service provider companies do not question the customers' ownership of the data collected with the provider's solution. The data ownership issue has traditionally been an important and unresolved question in the servitization domain. Furthermore, according to the evidence, the customers of the case companies are willing to provide access

to information resources in their possession. The reason for this is that the customers lack capabilities to gain insights from the data. Therefore, the data ownership question loses its relevance. There is also anecdotal evidence that the suppliers want to engage in non-opportunistic strategies with regard to using shared information resources, in order to gain full benefits from the increasing data access. Thus, the actors strive for win-win scenarios.

> Finding 3b: The customer's data ownership is not challenged.
>
> Finding 3c: Customers lack knowledge to gain insights from data, so they share the data with suppliers.

New entrants' perspective to information resources opens an interesting situation with regard to the resource-dependencies between the suppliers and customers, and also among the collaborating companies in the industry. Actors tend to combine diverse sources of shared of data and thereby gain unique insights that promote their capability development. With the improved capabilities, the companies can further enhance their information resource related actions. Thus, a beneficial cycle is formed. However, the firms become dependent on each other resource-wise.

> Finding 3d: Service providers develop their capabilities with shared data. Capability building is enhanced by combining diverse sources of data in novel ways.

4.2 Findings related to the strategic role of platforms in service networks

Research question 2: What is the role of platforms in leveraging service networks for strategic purposes?

The second primary research question is informed by articles four (Eloranta and Turunen, 2015b) and five (Eloranta *et al.,* in review). Article four provides results regarding leveraging service networks complexities with platforms. Article five, in turn, shows how platforms can be used to allow strategic flexibility and pursue strategic opportunities in service networks.

4.2.1 Platforms and complexity of service networks

The research reported in article four (Eloranta and Turunen, 2015b) shows how platform approaches have been used and could be used to *leverage inherent complexity of the service networks*. Current approaches in platform discourse have focused on controlling supply networks and reducing their complexity. The case companies of article four seem to favor more flexible approaches and intentionally embrace the complexity of network structures. The reason for this is that the companies perceive the complexity as something

to be leveraged. The endeavors of managing and reducing complexity might be reaching their limits, due to the increasing complexity of the market environment. For a long time, servitizing manufacturers have tried to address the challenges of complex customer needs by developing service networks. However, integrated solutions and service partnering approaches may be too inflexible in an exceedingly complex environment. Platform approaches may offer the required agility and flexibility, yet preserving enough possibilities to guide value creation and capture.

Primary finding 4: Organizing service networks with platforms provides firms a means of leveraging network complexity.

The findings reveal five ways in which the case companies aim to benefit from the complexity involved in the networked service provision. The mechanisms are summarized in Table 7. First, the platforms enable the companies to extend the network orchestrators' reach in complex supply networks. Platforms gather together companies, individuals, and even technological machinery from inside and outside the traditional supply networks. The platform acts as an environment in which the intensified collaboration could take place. It also appears that one of the most important attractors through which platforms gain usage in service networks was in their ability to facilitate in communicating shared interests between the parties.

Finding 4a: Platforms extend the orchestrator's reach in complex supply networks.

The platforms also seem to assist the orchestrator companies in forming new resource and capability combinations in the extended supply base. The access to actors' resources is perceived to have a role in enabling the formation of novel offerings and value constellations. Many case companies agree that platforms actually make it possible to create services that no company alone could create. The orchestrator's role in these platforms seems to be related to 1) constructing flexible enough infrastructure through which the parties could connect, 2) providing trust to previously unknown parties to help them connect, and in some cases 3) assisting actors in breaking existing industry boundaries.

Finding 4b: With platforms, companies can leverage a complex supply base by forming new resource and capability combinations.

Fostering social embeddedness and relational capital is also inherent in platforms. According to the case evidence, the network formation facilitation features of platforms make it possible to implement common processes, build social structures, and blur organizational boundaries between the suppliers and customers. These features seem to have a role in encouraging the actors to allow other parties to access their proprietary resources.

