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Creating multi-vendor solutions: the resources and capabilities required

1. Introduction

In the face of growing competition and stagnating markets, many manufacturers are transforming their organisations so that they no longer rely solely on their products to provide market differentiation (Oliva and Kallenberg, 2003; Ostrom *et al.*, 2010); a process identified as service infusion (Brax, 2005). Instead manufacturers are undertaking service innovation to combine products and services into customized solutions (Lightfoot and Gebauer, 2011). Although there are many definitions of what constitutes a 'solution' a number of distinctive features appear common: longitudinal relational processes (Töllner *et al.*, 2011; Tuli *et al.*, 2007); individualized product/service offerings which are customized and integrated to address customer problems (Matthyssens and Vandenbempt, 2010; Sawhney, 2006) and compensation on the basis of achieved performance or value for the customer (Sawhney *et al.*, 2004; Storbacka, 2011). These characteristics highlight that solutions are more than just a complex variety of services (Nordin and Kowalkowski, 2010). The potential role of products and services from other manufacturers as components of solutions has also been noted as a characteristic of solutions (Foote *et al.*, 2001; Miller *et al.*, 2002). Service innovation as part of solution development is therefore not restricted to a manufacturer's own products and services, with products from other vendors also incorporated if required (Davies, 2004; Windahl and Lakemond, 2010). Equally, innovation within one component of the solution could lead to innovation in others; thus an appreciation of how this inter-relatedness might affect the overall customer offering is important (Evanschitzky *et al.*, 2011).

Different types of solution providers have been identified in the literature, including system sellers and systems integrators. *System sellers* produce all or most of the product and service components required for the solution (Davies *et al.*, 2007; Salonen, 2011). A pure system seller's offerings are based on single vendor design, internally developed technology and products (Davies *et al.*, 2007). *Systems integrators* are prime contractors responsible for overall system design, integrating product and service components supplied by other suppliers within a solution (Davies *et al.*, 2007; Salonen, 2011). However, categorizing manufacturers as system sellers and systems integrators assumes a project-based perspective, which is not necessarily appropriate for solutions. The project-based perspective emphases the physical product with services ancillary, whilst the solution-based perspective emphasizes the whole product life lifecycle with services central (Brax and Jonsson, 2009; Tuli *et al.*, 2007). To fully embrace the central role of services in solutions, we propose a new typology of solution providers to emphasize that solutions address the whole product lifecycle: *Single-Vendor Solution Providers* (SVSPs) and *Multi-Vendor Solution Providers* (MVSPs). SVSPs focus on their own products and services. MVSPs integrate products from multiple vendors and provide post-deployment services for these products, including their own.

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The journey from product manufacturer to solution provider is sometimes presented as a transition along a continuum (Evanschitzky *et al.*, 2011; Oliva and Kallenberg, 2003). We contend that types of solution provider can also be positioned on a continuum, which has two theoretical extremes. At one extreme is a pure SVSP, which is completely *partial* in that it only supplies its own products for the solution. MVSPs in contrast are capable of operating across the whole continuum of potential solutions. At the other extreme is a pure MVSP that may not have products of its own and is potentially completely *impartial* in terms of the products which constitute the solution; the best solution from a customer's perspective encompasses the most suitable products, no matter whom the supplier (Galbraith, 2002).

The resources and capabilities necessary to successfully develop and deliver solutions have previously been studied (e.g., Brady *et al.*, 2005; Storbacka, 2011). Resources are the stock of available factors that are owned or controlled by the firm, whilst capabilities are the ability to deploy resources, usually in combination, using organisational processes (Amit and Schoemaker, 1993). Brady *et al.* (2005) find that capabilities in systems integration, operational service, business consulting and financing are required for product firms to become solution providers. Storbacka (2011) groups the capabilities supporting the implementation of a solution business into four categories; strategy planning, management systems, infrastructure support and human resource management (HRM). Whilst these authors identify a range of important resources and capabilities it is notable that these studies do not distinguish between the resources and capabilities required by different types of solution provider, with previous research mainly focused on SVSPs. The need to assess how these resources and capabilities differ between solution providers is therefore an important gap in the extant literature (Storbacka, 2011), with a consideration of those resources and capabilities required by MVSPs particularly embryonic. The objective of this study is therefore to investigate the resources and capabilities required by MVSPs as distinct from SVSPs. The study builds on previous research into service innovation in manufacturing companies by investigating the capabilities required for success. For example, Kindström *et al.* (2012) contend that product- or manufacturing-driven capabilities alone are not sufficient. MVSPs appear to be most prevalent in sectors with high value complex products, but it is possible that customers in other sectors will also require their suppliers to provide holistic offerings to address their increasingly complex requirements. Although recent research proposes that manufacturers may not be able to master all the relevant service activities of developing and delivering complex solutions in-house (Gebauer *et al.*, 2013), for many manufacturers being a MVSP is still a likely goal if services are viewed as a means to grow the business rather than a way to differentiate existing products (Raddats and Easingwood, 2010).

