



Interactively developed capabilities: Evidence from dyadic servitization relationships

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**Interactively developed capabilities: Evidence from dyadic
servitization relationships**

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Interactively developed capabilities:

Evidence from dyadic servitization relationships

Abstract

Purpose – The paper challenges the focal firm perspective of much resource/capability research, identifying how a dyadic perspective facilitates identification of capabilities required for servitization.

Design/methodology/approach – Exploratory study consisting of seven dyadic relationships in five sectors.

Findings – An additional dimension of capabilities should be recognised; whether they are developed independently or interactively (with another actor). The following examples of interactively developed capabilities are identified: *knowledge development*, where partners interactively communicate to understand capabilities; *service enablement*, manufacturers work with suppliers and customers to support delivery of new services; *service development*, partners interact to optimise performance of existing services; *risk management*, customers work with manufacturers to manage risks of product acquisition/operation. Six propositions were developed to articulate these findings.

Research implications/limitations – Interactively developed capabilities are created when two or more actors interact to create value. Interactively developed capabilities do not just reside within one firm and, therefore, cannot be a source of competitive advantage for one firm alone. Many of the capabilities required for servitization are interactive, yet have received little research attention.

The study does not provide an exhaustive list of interactively developed capabilities, but demonstrates their existence in manufacturer/supplier and manufacturer/customer dyads.

Practical implications – Manufacturers need to understand how to develop capabilities interactively to create competitive advantage and value and identify other actors with whom these capabilities can be developed.

Originality/value – Previous research has focused on relational capabilities within a focal firm. This study extends existing theories to include interactively developed capabilities. The paper proposes that interactivity is a key dimension of actors' complementary capabilities.

Keywords: dyad; interactively developed capabilities; resources; relationships; servitization

Article classification: Research paper

1. Introduction

Many manufacturers are pursuing the creation of additional value through servitization; a significant cultural shift from providing products and basic services to more complex, advanced service offerings, such as availability and capability contracting (Vandermerwe and Rada, 1988). A primary approach to analysing servitization has been through assessment of the resources and capabilities manufacturers require (Raddats *et al.*, 2015). The Resource-Based View (RBV) (Barney, 1991) examines the need for firms to possess superior resources to achieve sustained competitive advantages. However, the applicability of the RBV has been questioned for servitizing firms since they might not own all the resources that confer competitive advantages (Kindström and Kowalkowski, 2014), suggesting other theoretical perspectives are required.

Capabilities can be conceptualised as a firm's abilities to perform productive activities (Jacobides and Winter, 2012) or produce market offerings important to customers (Madhavaram and Hunt, 2008). Consequently, capabilities to deploy resources (rather than resources *per se*) are the foundation of creating competitive advantages (Helfat and Winter, 2011). Capabilities are classified broadly as operational or dynamic. Operational capabilities enable a firm to conduct daily activities, such as providing existing products and services to customers; while dynamic capabilities enable firms to alter their activities to address new market opportunities (Winter, 2003). Both operational and dynamic capabilities have been used as lenses to explore how manufacturers achieve servitization (e.g., Kindström *et al.*, 2013).

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3 Capability-based approaches to studying complex, interactive contexts are often
4 criticised as having a one-sided or intra-firm perspective, as opposed to a dyadic or inter-firm
5 perspective (Johnsen and Ford, 2006), suggesting that alone, an intra-firm perspective is
6 insufficient to understand the capabilities required for servitization. Even a 'relational
7 capability', the capability to interact with other companies (Lorenzoni and Lipparini, 1999;
8 Wang *et al.*, 2015), is still based on an intra-firm perspective. Thus, interactivity and
9 dynamics, which are elements of the interaction and network approach (Håkansson *et al.*,
10 2009), represent an alternative lens to understand resources and capabilities required for
11 servitization (Baraldi *et al.*, 2007).
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25 The research gap concerns the focal-firm focus in much servitization research, both in
26 terms of the resource/capability lenses used and empirical data collected. This is despite the
27 prevailing view that in a business-to-business context, value is co-created by a range of actor-
28 to-actor interactions (Möller and Rajala, 2007); with interactivity central to this process.
29 Although some studies address capabilities within dyads and networks, these are still
30 undertaken from the perspective of the focal firm (Paiola *et al.*, 2013). Complementary
31 manufacturer/customer strategies and capabilities have been studied (Helander and Möller,
32 2007); however, this research did not consider how capabilities are developed interactively.
33 Thus, limited attention has been paid to understanding how interactivity is reflected in the
34 capabilities needed for servitization. Hence, this study has two objectives: 1) to explore how
35 interactivity affects capability development within the context of servitization; 2) to provide
36 evidence that capabilities are developed through interactions between business actors. In
37 addressing these objectives, we answer a (largely unanswered) call by Gebauer *et al.* (2012)
38 to use servitization research as a lens to contribute to capability theories, rather than vice
39 versa.
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5 The paper continues with a literature review that considers resources and capabilities;
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7 manufacturers' service relationships; and capabilities within these relationships. The seven
8
9 dyadic servitization cases studied highlight the importance of interactivity in the capabilities
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11 needed in both manufacturer/customer and manufacturer/supplier dyads. In the discussion,
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13 we: 1) demonstrate how interactivity is a distinct dimension of both operational and dynamic
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15 capabilities, created when two or more actors interact; 2) identify a range of interactively
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17 developed capabilities; and 3) propose that a dyadic (rather than intra-firm) perspective can
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19 reveal new insights into the capabilities for servitization. Finally, the paper presents
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21 managerial implications, limitations and areas for future research.
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26 27 **2. Literature review**