> Finding 4c: Platforms help in using diverse relationships to strengthen relational processes and creating social embeddedness.

Platform implementations also seem to offer orchestrators ways to benefit from the diverse contextual usage scenarios of different customers. The actor-specific value drivers as well as usage scenarios can be accessed. As majority of the communications are coordinated through the platform, the parties become aware of each individual's intrinsic experiences. This is especially important when there are many parties involved in the service provision. By organizing the operations through a platform, knowledge can be obtained on individual customer's contextual settings even when the majority of the service parts are provided by the third parties.

> Finding 4d: With platforms, diverse contextual factors (e.g. value drivers, experiences, usage contexts) of actors can be recognized.

The roles of different companies frequently change in supply networks. Platforms are perceived to have a role in benefiting from actor multiplicity and volatility. With platforms, the companies are actually restructuring the competitive environment. In everyday practice, this is made possible by identifying and communicating the roles of actors, revealing potentially opportunistic behavior among them and preventing undesirable power balance changes.

> Finding 4e: Platforms aid in restructuring the competition by leveraging the changing actor roles.

Furthermore, according to findings of the cases, there seems to be differences in terms of how the complexity leveraging mechanisms are prioritized. The platforms seem to exhibit three distinct logics: connecting actors, sharing resources, and integrating systems. One of the logics prevails in the cases, while others play a lesser role. A primary difference between the logics is in the areas of openness and transparency, actor involvement, and control over the value creation and innovation. The logics and their connection to complexity leveraging mechanisms are illustrated in Table 7.

Table 7. Mechanisms for leveraging complexity with platforms.

Mechanism for leveraging complexity	Connecting actors logic	Sharing resources logic	Integrating systems logic
Extending the orchestrator's reach in complex supply networks	Gathering together diverse actors from the industry, supply network and inside the organizations	Attracting parties that see themselves as adversaries to join the platform.	Reaching actors within collaborating organizations' boundaries
Leveraging a complex supply base by forming new resource and capability combinations	Platform structure and interfaces enable connections between many different actors, providing opportunities for new value offerings	Encouraging actors to provide access to each other's proprietary resources to pass on greater value to the customer	(no significant empirical evidence)
Using diverse relationships to strengthen relational processes and create social embeddedness	Striving to be a social integrator (connection point for different actors)	Forming deeper social connections between actors and building trust between them	Embedding actors of collaborating organizations deeply in each other's operational processes
Recognizing the diverse contextual factors of actors	(no significant empirical evidence)	(no significant empirical evidence)	Channeling the service delivery and feedback processes through the platform and gaining information about use value and problems
Restructuring the competition by leveraging the changing actor roles	Synchronizing the interests of actors to reveal opportunism and even morphing their roles in favorable directions	The dangers of the unwanted changes in the actors' roles tackled with clear communication of the platform's vision	(no significant empirical evidence)

The first logic, connecting actors, provides the opportunities for identifying potential collaborators and initiating co-operation. The key challenge of this logic is in how to attract, find, and bridge the gaps in an actor's networks. In addition, synchronizing the interests of actors to reveal potential opportunism has an important role.

The second logic, based on sharing of resources, is about providing opportunities for further co-operation, and even creation of new markets. Exploring mutual benefits and facilitating the formation of new resource combinations is at the core of this logic. The actions usually involve disclosing proprietary resources to the parties involved in co-operation. This requires trust that the orchestrator can provide. In addition, firms must be given methods to influence the level of visibility they provide to their important assets. It seems that one of the key issues related to platforms operating with "sharing logic" is to control the level of actor role volatility: the

unpredictability of co-operation partners roles seem to inhibit the sharing actions.