The paper is structured as follows. The theoretical framework of the research is set out below, which includes a discussion on the resource-based theory used in the study and resources and capabilities which have been identified in the solution literature. The research questions are presented, and the

study's methodology is outlined, followed by the results. The paper continues with a discussion of theoretical contribution, management implications, limitations and avenues for future research.

2. Theoretical framework

2.1. Resources and capabilities

Given the research focus, a resource-based perspective was adopted when undertaking the study, in line with similar studies (Ulaga and Reinartz, 2011). As part of the resource-based perspective firms are viewed as bundles of resources and capabilities that provide the basis for strategic competitive advantage (SCA) (Fahy, 1996). Resources can be categorized as tangible or intangible, and are heterogeneous, meaning that each firm has an assortment of resources that is unique (Hunt and Morgan, 1995). Capabilities are less easy to categorize and are firm specific, developed over time and not easily tradable between companies (Amit and Schoemaker, 1993).

The relational service-based nature of solutions makes it appropriate to apply the principles of Resource–Advantage (R-A) theory to this study. According to R-A theory firms seek to combine resources in order to achieve superior financial performance and comparative advantage over rivals (Hunt *et al.*, 2006). A firm's core competences are intangible, higher-order resources, which are significantly heterogeneous across firms and imperfectly mobile (Hunt and Morgan, 1995). Resources can be categorized as operand or operant; with operand resources typically financial (e.g., cash), physical (e.g., raw materials, goods, plant) and legal (e.g., patents), whilst operant resources are typically human (e.g., skills/knowledge of employees), organizational (e.g., competences, culture), informational (e.g., knowledge of customers) and relational (e.g., relationships with suppliers and customers) (Madhavaram and Hunt, 2008). Service logic suggests that it is the application of operant resources for the benefit of the receiver that are most important, emphasising 'value-in-use' (Vargo and Lusch, 2004) and 'value-in-context' (Grönroos, 2012; Vargo and Lusch, 2008). Operant resources can be combined with other (operant or operand) resources to provide firms with operant resource-based capabilities, which are important for creating customer value in context (Grönroos, 2012; Ngo and O'Cass, 2009). An innovation-based operant capability has been found to be the dominant capability in enabling firms to achieve superior performance (Ngo and O'Cass, 2009). In this respect an innovation capability involves applying the knowledge, skills and resources of a firm's innovation activities.

2.2 Resources and capabilities for Single-Vendor Solution Providers

Although the focus of this study is MVSPs it is important to firstly assess what the literature says about SVSPs. Many of the resources and capabilities identified for SVSPs will also be applicable for MVSPs, since the latter may also develop and deliver solutions exclusively comprising their own

products.The literature suggests that resources and capabilities required by a SVSP centre on being the original equipment manufacturer (OEM) of a product. One of the most important resources a SVSP possesses is its installed base of equipment (Ulaga and Reinartz, 2011). The installed base provides the opportunity for the manufacturer to offer services and solutions over its products' lifecycles (Wise and Baumgartner, 1999). Having a large installed base of products could also enable the manufacturer to achieve economies of scale by providing services for multiple customers (Auguste *et al.*, 2006). Leveraging core capabilities across multiple markets allows deep investment to ensure that these capabilities exceed those of customers and competitors (Miller *et al.*, 2002).

SVSPs possess other resources connected with being an OEM, such as production tools, equipment components and product patents (Ulaga and Reinartz, 2011). Being the OEM of a product is likely to mean that the manufacturer's service employees have strong product-related technical knowledge (Matthyssens and Vandenbempt, 1998). However, technical knowledge related to own products is likely to have lesser importance as solutions start to include products from other manufacturers and address customers' business problems (Shepherd and Ahmed, 2000). When solutions start to address customers' business rather than technical problems, then manufacturers require additional resources and capabilities. Developing solutions for business problems relies on having customer-specific market/business knowledge or a market-sensing capability (Kindström *et al.*, 2012). This may come about through account managers researching customers' needs and working with them to create innovative solutions (Storbacka, 2011).