28 29 30 31 32 *2.1 Resources and capabilities*

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36 According to the RBV, organisations are bundles of resources, with sustained competitive
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38 advantage coming from strategies based on those resources that are valuable, rare, inimitable,
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40 and non-substitutable and best suited to their markets (Barney, 1991). Despite acknowledging
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42 the role of resources in servitization research (e.g., Raddats *et al.*, 2016), most studies focus
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44 on capabilities (Eloranta & Turunen, 2015); derived from the strategic configuration and
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46 active deployment of resources, rather than resources alone (Ulaga and Reinartz, 2011). Thus,
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48 our focus is capabilities.
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54 Capabilities, an essential dimension of firm heterogeneity, are often separated into
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56 operational and dynamic, though the demarcation is often not clearly defined (Helfat and
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3 Winter, 2011). One approach to delineation is to conceptualise new operational capabilities as
4 the output of dynamic capabilities (Cepeda and Vera, 2007). Dynamic capabilities are, thus,
5 often classed as higher-level capabilities (Winter, 2003); disaggregated into: *sensing*
6 (perceiving opportunities and threats); *seizing* (taking advantage of opportunities identified);
7 *reconfiguring* (adapting a business' assets to create competitive advantages) to reflect the
8 stages of how new market opportunities can be addressed (Teece, 2007). Within the context
9 of servitization, dynamic capabilities are required to sense and seize new service
10 opportunities and to reconfigure the business and exploit opportunities through development
11 of new advanced services or solutions (Gebauer *et al.*, 2012; Kindström *et al.*, 2013). By
12 virtue of being harder to replicate, dynamic capabilities are often seen as more important
13 (than operational capabilities) for achieving sustainable competitive advantage (Helfat and
14 Peteraf, 2003).

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32 In contrast, operational capabilities concern existing offerings and are described as
33 supporting 'technical fitness' (as opposed to dynamic capabilities that are seen as supporting
34 'evolutionary fitness' [Teece, 2014]). A manufacturer's operational capabilities historically
35 centre on it being an Original Equipment Manufacturer (OEM), suggesting that the firm has
36 strong product-related technical knowledge that enables the provision of a range of product-
37 related offerings. Manufacturers undertaking servitization require additional capabilities
38 beyond those centred on products (Gebauer *et al.*, 2012). These new capabilities include
39 having suitable service methodologies and tools (Auguste *et al.*, 2006), an appropriate service
40 culture (Ostrom *et al.*, 2010), corporate leaders who are able manage the change to a more
41 service-focused business and appropriately skilled service personnel (Raddats *et al.*, 2015).
42 Thus, both operational and dynamic capabilities are important for servitizing firms. Research
43 also highlights the importance of complementarity with customers' capabilities (Helander and
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3 Möller, 2007), the significance of a manufacturer's network in supporting and facilitating
4 capability development (Spring and Araujo, 2013) and mediating the link between service
5 strategy and firm performance (Gebauer *et al.*, 2010).
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11 Some criticisms of resource- and capability-based theories focus on the 'myth of
12 independence' (Gadde *et al.*, 2003:5), with firms unable to simply deploy their own resources
13 independently from those of other organisations, particularly since firms might not possess all
14 the resources necessary to confer competitive advantage (Kindström and Kowalkowski,
15 2014). Madhavaram and Hunt's (2008) concept of 'relational' resources (i.e., establishing,
16 developing and maintaining relationships with customers and other partners), offers insights
17 for how firms achieve competitive advantage through their relationships with other actors.
18 However, this approach can be criticised for taking a focal firm perspective (Johnsen and
19 Ford, 2006). Day (2014:28) continues this critique identifying an 'inside-out myopia',
20 whereby a firm's dynamic capabilities may be constrained by its organisational structures.
21 Firms, therefore, need to develop greater focus on the resources and capabilities of other
22 actors in their network (Baraldi *et al.*, 2007) and how they might effectively combine their
23 resources with other actors' resources. We, therefore, contend that considering capabilities
24 without understanding how they relate to complementary capabilities (Helander and Möller,
25 2007) and the roles of other actors (Story *et al.*, 2011) is problematic.
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47 2.2 *Manufacturers' service relationships*

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52 Firms operate within the context of interconnected business relationships, forming networks;
53 with the ability to build and maintain relationships with other actors a key differentiator
54 (Gadde *et al.*, 2003). A firm's ability to create value is based on relationships with customers,
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3 suppliers, actors outside the firm's own industry and competitors (Ritter *et al.*, 2004), which
4 provide the context for the combination of internal and external activities and resources
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7 (Håkansson and Snehota, 1995).
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11 In the context of servitization, manufacturers form service networks, with both
12 upstream (e.g., product and service suppliers) and downstream (e.g., intermediaries and
13 customers) actors (Finne and Holmström, 2013; Saccani *et al.*, 2014). Relationships with
14 these actors are critical to developing new service offerings that customers value (Windahl
15 and Lakemond, 2006). Some work focuses on how manufacturers can create value upstream
16 by taking over service provision for other OEMs' products (Raddats and Easingwood, 2010).
17 However, it is the downstream environment that provides most opportunities and challenges
18 (Ulaga and Reinartz, 2011). The delivery of advanced services to customers enables them to
19 reduce costs and perform existing business processes more efficiently (Baines and Lightfoot,
20 2014). However, evidence of a servitization paradox suggests that moving into these services
21 results in reduced profitability for the manufacturers concerned (Benedettini *et al.*, 2015).
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38 2.3 Capabilities in service relationships

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43 Manufacturers might be unable to internally master all the capabilities required for
44 servitization (Gebauer *et al.*, 2013). Manufacturers' capability development, therefore, might
45 be internal (i.e., using their own capabilities), external (i.e., using the capabilities of other
46 actors), or mixed (i.e., using a combination of internal and external capabilities) (Paiola *et al.*,
47 2013). External and mixed developments include 'indirect capabilities', whereby a
48 manufacturer accesses the capabilities of other actors in its network (Spring and Araujo,
49 2014). Indeed, a number of new downstream capabilities are required by manufacturers for
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3 advanced services, such as the ability to price new service offerings based on risk/reward
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5 (Cova and Salle, 2008), integrate products into customer systems (Brax and Jonsson, 2009)
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7 and develop new service methodologies or processes (Paiola *et al.*, 2013). These capabilities
8
9 are generally internal to the focal firm, and even for firms adopting a mixed approach, the
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11 capabilities are generally assumed to reside within a single actor.
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16 Alliance, partnering or relational capabilities, which enable firms to work with actors,
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18 have been discussed in general (e.g., Lorenzoni and Lipparini, 1999; Möller *et al.*, 2005);
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20 Wang *et al.*, 2015) and specifically in servitization research (Baines and Lightfoot, 2014;
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22 Kreye *et al.*, 2015). For servitizing manufacturers, capabilities centred on network
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24 management/partnering and network visioning/orchestration appear most applicable (Möller
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26 *et al.*, 2005), but further work is required to understand the interactional nature of these
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28 capabilities.
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34 In Figure 1 we highlight the capabilities required for servitization across the different
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36 actors.
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40 41 **Figure 1** 42 43 44