Integrating systems is the third identified logic. In this setting, the challenges lie in creating an effective service delivery system. Building common processes, structures, and routines are the primary targets of the orchestrator. Interfacing and connecting human actors, technological machinery and intangible capabilities is the starting point of constructing integration platforms. Then, the challenges revolve around resource slack reduction and identification of control points for value creation and capture. An orchestrator company strives for a dominant position in the network, setting the rules for co-operation.

> Finding 4f: In service-driven manufacturing context, platforms differ in how they are constructed to create and capture value. The logics of connecting actors, sharing resources, and integrating systems can be identified.

4.2.2 Platforms and strategic opportunities

According to the results of the fifth study (Eloranta *et al.,* in review), service-driven manufacturers *construct platforms to allow strategic flexibility in dynamic environments*. This makes it possible to constantly pursue strategic opportunities. In the cases, platforms are perceived to 1) extend the physical product's capacity to produce new usage scenarios, 2) facilitate inter-firm information flows and gaining of collective benefits, and 3) create awareness of new value potentials regarding products. The findings imply that platforms enhance spontaneous cross-fertilizing of actors' resources with those of other actors in novel ways. It can be argued that platforms foster cospecialization in the case industry: systems of actors are enabled to gain mutual advantage from each other, yet being still adaptive to each agent's unique situation.

> **Primary finding 5: Service-driven manufacturers construct platforms to allow strategic flexibility in a dynamic environment.**

The findings reveal that the platforms are perceived to act as a structural bridge between tangible and intangible instances of the case industry's primary product. This implies that platforms seem to provide a way to merge a product's physical characteristics with its digital footprint. In the target industry, the physical characteristics of the product include e.g. form, weight, and length as well as standard-driven characteristics such as stiffness or resistance to wear and tear. The digital characteristics are related to the history of the product, audit trail, usage scenarios and e.g. specific settings to be used in the machinery working with the product. The result of combining these characteristic types is that the product becomes a "message carrier".

The case companies emphasize the role of the platform approach in this setting due to the challenges in adding digital features, e.g. memory, to the product. High temperatures and machining are involved in product processing, inhibiting the usage of complex electronics in the product level.

The case companies perceive that transforming the product to a form of a platform involving certain physical product marking technologies, cloud servers and application programming interfaces, can not only enable digital features, but make the digital aspect of the physical product more important, in terms of business, than the physical aspect.

With these endeavors, the companies are trying to transform their business away from the commoditized product markets, toward the direction of information-intensive businesses. Instead of enhancing the physical characteristics of the product, optimizing production processes or moving away from the product, new business opportunities are sought from designing new value potentials for the product. Thus, instead of total solutions, the design follows the paradigm of designing for (positive) incompleteness.

> Finding 5a: Platforms are constructed to enhance the physical product's capacity to produce new usage scenarios.

Platforms also have a role in organizing inter-organizational structures. By leveraging platform-induced product generativity, platforms are perceived to enable enhanced connectivity between many actors involved in the case industries. Information flow is seen to be facilitated between different companies, groups, and individuals. The companies in case contexts were at the time of our research primarily using their own resources to obtain information on e.g. product measurements, usage and processes. A common platform was sought for information sharing related to the whole product life cycle. The target use of the platform is not limited to optimization and automatization but also for identifying untapped innovation potential regarding the product and the accumulated data.

Thus, a combination of product and inter-organizational platform is formed in cases. While providing a common ground for co-operation regarding products, an important characteristic of the platform structure is perceived to be that the platform also provides the common vision for the meta-organization, as well as rules of cooperation. However, of equal importance is that the operational decisions are left open for the individual actor. Thus, the findings imply that the "semi-structural" nature of platforms enhances spontaneous cross-fertilizing of actors' resources with those of other actors in novel ways. Platforms are perceived to have potential to align the needs and requirements of different stakeholders and foster co-specialization.

> Finding 5b: Strategic opportunities are potentially pursued by facilitation of inter-firm information flows, enabled by the inter-organizational platform.