The transformation of a manufacturer to a solution provider often represents a significant challenge (Ulaga and Reinartz, 2011). The transformation involves changing existing organizational mindsets, capabilities and processes of value creation (Salonen, 2011). In developing a solutions culture, an important question is whether manufacturers' current employees have, or could be, trained to have a solution mindset; or whether new employees need to be recruited who already have this mindset (Ostrom *et al.*, 2010). Senior managers within the manufacturer need to lead the transformation from product- to solution-focus (Ulaga and Reinartz, 2011). This transformational task has been described as *management innovation*, which emphasises that manufacturers need to understand the potential of new service/solution-focused opportunities and key account management (Gebauer, 2011). To be successful at selling innovative solutions, relationships with customers need to be 'collaborative' and potentially represent a fundamentally new way of interacting with customers (Salonen, 2011). This might involve undertaking contracts which involve risk-sharing with customers, with payment linked to improvements in the customer's business performance (Cova and Salle, 2008; Kowalkowski *et al.*, 2009). This has been described as a result-orientated product service-system (PSS) (Baines *et al.*, 2009). In this environment developing new revenue and pricing models becomes key (Bonnemeier *et al.*, 2010). Developing innovative service/solution processes is another facet of *management innovation* (Gebauer, 2011). Innovation in customer processes might occur through developing improved service methodologies (Kindström *et al.*, 2012). It could also involve training the customer's

personnel to enhance the value of the solution (Tuli *et al.*, 2007) and managing service-based processes into a seamless solution (Töllner *et al.*, 2011).

In order to reduce the customer's perceived risks of buying the solution from a manufacturer previously noted for its products, SVSPs might also be able exploit their existing brand or reputation (Miller *et al.*, 2002). Customers are more likely to see highly regarded companies as competent and more likely to consider the interests of other parties when making decisions (Keh and Xie, 2009). It is likely that a SVSP's brand and reputation have been developed primarily through association with its products (Raddats and Easingwood, 2010), but nevertheless they could be exploitable resources for marketing solutions.

The first research question is therefore:

RQ1. *What resources and capabilities are required by Single-Vendor Solution Providers to develop and deliver solutions?*

2.3 Resources and capabilities for Multi-vendor Solution Providers

Many of the resources which are important for SVSPs are also relevant for MVSPs, since the latter may still provide their own products as part of the solution. However, there are some additional resources and capabilities that MVSPs require, e.g., the need for service engineers to be able to integrate products from multiple vendors into systems (Davies *et al.*, 2006). Service engineers therefore need to be trained how to install, maintain and support these products and have a holistic understanding of how they work as part of a system. To develop the necessary level of knowledge on these products, MVSPs may need to form partnerships with other manufacturers who can provide components for a solution (Storbacka, 2011). A manufacturer's resources and capabilities are therefore not just those directly under its own control but also ones that are 'indirect', i.e.,, under the control of other manufacturers (Gebauer *et al.*, 2013).

Whereas it would be expected that a SVSP develops the solution predominantly from its own product portfolio, a MVSP might be expected to be more vendor agnostic in what it supplies. Customers should therefore be able to trust that the MVSP is 'playing in the customer's team' (Brax and Jonsson, 2009, p. 553). Trust can be defined as the confidence that one partner has in another's reliability and integrity, and is one of the underlying tenets of relationship marketing (Morgan and Hunt, 1994). Trust can be considered as an indicator of relationship quality (Spohrer *et al.*, 2008) and might be demonstrated by recommending competitors' products as part of a solution (Miller *et al.*, 2002). This has been described as the 'acid test' for a manufacturer (Foote *et al.*, 2001); meaning that it is perhaps the ultimate test of how committed a supplier is to provide the best solution for the customer. To develop trust with a customer, a MVSP must therefore have not only service engineers with the

technical ability to integrate other manufacturers' products, but also the willingness to take end-to-end responsibility for the installed system base (Helander and Möller, 2008). Gounaris and Venetis (2002) had previously found that it was the quality and appropriateness of services that a manufacturer had previously supplied, that were important antecedents for the development of trust in mature relationships.

The second research question is thus:

RQ2. *What resources and capabilities are required by Multi-Vendor Solution Providers to develop and deliver solutions?*

Table 1 below summarizes the resources and capabilities found in the extant literature required by SVSPs and MVSPs.