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46 As manufacturers look to servitize through advanced services, the need to co-create
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48 service offerings with customers and other partners becomes imperative (Bastl *et al.*, 2012;
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50 Brax and Jonsson, 2009). However, we are unaware of empirical research that addresses how
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52 manufacturers work interactively with other actors to develop services in the context of
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54 servitization. It is this gap that our study seeks to fill.
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3. Methodology

The research methodology was exploratory, designed to build theory in the area of capabilities for servitization. A case study design was adopted since it facilitates an understanding of the complexity involved in relationships (Halinen and Törnroos, 2005). The focus is on dyads, addressing capabilities that require interaction between two parties (Håkansson *et al.*, 2009); thus, the unit of analysis is the ‘dyadic relationship’. In order to establish reliability (Yin, 2014), we adopted the following procedures. Using a ‘stratified’ purposive sampling approach (Bryman, 2008), five manufacturers from various sectors: aerospace/defence, telecommunications, chemicals, energy and transport were sampled. The selection criteria were: large organisations (i.e., parent companies with annual turnover of over £1 billion; in the United Kingdom; undergoing servitization (evidenced by the existence of a services business unit within their structure); access to actor(s) within their network (suppliers or customers) with whom they had longstanding relationships (10+ years), with relationship duration used as a proxy for relationship success.

Senior managers from the companies’ service businesses were identified. These key informants identified other individuals to interview, both within the manufacturer and customers or suppliers. Usually, we interviewed two managers from the focal manufacturer and one from the other actor. For two manufacturers (4a and 5a), there were two sets of dyads studied (4b/4c and 5b/5c). Five of the dyads were manufacturer/customer and two were manufacturer/supplier, to provide a comparative perspective of the capabilities under investigation. In line with Ulaga and Reinartz (2011), we view most opportunities for capability development from servitization to be downstream and, hence, prioritised data

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3 collection from customer relationships. In total, 17 managers were interviewed, nine from
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5 manufacturers; eight from suppliers/customers (Table 1).
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10 **Table 1**

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14 Data were collected between 2012 and 2015 through semi-structured interviews
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16 (Saunders *et al.*, 2007). Independent interview guides were developed for the manufacturer,
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18 customer and supplier interviews, with differences reflecting the roles each actor played
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20 (Appendix 1). Interviews were audio recorded, with each lasting, on average, one hour.
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22 Interviewees were asked to verify the transcripts before data were analysed (Bryman, 2008).
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24 Organisational data was also collected to provide evidence of service-based relationships
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26 between actors in the study, to enable triangulation with interview data (Yin, 2014). The
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28 systematic combining of data from multiple sources conforms to the abductive approach used
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30 in this study (Dubois and Gadde, 2002).
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36 Data were analysed through thematic analysis using NVivo 10 (QSR International).
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38 Initial capability-based themes were identified within each dyad and compared to those from
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40 the other dyads to identify similarities and differences (Dubois and Araujo, 2007). Transcripts
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42 were coded independently by two researchers via detailed reading and re-reading (Crabtree
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44 and Miller, 1999). The final coding structure was reached when further analysis of all the
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46 transcripts brought forward neither new codes nor new relationships; that is, theoretical
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48 saturation was reached (Bryman, 2008).
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54 **4. Findings**

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3 The data suggest that companies develop both their own intra-firm capabilities and use
4 partners to provide 'complementary' intra-firm capabilities (Helander and Möller, 2007).
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7 However, we also found strong evidence that actors cooperate to create capabilities necessary
8 for the development and delivery of advanced services. The findings presented focus
9 specifically on these inter-firm, interactively developed, capabilities.
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13 14 15 16 *4.1 Manufacturer/supplier dyads* 17 18

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20 Two manufacturer/supplier relationships were explored. In the first, a manufacturer of
21 aerospace/defence equipment (1a) works with a provider of IT services (1b). The companies
22 have an existing outsourcing contract whereby 1b provides 1a with managed IT services. In
23 the second, a telecommunication-products manufacturer (2a) uses a supplier (2b) to provide
24 software and associated services that are unviable for 2a to develop independently.
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32 33 34 *4.1.1 Knowledge development capabilities* 35 36 37