Platforms seem to have a role also in preventing suboptimization and fostering transparency between the actors involved in value creation and capture. The industry of the case companies exhibits a strong tendency to limit suppliers' abilities to differentiate. This has resulted in fragmentation of the goals of companies, further inhibiting the collective efficiency of the industry. By creating awareness of resource sharing potential inter-organizational

platforms are seen to have a role in shaking up and reconfiguring rigid industry structures. The agility of participation as well as transparency enables actors to see the value potential of novel collaboration scenarios.

However, according to the case evidence, sharing of information often happens only when the advantages of sharing can be understood beforehand. The role of platforms in cases is therefore to provide an environment in which novel information-driven solutions could be tried and tested, but also upscaled if needed. This dynamic process further emphasizes the need to include the rules and targets of co-operation to the core of the platform.

> Finding 5c: Platforms are perceived to provide awareness of new value potentials.

5. Discussion

The dominant finding of this research is that service-driven manufacturers are increasingly turning toward complex inter-firm networks as a source of competitive advantage. This implies that servitization research refocuses its interest from monolithic-firm dominated approaches toward the theories that explain competitive advantage through networks of companies (Eloranta and Turunen, 2015a). In particular, the dominance of e.g. RBV approaches (Barney, 1991) seems to be changing to the benefit of the dynamic capabilities view (Teece, 2007), as well as the relational view of strategy (Lavie, 2006; Dyer and Singh, 1998). Regarding dynamic capabilities, of special importance is the line of research adhering to the target of driving constant change (Eloranta and Turunen, 2015a; Schreyögg and Kliesch-Eberl, 2007; Eisenhardt and Martin, 2000).

The implications of this study are laid out as follows. First it is proposed that the digitalization and the dominant use of inter-firm networks set a baseline level for the openness of the manufacturers' service organizations. Theoretical contributions of this are highlighted. Thereafter, the theoretical discourse on platforms, as well as the platform related findings of this study, are viewed in with the perspective of increased openness. It is revealed that certain platform approaches should be prioritized in servitization. Finally, theoretical contributions regarding the platform discussion are concluded.

5.1 Open system paradigm as a precondition in servitization

The findings of this study seem to propose that digitalization-driven movement towards inter-firm networks in servitization sets a baseline for openness of service-driven manufacturer organizations. An open system allows interactions between its internal elements and the environment (Bertalanffy, 1969). In servitization, the open system thinking seems to be evolving from a theoretical paradigm to a precondition.

Digitalization and increasing network orientation seems to drive the service-driven manufacturing industry toward directions in which it is not up to the firms to strictly define the level of openness. Technological resources are increasingly vulnerable to imitation and competitive threats (Eloranta and Turunen, 2015a). New ventures do not perceive information-based resources as sources of competitive advantage, and promote resource sharing, and

recombination (Turunen *et al.,* 2015). Sources of strategic inter-organizational power are based not on resource-position barriers but building networking skills and capabilities (Finne *et al.,* 2015). Temporary barriers can still be built around important assets, but the obstacles are constantly under attack by the digitalization-enabled technologies, lowering the information asymmetries (Eloranta *et al.,* in review; Finne *et al.,* 2015; Turunen *et al.,* 2015). This has specific importance for digitalized service-driven manufacturers' strategy formation.

> Proposition 1: Driven by digitalization, strategic focus on inter-firm networks increases the baseline openness level of service-driven manufacturers' organizations.

The findings of this study show that the openness does not necessarily mean complete and vulnerable openness to all actors in service networks. Instead, the findings indicate how an open system imperative is materialized in diverse ways of value creation and capture, as well as different levels of resource access and coordination (Eloranta and Turunen, 2015b; Turunen *et al.*, 2015). Some sort of system boundaries are still strived for, whether they are set around the service provider and its client (Eloranta and Turunen, 2015b), the industry-wide network of firms, potential collaborators and groups of clients (Eloranta *et al.,* in review; Eloranta and Turunen, 2015b), or even firms competing with each other (Eloranta and Turunen, 2015b; Turunen *et al.,* 2015). However, the boundaries are in constant flux, and they cannot be precisely controlled (Eloranta and Turunen, 2015a, b). Therefore, the volatility of the systems must be accepted as a baseline condition, and attempts must be made to take benefit from it.