Table 1 here

3. Research methodology

The research was designed to determine the resources required by manufacturers to develop and deliver multi-vendor solutions; as such a qualitative multi-case study was undertaken (Eisenhardt, 1989). Initial assessment was undertaken of the products/services offerings of the ten largest manufacturers in each 'manufacturing' sector (conforming to the UK's Standard Industrial Classification [2003] codes 20 to 35), to determine whether they offer multi-vendor solutions. The ten largest manufacturers in each sector were identified using the FAME database (Bureau Van Dijk). The analysis of these companies' customer offerings was initially conducted by considering their web-based marketing materials. The analysis suggested that offering multi-vendor solutions was prevalent in relatively few manufacturing sectors: 1) aerospace/defence (code 35), 2) information technology (IT) (code 30) and 3) telecommunications (telecoms) (code 32). The goal of theoretical sampling is to choose cases that are most likely to replicate or extend existing theory, so cases were selected from these sectors (Eisenhardt, 1989). A stratified purposive sampling approach was undertaken based on sector, with the unit of analysis the strategic business unit (SBU) within the manufacturer (Bryman, 2008). Four large MVSPs were selected in each of the three sectors (>£1 Billion per annum turnover). Suitable managers at the 12 MVSPs were identified and contacted by email and then telephone. An aim of the sampling process was to ensure that multiple manufacturers were selected from each sector to ensure that different perspectives were included in the results. Of the 12 companies initially contacted, the researchers negotiated access to six (two from each sector) and six cases were developed, with this number within the acceptable range for a multi-case design (Eisenhardt, 1989).

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For each case the interviewees were senior managers within the SBU's services or sales/marketing organizations with experience at developing and/or delivering solutions to customers. After the first interview an intra-company recommendation allowed a second interviewee to be identified, giving a total of twelve interviewees. Cases were completed by a review of archival records for each manufacturer, such as the emphasis given to solutions in its financial reports and portfolio of offerings. Table 2 provides information about the companies' activities, their solutions and who was interviewed.

Table 2 here

Data collection was via semi-structured interviews (Saunders *et al.*, 2007). An interview guide was prepared based on the main themes identified in the literature (i.e., the composition of a solution; the resources and capabilities used to develop and deliver solutions, particularly ones comprised of components from multiple vendors). The interview guide was reviewed by two peers with expertise in the research topic and a pilot interview was undertaken with a manager from the IT sector. Minor changes were subsequently made to the interview guide. Interviews were conducted over a six month period and were recorded, with each lasting on average an hour and a quarter. Transcripts of the interviews were provided to interviewees for verification before data were analysed (Bryman, 2008). Seven of the interviewees made minor changes to the transcripts. Data (interview transcripts and archival records) were analysed by thematic analysis using NVivo 7 (QSR International) (Saunders *et al.,* 2007). A number of themes were developed which aligned to the resources and capabilities identified from the literature. Thematic analysis of the textual data was conducted both within each case and between cases in order to search for cross-case patterns (Eisenhardt, 1989). Theoretical saturation was reached before the final case was completed; i.e.,, common responses to each theme were identified in the latter stages of the interview process (Eisenhardt, 1989). The final themes comprised; the drivers for solutions, how a solution is constituted in terms of products and services; the 'internal' resources and capabilities required to successfully develop and deliver solutions and the partnerships and relationships with other actors that are particularly needed for multi-vendor solutions. A management report of the findings was returned to each manager who took part in the research, with feedback confirming that these themes represented an accurate and complete account of the phenomenon under investigation (in accordance with Storbacka, 2011).

Credibility was achieved by using different sources of information to triangulate data, through checking the interpretation of the findings with respondents and discussing findings with academic colleagues experienced in this field (Lincoln and Guba, 1985). The issue of dependability was addressed by having a rigorous research method and templates documenting initial and final themes (Lincoln and Guba, 1985). Finally, transferability was improved by the comparison and integration of data from each company, with results transferable to similar companies in these sectors (Lincoln and Guba, 1985).

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4. Results

A summary of the main solution drivers and capabilities for each company together with an indication of the type of solution they offer is presented in Table 3. This is followed by identification of the key resources and capabilities for developing and delivering solutions (sections 4.1 and 4.2). Resources and capabilities identified are common among all case companies unless specified for a particular sector.

Table 3 here

4.1 Operand resources

There was evidence that financial resources were important for developing and delivering solutions; e.g., the ability to achieve economies of scale. Economies of scale might result in superior purchasing power of components and enable the development of methodologies and processes superior to those that customers could develop themselves. For example, the use of off-shoring was highlighted in the IT sector as an approach to efficient solution provision, with economies of scale achievable through running many customers' helpdesks from one centre of excellence.