38 The cases highlight that even in mature relationships partners need to invest time and money
39 to learn about each other's capabilities. This involves fully explaining the capabilities one
40 partner possesses and how these might benefit other parties they are considering developing
41 new services with. While data from the study show that it is possible to learn about each
42 other's capabilities, this process is not always easy. For example, the Partner Manager in
43 Supplier 1b noted difficulties in developing appropriate relationships with counterparts in
44 Manufacturer 1a because of his 'newness' to the relationship. Thus, learning about each
45 other's capabilities may be impeded if good working relationships between managers do not
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5 Even when there is awareness of the central products/services being exchanged
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7 between actors, knowledge development is vital when advanced services lie outside normal,
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9 daily partnership activities:
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14 “So, who do we actually know who can help us as a partner... who does have
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16 that capability and can bring that ‘piece of the jigsaw’ to provide the total
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18 solution?” (Manufacturer 1a).
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23 “As you speak to more people in the business (1a) they want to know what
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25 capabilities you have. We did a presentation to the (1a’s services division) Vice
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27 President who didn’t know much about us other than baseline services. So, we
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29 gave a presentation about what 1b does in the US on through life support. We
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31 ‘blew him away’ with all the attributes of where we work” (Supplier 1b).
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36 1a knows it has gaps in its capabilities for new advanced services, and attempts to identify
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38 potential partners that offer the missing pieces. Both parties went on to talk about how better
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40 communication of capabilities enabled 1b to jointly bid with 1a for a new contract, which
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42 might have been impossible without this knowledge exchange, since neither party had the
43
44 right mix of capabilities to win the bid on its own.
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50 For (2a/2b), knowledge development formally takes place via 2a’s partner managers,
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52 who manage a range of suppliers. Within 2a, the role of partner manager was well established
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54 and designed to help understand what capabilities partners offer. This has been seen as
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3 necessary because 2a was very aware of their own limitations in developing every capability
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5 themselves:
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10 “In this industry, we’ve moved more from a technical-oriented organisation into
11 a business-oriented organisation. First of all, we wanted to create our products
12 on our own...now we have a multitude of smaller ‘boxes’ and systems with a
13 complex mesh for all these functions to be interconnected. We could not realise
14 everything on our own; it’s not possible anymore in this kind of industry”
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20 (Manufacturer 2a).
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25 The 2b interviewees recognised the importance of interactivity for developing
26 knowledge, speaking about the informal role of ‘internal champions’ (including partner
27 managers) within 2a. 2b’s products were part of an established frame contract; thus, less
28 communication was required to explain features/benefits. However, the importance of
29 interaction with partners in building new knowledge was emphasised, both in 2a and 2b:
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39 “For service capability development, I would say that we really deal with the
40 ‘internal champions’ within 2a. Sometimes they are located in sales, sales
41 support, or sales development roles. We work with them in order to mobilise
42 inside (Manufacturer 2a) and really go to market together and deliver, improve
43 the capability. We would, of course, have to work through the champions, train
44 them to obtain a bigger group of people inside (Manufacturer 2a) to actually be
45 able to deliver” (Supplier 2b).
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3 The data suggest that this knowledge development capability needs to reside with both
4 partners, with both sharing information for mutual benefit. Thus, 2a is aware of the need to
5 build knowledge development capabilities with its partners and 2b sees the best approach to
6 doing this as being through internal champions. It is clear that this capability develops only
7 through interaction and offers an important mechanism for knowledge development. The
8 interviewees from 2b note, however, that although their ambition is to develop and maintain a
9 community of internal champions throughout 2a, it is difficult to achieve in practice since
10 these people have other roles, and conflicting priorities. They might not see themselves as
11 advocates of 2b and resist being termed internal champions. Thus, persuading these people to
12 embrace their 'champion' role might be paramount to building a knowledge development
13 capability and at present the interviewees from 2b felt they were some way short of having
14 the community of champions necessary to fully develop business within 2a, suggesting the
15 need for more interaction to achieve this.
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34 'Knowledge development', as an ongoing, interactive activity, seems to be aligned to
35 the dynamic capability of 'sensing' (Teece, 2007). Before these firms can 'seize' market
36 opportunities, they should focus efforts on learning about their network partners; almost as a
37 pre-requisite for developing other network-related capabilities. This supports the views of
38 Helander and Möller (2007) who suggest that reducing the knowledge gap between partners
39 is important for success. It also shows that the interaction between actors drives the
40 development and exploitation of their capabilities. Thus, having a strong understanding of
41 each other's capabilities through close interaction and communication is a first important step
42 to maximising the benefits offered by complementary capabilities (Helander and Möller,
43 2007).
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4.1.2 Service enablement capabilities

This theme focuses on the interactively developed capabilities that support the introduction and viability of new services. The literature suggests that upstream partners working with manufacturers play an important role in enabling the sale and delivery of services. For manufacturer 2a, 2b plays a crucial role in service enablement, particularly with products that have lower sales volumes or specialist requirements, meaning it is unwise for 2a to invest resources in up-skilling its own staff. From 2b's perspective, filling in gaps in 2a's portfolio is a strategic and time-consuming process; with the need to: gain acceptance (both within 2b and 2a) to become part of 2a strategic initiatives; develop joint market offerings; and, realise sales of these offerings from 2a's customers. From 2a's perspective, this highlights the crucial role suppliers play in helping manufacturers to widen their market reach into what might otherwise be unprofitable markets. Interaction, thus, facilitates the development of a market-seizing capability (Teece, 2007), whereby firms exploit new market opportunities. Involvement of a partner in this process can overcome market-seizing difficulties, when markets lie outside a manufacturer's core area of expertise and knowledge (Day, 2014), but firms must recognise that the interactivity involved is a processual, time-laden activity.

Another service enablement avenue was 'Big Data' exploration and exploitation (Opresnik and Taisch, 2015). In dyad 1, the interviewees spoke about combining capabilities to enable a new aerial ground surveillance service; with 1b's data analytics capabilities combining with 1a's capabilities in operating the surveillance vehicles. Dyad 2 described such an opportunity in the context of complex telecommunications networks. This complexity means that new data analytic services are required by network operators to enable them to provide reliable and scalable services to customers:

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5 “Customer experience management is a new area where the operators want to
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7 ‘dig out’ more information about their customers, about customer behaviours, to
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9 see where customers are facing risk problems, whether they have the bandwidth
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11 they need for their services” (Manufacturer 2a).
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16 2b supports manufacturer 2a through its data analytics capability in customer experience
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18 management:
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23 “It is part of the analytics proposition. We would analyse the data that is coming
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25 from the network and provide the results back to 2a’s people to actually perform
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27 the work much more intelligently... and achieve better business results for the
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29 customer” (Supplier 2b).
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35 Thus, sometimes manufacturers may need to go beyond simply acquiring external capabilities
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37 from other actors via outsourcing activities, and instead interact with suppliers, aligning
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39 capabilities to seize new opportunities. Many new servitized offerings require new ways of
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41 working to deliver added value over what customers can already do for themselves and many
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43 firms are unable to achieve sufficient levels of value-add independently; needing instead to
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45 combine intra-firm capabilities to interactively create new inter-firm capabilities that are
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47 more than the sum of their parts.
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53 4.1.3 Service development capabilities 54 55 56 57 58 59 60

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3 This theme concerns interactive capabilities between suppliers and manufacturers for
4 developing and delivering services to the market. In this regard, 1b was able to help 1a
5 deliver service offerings:
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11 “We had another piece of work with 1b, we have a close relationship anyway,
12 and they tried to operationalise our services, in terms of specific things that we
13 needed to do” (Manufacturer 1a).
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21 Their supplier, 1b, articulates its efforts to support 1a:
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25 “1a’s service organisation is all about through life support, ‘cradle to the grave’
26 type activities. We have very good capabilities in terms of consultancy as
27 regards to supply chain, for example. So we have given them a perspective of
28 where they are currently positioned, where they need to be and, therefore, how
29 they could bridge that gap” (Supplier 1b).
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38 In this capacity, 1b works with 1a in terms of operationalising services and in helping 1a
39 identify how to reposition itself. This aligns with a reconfiguration capability (Teece, 2007),
40 since 1a works with 1b to realign and reconfigure its business. Interactive service
41 development capabilities are also apparent in the other dyad; since 2a’s strategic focus has
42 recently switched from services on multi-vendor products to services on its own products.
43 This switch has been possible (while maintaining the same offerings to customers) because
44 suppliers, such as 2b, have worked together with 2a to complete 2a’s service portfolio, by
45 jointly developing a suite of services on their own products, which in the past 2a tried to offer
46 to customers in-house, but are now supported by the services of 2b.
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5 Thus, evidence of interactive development of dynamic capabilities is apparent within
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7 the supplier-manufacturer dyads, which help manufacturers develop servitized offerings for
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9 new market opportunities through: knowledge development (sensing), service enablement
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11 (seizing), and service development (reconfiguring). These findings are articulated by three
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13 propositions.
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18 **Proposition 1:** Collaborative knowledge development between manufacturers and
19
20 suppliers enables effective market sensing.
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23 **Proposition 2:** Manufacturers and suppliers seize market opportunities through
24
25 interactively combining individual capabilities to enable new services to be realised.
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28 **Proposition 3:** Manufacturers reconfigure their businesses by interactively developing
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30 services with suppliers.
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32 33 34 4.2 *Manufacturer/customer dyads* 35 36