The resulting increased intertwining of actors' resources and capabilities in service networks provides many possibilities. By building value constellations, and using inter-firm resource complementarities, firms can overcome the challenges of a comprehensive transition toward customized value offerings (Eloranta and Turunen, 2015b). The networked model enables the servitization without too demanding intra-organizational operations, including resource and capability development. Therefore, accepting the openness as an imperative in the service business, the so-called service paradox (Gebauer *et al.*, 2005) could be addressed.

Furthermore, the openness is perceived to result in strategic benefits (Eloranta *et al.,* in review*;* Eloranta and Turunen, 2015b). An open system paradigm makes socio-technical systems increasingly intertwined, yet in a manner in which they can be influenced. This makes it possible to leverage intentionally embraced network complexity. Relational capital and socially complex hard-to-imitate systemic relationships are created, potentially leading to a competitive advantage (Eloranta and Turunen, 2015b).

Openness also facilitates the formation of adaptive inter-firm systems that assist in pursuing a constant stream of mutual business opportunities (Eloranta *et al.,* in review). The system can be engineered to include incompleteness by design, which in practice means designing hidden potential

for value (Eloranta *et al.,* in review; Garud *et al.*, 2008). As the evidence shows, even physical products may be added characteristics that allow the features of a digital innovation (Eloranta *et al.,* in review; Yoo *et al.,* 2012). This is perceived to lead to flexible action potentials of the products and systems, which increases "technology's overall capacity to produce unprompted change" (Eloranta *et al.,* in review; Yoo *et al.*, 2012; Zittrain, 2006). When these characteristics are used at the inter-organizational level to foster co-specialization, it is perceived that the system can better respond to dynamic competition (Eloranta *et al.,* in review; Brown and Eisenhardt, 1998).

> Proposition 2: Increased openness assists service-driven manufacturers in 1) addressing the service paradox, 2) turning complexity of the inter-firm networks into a competitive advantage, and 3) enhancing the responsiveness to dynamic competition.

5.1.1 Contributions

The presented conclusions are in line with the extant service marketing literature, arguing that an organization driven by the service offering is always operating as an open system, since the value is always co-created with the customer (Grönroos, 2008; Vargo and Lusch, 2004). The evidence also adheres to the view that despite the openness, certain access rights can be set in the system (Maglio and Spohrer, 2013). However the findings propose that appropriation of the access rights in a service-driven manufacturing domain becomes challenging as the value of simple resources depletes rapidly due to imitation, driven by digitalization (Eloranta and Turunen, 2015a). In addition, at least among the new ventures in an industrial services domain, the added-value of a service is increasingly based on an innovative combination of many resources of the network, enabled by reducing control of the resources (Turunen *et al.*, 2015). Furthermore, according to anecdotal evidence of this study (Eloranta *et al.,* in review), further the relational processes develop in service provision and innovation, the more the intangible resources of the value creating system must be exposed to the customer or partner.

The effects of this are emphasized as service-driven manufacturing extends the domain of co-creation reaching beyond the supplier-customer dyads (Eloranta and Turunen, 2015a). Access rights are even more challenging to enforce due to the complexity of the inter-firm networks (Eloranta and Turunen, 2015b). However, the more complexity there is, the more there is to be strategically leveraged (ibid). This is especially evident in settings that involve digital platforms (Eloranta *et al.,* in review; Eloranta and Turunen, 2015b). Furthermore, intensified and more transparent co-operation at the network level seems to provide prerequisites for pursuing strategic opportunities (Eloranta *et al.,* in review).