Possession of physical and legal resources is closely linked to being an OEM. If the solution is based on a manufacturer's own products, then being the OEM has clear advantages; e.g., having an installed base of products for which new services can be developed (aerospace/defence and telecommunications sectors). However, when the solution is more akin to business process outsourcing, incumbency may become less important (IT sector). Despite this, delivering solutions from a position of having a product heritage gives a manufacturer the image of an industry practitioner rather than consultant, which can be an advantage over a competitor without this background:

> "We have been selling our capabilities for over 100 years; have a large installed base and presence in over 140 countries. We understand the core technologies that go into a solution". (VP Partner Management, Company 5, Telecommunications sector).

Despite the importance of operand resources, they appear to be only the starting point for developing and delivering multi-vendor solutions. Evidence from the study suggests that manufacturers need to utilize operant resources in order to successfully become a solution provider.

4.2 Operant resources

4.2.1 Human resources

It is important that the manufacturer's senior executives and account managers have strong knowledge of their customers' business challenges. A manufacturer's senior executives play the lead role in the transformation of a SBU from product seller to solution provider and are crucial for planning and implementing the strategy to develop a solution-orientated business. Senior executives must manage the potentially conflicting demands of solution-orientation and product-orientation within their businesses (aerospace/defence sector). Account managers must be capable of selling solutions and undertaking consultative sales engagements, with this activity distinctly different from a traditional sales approach:

> "This is a consultative engagement, which doesn't look or feel like a selling activity. Our people align on an industry basis, so they come with consulting expertise and industry know-how and then engage the customer at the Executive level in order to create solutions for the customer" (Services Business Manager, Company 4, IT sector).

These demanding requirements mean that new account managers are often recruited from the industry which they subsequently become accountable for (IT sector). Equally, service engineers need to be skilled, flexible, able and willing to maintain and repair own brand goods, integrate goods from multi-vendors and develop holistic support solutions.

4.2.2 Organizational resources

The successful development of a services or solutions culture for manufacturers appears to require a balance between two seemingly contradictory positions. These are: using a product heritage to demonstrate technical credibility (see section 4.1) whilst at the same time being vendor agnostic with respect to specifying solutions. In this sense, being vendor agnostic means that a manufacturer is prepared to supply the most suitable outcomes to meet the customer's needs, be they product free solutions, involve its own products, or involve those of other manufacturers. To be successful in providing solutions requires the supplier to put the customer's interests first, and these are not always compatible with those of the product SBUs within the manufacturer. For example, a solution provider might put greater emphasis on keeping existing products operational than undertaking large-scale technology refresh programmes. These challenges were highlighted:

> "A manufacturing culture is different to that of a services culture, which is more flexible, customer-accommodating, with different objectives. The cultures are diametrically opposed with it very difficult to persuade the manufacturing side of the business that the objective is not to sell as many engines as possible. In an OEM it is the reconciliation of those two different sides and competing interests and cultures that is important". (Managing Director, Support Services, Company 2, Aerospace/defence sector).

A services or solutions culture may therefore be difficult for a manufacturer to develop if it is dominated by product-centric SBUs (aerospace/defence sector).

4.2.3 Informational resources

To offer solutions requires an intimate knowledge of a customer's business challenges, its competitive environment and alternative approaches to address these challenges. If customers are to pay a fixed price for an agreed level of output or availability (key performance indicators or KPIs), it is important that suppliers have thorough knowledge of all the elements that could cause an over-spend and those areas where savings might be found. For example, how reliable are the components in a solution and therefore how often are they likely to fail? An OEM is likely to have a distinct advantage in this regard because of its product heritage:

> "We have an engineering heritage that is different from a lot of service companies, which is a strength, because we know how to design things from scratch and understand the deep aspects of the technology". (Managing Director, Company 3, IT sector).

If a contract includes an element of risk sharing, any savings are sometimes shared between the supplier and customer. It is imperative in this situation to have detailed information on customers' operational processes (and associated costs) to assess what additional savings might be possible. Using this information it might be possible for the manufacturer to re-design and operate the processes more efficiently than the customer can. If a manufacturer is the prime contractor then cost savings and process improvements might also be achieved through knowledge of sub-contractors' processes, with transparent sharing of information between the customer and the prime/sub-contractors necessary to achieve this:

> "I run workshops between our company, sub-contractors and the customer to give us visibility of what we all need to do to meet the availability KPIs. This is done in the spirit of partnering and working together in order to protect the aircraft's availability. It's about communication and data flow back to the customer about the number of parts needed and when they are needed, because the customer may not know what could cause us to fail on the KPI". (Programme Manager, Company 1, Aerospace/defence sector).