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38 Servitization literature highlights the importance of manufacturers and customers cooperating
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40 in a more coordinated fashion for advanced services, given the extent of coproduction
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42 between a supplier and customer involved in delivery of these offerings (Brax and Jonsson,
43
44 2009). Exploring these interactions, this study revealed a number of interactively-developed
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46 capabilities between manufacturers and customers that improved the management of installed
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48 products, which in turn helps customers with their own business development. We consider
49
50 five dyadic manufacturer/customer relationships. Manufacturer 3a provides chemical goods
51
52 and services to customer 3b, which is involved in water treatment. Manufacturer 4a supplies
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54 power-generation equipment to power generators 4b and 4c. Manufacturer 5a supplies
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3 vehicles to distribution and logistics providers 5b and 5c. In all cases services are
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5 increasingly being used to enhance traditional product-based relationships.
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10 *4.2.1 Service enablement capabilities*
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14 Service enablement within the context of manufacturer/customer dyads primarily concerns
15
16 manufacturers providing finance or expertise to customers to expedite the introduction of
17
18 new, technically complex offerings. 5a has evolved its customer offerings from vehicles and
19
20 maintenance to fixed price service contracts and contract hire/rental contracts (which include
21
22 financing) and adapted the way it works with the customer:
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27 “The big thing is on the finance side; 60% of what we sell we fund, so we’ve
28
29 had to become incredibly innovative...our innovation has come from fixed price
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31 service contracts but even more importantly, fixed price contract hire and rental
32
33 contracts. We’ve moved into the rental contract hire space, as a result of
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35 changes in the marketplace. We’ve had to adapt like you can’t believe
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38 (Manufacturer 5a).
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42
43 5a adapted its service offerings in response to customer demands and in so doing has
44
45 developed new operational capabilities around product financing. From the customer’s
46
47 perspective, although financing is often available from banks, there can be advantages in
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49 using manufacturer-provided finance, for example:
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54 “[Bank] is saying that we’ve leased this truck to you, you’ve paid us so much a
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56 month, you’ve signed these T&Cs and all we’re doing now is enforcing them. I
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3 would rather use finance through a manufacturer because he tends to be a bit
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5 more flexible with you because he wants you to buy some more trucks”
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7 (Customer 5c).
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11 The ability to provide customers with finance under innovative terms is, therefore, an
12
13 important enablement capability for winning business (5c switched to buying vehicles from
14
15 5a rather than a competitor on the basis of the financing). From the customer’s perspective,
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17 the negotiation that is possible (e.g., paying per mile driven rather than acquisition of
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19 vehicles) is an important element of the contract. Thus, the interactive relational dynamics
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21 and ongoing processes in these contracts can be seen as a key differentiator for both actors.
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27 Two contrasting perspectives on service enablement were illustrated by 4a and 4b. 4a
28
29 focuses on developing deeper customer relationships:
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34 “From our point of view, the risk of substitution makes us willing partners and
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36 the contract (with 4b) provides an environment in which we can position
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38 product upgrades more successfully. So we can establish an exclusive
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40 relationship with the client now and better enable ourselves to continue that into
41
42 the future through product upgrades” (Manufacturer 4a).
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47 On the other hand, 4b views interactive service enablement as an opportunity to learn
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49 about 4a’s products, and then seek alternative service suppliers:
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54 “We would probably have a single tender with 4a for the first 12 months, to
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56 understand the servicing, repair, management, condition monitoring aspects of
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3 the product. But then over this phase, we'll be transferring that into a contract
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5 that we own and have input into and probably move away from the OEM (4a) to
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7 someone we would recognise within our fleet as our main supplier" (Customer
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10 4b).

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14 Thus, interactive service enablement is both an opportunity and risk for a manufacturer since
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16 our data suggests that customers can seek to buy products and to develop technical
17
18 capabilities to manage product complexities short-term. However, customers might also look
19
20 to retender service contracts to lower cost (or preferred) providers after the initial contract
21
22 period expires. These capabilities are operational, with both manufacturers and customers
23
24 combining resources into capabilities required to operate in the marketplace. The experiences
25
26 of 4a and 4b highlight tensions that occur as firms seek control (Zolkiewski *et al.*, 2008).
27
28 While, complementarity of resources and capabilities may facilitate the long-term survival of
29
30 relationships (Lavie, 2007), firms need to balance these inter-firm efforts with their own
31
32 intra-firm capability development efforts that could challenge these relationships.
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38 4.2.2 Service development capabilities

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43 The customers in this study worked with manufacturers to ensure products performed
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45 optimally, with manufacturer selection partially based on service capabilities. Customer 3b
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47 used manufacturer 3a's service capabilities to co-develop and deliver its own service
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49 offerings; but required 3a to respond to technical queries to do so:
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54 "Our mission statement is to provide the best service offering to the industry; so,
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56 for example, a technical enquiry: the technical team is tasked to respond within
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3 24 hours, even if it's to say, 'We need to research it but we'll be back to you'.