Therefore, business models of service-driven manufacturing should consider the approaches identified in the platform-related value appropriation discourse that balance between system openness and closeness (Thomas *et al.,* 2014; Boudreau, 2010). Due to the potentially increasing strategic benefits of

non-proprietary resource strategies (Eloranta *et al.,* in review; Eloranta and Turunen, 2015b; Turunen *et al.,* 2015), service-driven manufacturers must specifically ensure that they are attractive candidates for sharing-based exchange. In some cases, this may require a preference for market and industry benefits over own profit maximization.

The implications also pave the way to slightly higher contributions. Although the intention of this study is not to theorize the most viable approach for gaining and sustaining competitive advantage with servitization, the findings provide new elements for advancing this debate. As the literature review (Eloranta and Turunen, 2015a) shows, the majority of the servitization research has tried to justify the strategic role of servitization by emphasizing the inimitability of the service-enabled relationships. The strategic logic followed has primarily been based on the capability approach (Sambamurthy *et* al., 2003; Eisenhardt and Sull, 2001; Lengnick-Hall and Wolff, 1999). As mentioned, this approach reaches its boundary conditions as the baseline openness and competitive dynamism increases (D'Aveni *et al.,* 2010; Schreyögg and Kliesch-Ebel, 2007; Eisenhardt and Martin, 2000; D'Aveni, 1994). Following the argument, this study suggests a different approach of justifying service business from strategic perspective, based on the opportunity logic (Sambamurthy *et* al., 2003; Eisenhardt and Sull, 2001). Thus, it appears that the orientation toward customized value offerings (i.e. infusing services) provides the benefits of adapting to changing environmental conditions. The key enabler here is the increased customized offering. Moving into more standard or "productized" offerings, in turn, suppresses the strategic adaptability. Therefore, it is possible to suggest that the primary way servitization provides competitive advantage is that is offers more *possibilities to adapt to dynamic environments*. Along this line of thinking, service business does not primarily provide the means to maximize profits, but rather, the ability to survive and pursue strategic opportunities. The findings of this study cannot prove this argument, but the problematization potentially offers new avenues for service research.

5.2 The role of platforms in servitization

The movement towards networks in service-driven manufacturing (Eloranta and Turunen, 2015a) as well as the predominant openness of the service systems described above has interesting implications for the use of platforms in the servitization context. As stated in the theoretical section of this study, the platforms vary in their scale of stakeholder involvement (intra-firm/dyads, many-to-may relationships or system-wide approach), as well as in terms of how they can be divided between the strategic core logics of position, capability and opportunity (Sambamurthy *et al.,* 2003; Eisenhardt and Sull, 2001).

The straightforward implication of the increasing network focus on servitization (Eloranta and Turunen, 2015a) is that the use of platforms is focused on the ones that have more scale (more extensive stakeholder

involvement). Thus, internal platforms, as well as the ones that only focus on dyadic service relationships are of less importance than those having more scale in value creation and capture. In detail, the platform types having potentially less scale and thereby less priority as servitization progresses toward service networks are e.g. product platforms (if only used internally), dyadic service delivery platforms, as well as intra-organizational platforms. Correspondingly, supply chain platforms, service delivery and engagement platforms involving third parties, multi-sided markets, industry platforms as well as inter-organizational and ecosystem approaches to organizational platforms are of greater interest when approaching servitization from a platform perspective.

The implications of this study regarding the strategic logics in platforms are more far-reaching. The dominant argument based on the findings of this study is that the service-driven manufacturers are operating in an increasingly dynamic environment (Eloranta *et al.,* in review; Eloranta and Turunen, 2015a, b; Turunen *et al.,* 2015), that can even be characterized as high-velocity (Bourgeois and Eisenhardt, 1988) or hypercompetitive (Wiggins and Ruefli, 2005; D'Aveni, 1994). Therefore, it can be proposed that in terms of gaining competitive advantage, most viable platform strategies are those located closer to the opportunity logic (Sambamurthy *et al.,* 2003; Eisenhardt and Sull, 2001) end of the spectrum. These platform models include engagement platforms, industry platforms as well as inter-organizational and ecosystem approaches to organizational platforms. Correspondingly, in terms of platform orchestrator's approaches to the value creation, federation (Gawer, 2014) and fostering synergies, and co-specialization (Teece, 2007) are emphasized.