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5 But, invariably, you get an answer. So it's a very quick delivery back to the
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7 client" (Manufacturer 3a).
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11 "3a is particularly good at providing us with technical support, so if we have
12
13 difficult contaminants or just particularly unusual ones, then I know that the
14
15 technical support we're going to get is going to be fast and reasonably
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17 comprehensive; whereas going elsewhere can take a matter of days instead of
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19 hours, which can be the difference between successfully tendering a project or
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21 not" (Customer 3b).
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27 In this example, 3a worked to develop an operational capability based on speed of response,
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29 which is valued by its customer (3b) through supporting its project tender process. In addition,
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31 3a's Marketing Manager stressed the importance of adaptability; being willing to work with
32
33 3b to customise products and services in line with their customers' requirements. For
34
35 example, the interviewee at 3b noted how 3a tested the performance of its chemicals at
36
37 different temperatures as part of 3b's service development activities. This enabled 3b to win a
38
39 contract for which chemical performance at low temperature was a key requirement.
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45 This responsiveness to customer requirements was also apparent in the changing focus
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47 of 5a's offerings, which are no longer based on the price and technical specifications of its
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49 vehicles but their reliability, efficiency and usability from the customer's perspective:
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54 "It's not the price of the truck but the reliability of the truck, the fuel-efficiency
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56 of the truck and the driver acceptability of the truck; these are the three big
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3 things. And in the servitized world that we're in now, this is what we offer"

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5 (Manufacturer 5a).
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10 In changing its approach, 5a can now work interactively with their customers to ensure
11 the reliability and efficiency of their offering:
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16 "Each vehicle is generating (X thousands of) pounds of revenue per year and is
17 operating several thousand hours per year. A vehicle is like a taxi with a meter
18 running. If there isn't a 'passenger' in there, in other words if it's not carrying
19 something that we're charging our clients for, we're not generating any revenue
20 and those costs of the vehicle and the driver are all fixed costs for us" (Customer
21 5b).
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32 This example demonstrates how a manufacturer worked to develop a new business model, to
33 enable them to provide more efficient and effective solutions to their customers. Thus, in both
34 the above cases, the manufacturers' service offerings reflect the criticality of their products to
35 customers' businesses and close interaction between the actors is essential to facilitate the
36 development of these end-customer solutions.
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45 4.2.3 Risk-management capabilities 46 47 48

49 Interactive risk management capabilities were illustrated in the energy industry by 4a's
50 relationships with its two customers, 4b and 4c. A higher degree of trust is required when a
51 manufacturer is involved in a customer's operations, rather than simply supplying products.
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55 In this situation, customers are sharing the operational risks with the manufacturer in order to
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3 prevent the failure of the operation itself. Due to the criticality of power generation, trust
4
5 appeared asymmetric, with 4a seeing an opportunity to build trust, but 4c seeing the dangers
6
7 of over-reliance on a supplier:
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11 “So there’s a basis for the relationship which isn’t present in every other part of
12
13 our (product) business. That is symptomatic of a tighter coupling between the
14
15 OEM in terms of that organisation being a source of parts, technology, advice
16
17 and support and [the customer’s] operation in terms of its ability to produce
18
19 electricity” (Manufacturer 4a).
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25 “And when you’re in a contract that is the dilemma that you have then isn’t it.
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27 What do they know that we don’t know? On one side they could be absolutely
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29 to the line, ‘this is really serious, you need to change this’, or it could be this is
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31 just commercial ‘I want to make more money out of you’, and we don’t always
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33 know where we are” (Customer 4c).
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38 The issue of risk is particularly important for services involving technically complex products
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40 that require high availability and co-operative operation:
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45 “The technical risks are quite high for the client, the degree of integratedness
46
47 between the performance of the machine and the operation of the machine...so
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49 an operator may need the support of the technical team, the OEM”
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51 (Manufacturer 4a).
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3 “So, there is an element of cost to that but there’s also a large element of the risk
4 of that asset. So, a main gas turbine; it’s critical that the asset has very high
5 levels of availability. It’s also not an area where we have a specialist team. So,
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7 there will be a boundary at which I need that OEM support” (Customer 4b).
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14 Risk management is an essential issue during servitization and this study identifies relational
15 and technological risk that manufacturers and customers must interactively manage.
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21 Operational services for complex, mission-critical products always represent an
22 opportunity for manufacturers and a concern for customers, whether customers operate the
23 products in-house or rely on an OEM or other service provider. Equally, data from the study
24 shows that these risks extend beyond the manufacturer/customer relationship and also include
25 risks in the customer/end customer relationship. For example, the manager in Customer 3b
26 noted the risks for its business of end customers performing operational aspects of water
27 treatment that involve explosive gases. Thus, 3b would like to get more involved in its
28 customers’ operational activities and help them to optimise operational performance and
29 minimise risk, but cannot do so without 3a. Risk management is, therefore, likely to be
30 influenced by risks in other relationships; thus, the development of these capabilities needs to
31 be seen within the context of capabilities residing in other parts of the network and the
32 integral role of interaction and trust development.
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50 Within manufacturer/customer dyads we identify three operational capabilities in which
51 interaction is core: service enablement, service development and risk management. These
52 findings are articulated in three propositions.
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3 **Proposition 4:** Manufacturers and customers work collaboratively to create
4 capabilities to enable service offerings.
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7 **Proposition 5:** Manufacturers and customers develop capabilities jointly to optimise
8 service performance.
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11 **Proposition 6:** Customers manage the risk of service operations by working with
12 manufacturers, combining manufacturers' capabilities with their own.
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18 Table 2 sets out the interactively developed capabilities identified in this study.
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23 **Table 2**
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27 **5. Discussion** 28 29 30 31

32 *5.1 Theoretical implications* 33 34 35

36 The paper contributes to both servitization and capability-based research and challenges the
37 resource/capability orthodoxy, based on the focal firm. In doing so, it answers a call from
38 Gebauer *et al.* (2012) to use servitization research as a lens to contribute to operational and
39 dynamic capability theories. It is also one of the first to consider capability development from
40 a dyadic rather than focal firm perspective, and is noteworthy in that it includes
41 manufacturers working with both suppliers and customers. The paper makes three main
42 contributions.
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54 Firstly, specifying interactively developed capabilities. Discussion about capabilities,
55 even relational capabilities, have been criticised for largely having a one-sided, intra-firm
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3 focus (Johnsen and Ford, 2006; Baraldi *et al.*, 2007). This prior work does not take into
4
5 consideration interaction between actors, which is the key relational and network dynamic
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7 that facilitates access to and recombination of resources and capabilities resident in other
8
9 actors. Our study extends Helander and Möller's (2007) concept of 'complementary'
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11 capabilities, by examining the interaction between actors that generate new capabilities, not
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13 just the alignment of actors' internal capabilities. Figure 2, therefore, conceptualises
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15 interactively developed capabilities at the intersection of actors' intra-firm operational and
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17 dynamic capabilities.
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Figure 2

In the model, all actors are likely to have distinct, intra-firm dynamic and operational capabilities, which may be complementary to other actors' capabilities. Interactivity is, however, recognised as a separate dimension of both operational and dynamic capabilities, since some capabilities require actors to work together, but if either actor lacks this interactive dimension it is likely that the relationship will be less productive. Our data also considered the relationship between a customer and end customer (Customer 3b and its customers) and how this relationship can influence the customer-manufacturer relationship. Thus, a study solely on focal dyads may be insufficient to uncover all the influences from other network actors, on particular interactively developed capabilities.