> Proposition 3: In the servitization context, the strategic emphasis should be in platforms that have a wide scale. In addition, the highest interest is directed to platforms that foster adaptation.

However, at the same time, the platform theory does not provide much evidence on value appropriation models of the platforms based on opportunity logics (Thomas *et al.,* 2014). Thus with regard to different platform models, the findings of this study are pointing towards disentangling with 1) adaptation and survivability related competitive advantage of the service-driven manufacturing firm or meta-organization (challenging value appropriation), and 2) growth and profit maximization-related competitive advantage (straight-forward value appropriation). This argument is illustrated in Figure 3 with regard to the platform models.

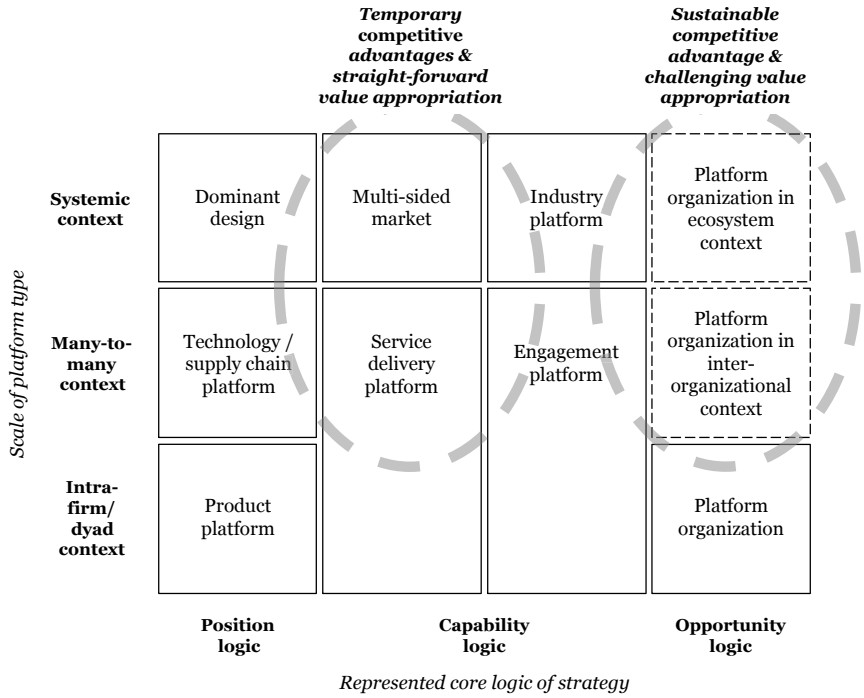

Figure 3. Different approaches to platforms, and potentials for competitive advantage and value appropriation.

The empirical data of this study cannot prove or falsify these arguments. However, according to the theory regarding the strategic core logics, strategic frameworks (Eloranta and Turunen, 2015a), as well as the case-originated results of this study (Eloranta *et al.,* in review; Eloranta and Turunen, 2015b; Finne *et al.,* 2015; Turunen *et al.,* 2015), it can be proposed that the competitive advantage related to growth and profit maximization may be of a more temporary nature than the competitive advantage based on adaptation and survival. If this proposition holds in future studies, it is a paradoxical situation for the service-driven manufacturers, as according to the theory these views cannot be combined in same organization due to the fundamental differences in their epistemological assumptions (Lengnick-Hall and Wolff, 1999). However, it might be that the fluidity of the platform structure, as well as its low transaction and search costs related to the resource and capability externalization, offer solutions to the dissonance that has for some time been elaborated in the discussion of organizational ambidexterity (March, 1991).