Secondly, the identification of a range of interactively developed capabilities: knowledge development, service enablement, service development, and risk management. Identification of this interactively developed aspect of capabilities reinforces the co-evolution of capabilities notion (Gebauer *et al.*, 2012), whereby organisational learning by

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2
3 network actors drives capability development. This contrasts with the focal firm perspective
4 often used during studies of servitization (Ulaga and Reinartz, 2011), whereby resources and
5 capabilities are conceptualized as internal to a firm. This study begins the process of
6 identifying areas in which co-evolvement can occur. We argue that firms adopt a mixed
7 approach to capability development (Paiola *et al.*, 2013), so even for services that are
8 assumed to develop internally, in reality they form part of a broader interactive offering to
9 customers. This aligns with extant literature (Bastl *et al.*, 2012; Brax and Jonsson, 2009)
10 which views co-creation of service offerings as being more important for manufacturers
11 developing advanced services.
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25 Thirdly, we find that capabilities are not created in isolation, even for intermediate
26 services, such as technical support (Baines and Lightfoot, 2014). Although such services rely
27 on a manufacturer's own products, processes and people capabilities; technical support
28 services ultimately require additional capabilities from a customer (Helander and Möller,
29 2007) and, potentially, other actors. We contend that adding partnering, collaborative, or
30 network capabilities (Lorenzoni and Lipparini, 1999; Wang *et al.*, 2015) to other capabilities,
31 considered internal to the manufacturer, is a complex process (supporting Ford and
32 Håkansson [2006]). Thus, relational capability development between manufacturer and
33 customer (Kreye *et al.*, 2015) might involve having engineers trained to perform on-site fault
34 diagnostics. Equally, manufacturers' customers sometimes need to include offerings that they
35 buy from suppliers within offerings they create for their customers. We, therefore, find that
36 interactively developed capabilities are applicable for the development of both intermediate
37 and advanced services.
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3 This study suggests that an interactive approach is essential if the genuine requirements
4 of a market are to be identified (Day, 2014). Interactive operational capabilities were
5 apparent in manufacturer/customer dyads, with both actors cooperating to develop
6 capabilities. In contrast, interactive dynamic capabilities appeared to be present in
7 manufacturer/supplier dyads, with both actors adapting their capabilities to facilitate
8 transformation of their offerings (Kindström *et al.*, 2013). Thus, interactivity is relevant for
9 both dynamic and operational capabilities. We contend that capabilities, dynamic or
10 operational, should be studied through the lens of a dyad or network, since only this approach
11 reveals the true, shared nature of the capabilities firms develop.
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25 5.2 *Managerial implications*

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29 Having the right capabilities for servitization provides one of the most enduring challenges
30 for manufacturers. The findings outlined here suggest that manufacturers must rethink how
31 these capabilities are developed. Although research encourages manufacturers to develop
32 greater understanding of how customers use their products in an operational environment, a
33 failure to recognise interactivity means that this does not go far enough, and manufacturers
34 need to consider how capabilities are developed jointly with suppliers and customers. Being
35 good at partner management or alliance development is often insufficient. Equally, actors
36 should assess potential partners to determine whether they have sufficient relational intent
37 (Grönroos and Helle 2010) in order to develop the necessary interactive capabilities and
38 continue the relationship once these capabilities are developed. This is a balancing act, as
39 once partners have acquired new capabilities through interaction they may well decide to go
40 it alone (customer 4b).
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3 This study identifies four interactively developed capabilities manufacturers must co-
4 create with suppliers and/or customers. *Knowledge development* involves manufacturers and
5 suppliers ensuring that they understand the range of capabilities each possesses. Developing
6 capabilities jointly with suppliers is a common activity in many industries; however, existing
7 manufacturer/supplier relationships might focus on a good or service, while other capabilities
8 beyond this focal offering, are unknown or ignored. *Service enablement* concerns suppliers
9 helping manufacturers add new service offerings into their portfolio, ones that might not be
10 financially viable for a manufacturer to develop alone. Equally, it can concern manufacturers
11 enabling customers to procure expensive products through service-based contracts and make
12 more effective use of technically complex products through interactive efforts. *Service*
13 *development* involves the joint capabilities of manufacturers and partners being turned into
14 activities that neither party could develop or deliver on their own, thereby creating new sales
15 opportunities. Finally, for *risk management*, manufacturers must understand the risks of
16 supplier selection and product acquisition/management from a customer's perspective.
17 Although manufacturers view services as a way to get closer to customers, closeness might
18 signal risk to a customer who wishes to retain skills in-house, or at least not rely on one
19 single external provider. Manufacturers need to interactively manage this risk, particularly for
20 complex, mission-critical products, but should not assume closeness is necessarily an
21 endpoint every customer wants.
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47 5.3 *Limitations and future research*

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52 The dyadic case study approach used in the study means that the findings are not transferable
53 to other settings. We do not contend that these interactive capabilities represent an exhaustive
54 list, nor do we propose a causal link between interactively developed capabilities and firm
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3 performance. Companies from other industries should be included in future studies to
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5 determine whether the four categories of interactively developed capabilities are replicable in
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7 other settings, or whether new ones emerge. Interactively developed capabilities should be
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9 tested in a confirmatory study to assess generalisability, based on the propositions developed
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11 in the study, and could be tested to determine whether they lead to improved firm
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13 performance.
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18 The study used a small number of informants per organisation. This was in part because
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20 customer/supplier interviews were arranged via the key informant in the focal manufacturer
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22 and subsequent access to other suitably knowledgeable managers in the customer/supplier
23
24 was quite difficult to achieve. Equally, we only studied 'successful' relationships; although
25
26 studying failed or problematic relationships would provide valuable comparative findings.
27
28 The study considers interactively developed capabilities that manufacturers form with both
29
30 suppliers and customers. Although there are similarities between these groups, we recognise
31
32 that these dyads may represent disparate relationships. The tenet of interactively developed
33
34 capabilities applies to both dyads, but the idiosyncrasies of each are likely to be different. In
35
36 future studies of resources/capabilities, within or outside the domain of servitization, we urge
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38 researchers to move beyond a focal firm perspective, as a degree of interactivity is present in
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40 nearly every capability. Thus, studies of networks or ecosystems are likely to further extend
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42 knowledge in this area.
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Appendix 1 – Questions from interview guides