> Proposition 4: With regard to competitive advantage, i) adaptivity and survivability, and ii) growth and profit maximization approaches should be disentangled when planning platform strategies.

5.2.1 Contributions

The implications presented offer an important contribution to the servitization literature on platforms. As described in the theoretical section, the approaches toward platforms have been so far scattered in the servitization domain. The holistic framework presented initially in the theory section (Figure 1), and its further elaboration in the discussion part (Figure 3) with regard to the sustainability of the competitive advantage in servitization context, provides structure to the current and potentially also future discourse.

Of special importance in that framework is 1) the combination of the major platform models presented in various different disciplines to the same framework (not only at the research stream name level, but concrete platform type level), 2) demonstrating the scale axis (stakeholder involvement: dyad, many-to-many, systemic level) of different platform types, and 3) categorizing the platforms according to the underlying assumptions with regard to strategic decision making (position, capability, opportunity) (Sambamurthy *et al.,* 2003; Eisenhardt and Sull, 2001; Lengnick-Hall and Wolff, 1999), as well as related epistemological assumptions (Farjoun, 2002).

This discussion may also plant a seed for more abstract level contributions. It seems that extant platform discussion is not making a distinction between offering and organization related platforms. This makes platform research complicated. Viewed from the perspective of this study, it might be possible to shed some light on that discourse. Based on the framework presented in Figure 3, it is possible to make a distinction between *offering structure* and *organization structure* platforms. Product families, technological platforms and dominant designs are oriented to structure offerings that a party or parties provide for customers or partners. The value creation is largely pre-planned and adaptability to the environment is limited. On the contrary, different approaches to organizational platforms specify a semi-structure that allows actors to adaptively co-specialize together and recombine resources in value creation. The platform models between these extremes combine offering structure and organization structure views, such as Gawer (2014) mentioned when approaching industry platforms from a meta-organizational perspective. This proposed continuum between platforms-as offerings and platforms-as-organizations offers structure to the platform discussion, and perhaps even allows more cross-fertilization between different domains' of platforms research.

6. Conclusion

Manufacturing has been a cornerstone for the well-being and economic growth of the developed economies. Servitization and digitalization are now facilitating rapid changes in manufacturing industries. Many prevailing assumptions regarding preferred ways of organizing businesses seem to be changing, possibly irreversibly.

This research has used the strategy approach to inform manufacturing industries on managing the challenges and possibilities of the disruption. It was explored how service-driven manufacturers attempt to benefit strategically from inter-firm networks. Furthermore, the focus has been on identifying the role of platforms in leveraging service networks for strategic purposes. The findings of this study indicate how 1) service-driven manufacturers take a systemic perspective on the service business, 2) the role of resource-position barriers in sustaining competitive advantage decreases and 3) co-specialization in terms of resource usage increases. Furthermore, it was suggested that platforms 4) provide opportunities for complexity leverage in service networks and that platforms 5) can be used to pursue a constant stream of strategic opportunities.

The implication of these results is that the strategic focus on inter-firm networks increases the baseline level of openness among service-driven manufacturer organizations. Furthermore, increased openness assists service-driven manufacturers in 1) addressing the service-paradox, 2) turning the complexity of the inter-firm networks into a competitive advantage, and 3) enhancing the responsiveness to dynamic competition. With regard to platforms, it seems that the models incorporating extensive stakeholder involvement and high adaptability are of special importance.

We seem to be witnessing dynamic and continuously changing markets as manufacturing industries are simultaneously facing the disruptive effects of servitization and digitalization. This study has provided a theoretical base and explorative empirical insights to advance research in these fields. The developed propositions provide directions for further research. The implications of this study also indicate that the servitization discourse has significant potential to contribute to the field of strategic management, and especially to the domain of platforms.

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