Manufacturers

- What services do you offer to your customers?
- What capabilities does your company possess to enable the provision of services?
- Who is involved in service provision from outside your company?
- What roles do these inter-company actors play in terms of developing services?
- What service-related interactions do you have with these actors?

Customers

- What services does the focal manufacturer provide to your company?
- How do the manufacturer's services develop your businesses?
- What is your company's role in during service provision?
- Can you describe the interactions you had with the focal manufacturer during the provision of these services?

Suppliers

- What were the drivers for becoming involved with [the focal manufacturer]?
- How involved are you now – no. of projects involved with/no. of new service projects in the pipeline?
- What capabilities does your company possess to enable the provision of the manufacturer's services?
- Can you describe the interactions you had with the focal manufacturer during the provision of these services?

Manufacturer	<p>Dynamic capabilities (Gebauer et al., 2012; Kindström et al., 2013)</p> <ul style="list-style-type: none"> • Sensing • Seizing • Reconfiguring 	<p>Dynamic capabilities (Gebauer et al., 2012; Kindström et al., 2013)</p> <ul style="list-style-type: none"> • Sensing • Seizing • Reconfiguring 	Customer or supplier
	<p>Operational capabilities</p> <ul style="list-style-type: none"> • Product-related knowledge, including integration skills (Gebauer et al., 2013) • Service culture (Ostrom et al., 2010) • Service tools and methodologies (Paiola et al., 2013) • Service-focused leaders and personnel (Raddats et al., 2015) • Partnering capabilities (Baines and Lightfoot, 2014) • Network management/ orchestration (Möller et al., 2005) • Risk/reward business models (Cova and Salle, 2008) 	<p>Operational capabilities</p> <ul style="list-style-type: none"> • Complementary to manufacturer's operational capabilities (Helander and Möller, 2007) 	

Figure 1: Operational and dynamic capabilities required for servitization

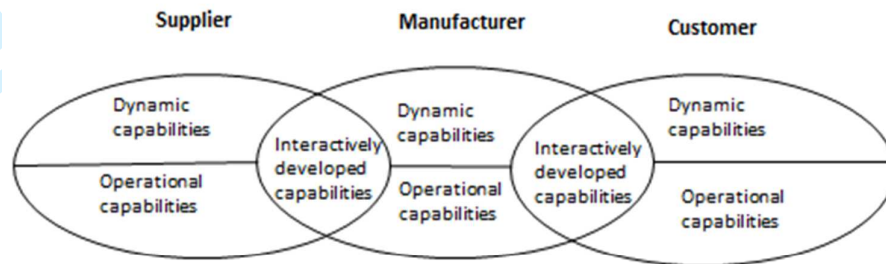


Figure 2: Interactively developed capabilities within the context of dynamic and operational capabilities

Focal manufacturer (parent organisation's headquarters)	Sector of focal manufacturer	Number of interviewees (function)	Other actor (C = customer, S = supplier)	Main business of other actor	Number of interviewees (function)
1a (European)	Aerospace/defence	2 (service management)	1b (S)	Information technology	1 (partner management)
2a (European)	Telecommunications	2 (service management)	2b (S)	Software and services	2* (partner management)
3a (Japanese)	Chemicals	2 (marketing/services management)	3b (C)	Water treatment	1 (general management)
4a (American)	Energy	2 (service management/ general management)	4b (C) 4c (C)	Power generation Power generation	1 (general management) 1 (general management)
5a (European)	Transport	1** (general management)	5b (C) 5c (C)	Distribution/ logistics Distribution/ logistics	1 (general management) 1 (service management)

Table 1: Companies/interviewees who participated in the study

* All managers were interviewed separately except for those in 2b

** Only one manager interviewed, although the richness of the data allowed us proceed on this basis

Capabilities built through interaction	Manufacturer/supplier dyad (dynamic capabilities)	Manufacturer/customer dyad (operational capabilities)	Representative quotation
Knowledge development	Suppliers communicating their capabilities throughout the manufacturer, sometimes through 'internal champions'	<i>No evidence in this study</i>	<p>"We could not realise everything on our own; it's not possible anymore in this kind of industry" (Manufacturer 2a).</p> <p>"For service capability development, I would say that we really deal with the 'internal champions' within 2a" (Supplier 2b).</p>
Service enablement	Suppliers providing manufacturers with specialised services to enable new customer offerings	<p>Manufacturer providing financial solutions or technical expertise to customers</p> <p>Customers enabled to offer distinct services or realign their supplier strategy</p>	<p>"The big thing is also on the finance side; 60% of what we sell we fund, so we've had to become incredibly innovative" (Manufacturer 5a).</p> <p>"I would rather use finance through a manufacturer because he tends to be a bit more flexible with you" (Customer 5c).</p>
Service development	Suppliers helping manufacturers to explore new service opportunities	<p>Manufacturers providing the customer with technical support to maximise product performance</p> <p>Customers developing market-leading offerings for customers</p>	<p>"We had another piece of work with 1b... to try and operationalise our services, in terms of specific things that we needed to do" (Manufacturer 1a).</p> <p>"We have given them a perspective of where they (1a) are currently positioned, where they need to be and therefore how they could bridge that gap" (Supplier 1b).</p>
Risk management	<i>No evidence in this study</i>	<p>Manufacturers managing complex product operations for customers</p> <p>Customers managing product and supplier risks to ensure continuing product operations</p>	<p>"The technical risks are quite high for the client" (Manufacturer 4a).</p> <p>"So, there is an element of cost to that but there's also a large element of the risk of that asset". (Customer 4b).</p>

Table 2: Interactively developed capabilities identified in the study