Thus, achieving KPIs is not solely the responsibility of the supplier(s), but rather it is a shared responsibility with the customer, with information sharing important for success.

4.2.4 Relational resources

Relational resources are central to delivering solutions. Manufacturers need to develop relationships with customers and other OEMs providing products for a solution. Relationships between a solution provider and customer might develop in many areas of the business, e.g.,, purchasing, marketing, operations and finance. Since many functions in the customer's business could be affected by a solution, there will be many customer/supplier contact points. These customer relationships provide the solution provider with a strong differentiator over a competitor only supplying products. Being seen by customers as impartial is an antecedent of trust building, with suppliers becoming more vendor agnostic as they address customers' business problems:

> "If you are product agnostic you can align yourself with the customer's interests and create commercial structures that mean you have a win-win relationship, with the solution being best for the customer and us. This way you really can get to the point where the customer trusts you". (Business Development Director, Company 6, Telecommunications sector).

The manufacturers in the study developed appropriate relationships with other OEMs in order to have knowledge of alternative solutions. In this situation, the focal manufacturer acts as the solution integrator, procuring components and integrating them into a single output. This means negotiating suitable agreements with these OEMs, so that technical support is available should equipment faults develop and engineers can be suitably trained. A solution integrator can help the customer to mitigate the inter-operability risk between disparate products. Acting as the solution integrator has risks for the manufacturer, with increasing reliance on external businesses with different capabilities and objectives. A manufacturer might have a range of partners for different aspects of a solution, with a company that has a genuine partnering ethos able to be part of the team (a sub-contractor) as well as leading the team (a prime contractor).

5. Discussion and Conclusion

5.1 Theoretical contribution

This study contributes to the emerging research field of service innovation in manufacturing companies through considering the resources and capabilities required by MVSPs as distinct from SVSPs. Table 4 sets out the major differences and similarities between the two types of solution providers.

Table 4 here

The first contribution of the study is the development of a solution continuum framework, based on the partiality/impartiality of the solutions being provided. Although continua are sometimes used in relation

to service infusion (e.g., Oliva and Kallenberg, 2003) this is one of the first to be developed in the context of solutions (Figure 1). The solution continuum provides a novel approach to investigating the resources and capabilities required by solution providers, with Figure 1 identifying positions along the continuum between the two extremes.

Figure 1 here

In addressing the first research question (RQ1), we find that the resources and capabilities that SVSPs require centre on being the OEM of a product. This study therefore supports other studies in this area (e.g., Wise and Baumgartner, 1999; Ulaga and Reinartz, 2011), but also identifies the importance of a manufacturer's product/engineering heritage. Product/engineering heritage is identified as an operand resource that confers operant informational and organizational resources that can facilitate creation of value in context (Grönroos, 2012; Vargo & Lusch, 2008). Having a strong product/engineering heritage enables manufacturers to competitively position themselves as practitioners (rather than consultants), thoroughly versed in the technologies of their industry. Product/engineering heritage thus becomes an antecedent of a manufacturer's brand and reputation (Miller *et al.*, 2002). The study's findings support Kindström *et al.*'s (2012) contention that product- or manufacturing-driven capabilities are not sufficient for success in service innovation. In particular, we find that the development of a service supporting culture is required, supporting Ostrom *et al.* (2010).

The focus of this study was identification of the resources and capabilities required by MVSPs to develop and deliver solutions (RQ2). The literature suggests that there are three important capabilities for MVSPs which are less important for SVSPs: 1) manufacturer's expertise at specifying the solution in order to engender trust with customers (Brax and Jonsson, 2009); 2) engineers skilled in servicing multi-vendor products (Brady *et al.*, 2005); 3) an ability to partner with component suppliers for the solution (Storbacka, 2011). This study finds support for all three capabilities, but crucially we find that each one mainly concerns a MVSP's technical proficiency: knowledge of alternative solutions, which might comprise competitors' products (capability 1); engineers who have been correctly trained in servicing other manufacturers' products (capability 2); agreements with other manufacturers to supply components for the solution (capability 3). All case companies demonstrated technical proficiency in solution provision. Beyond technical proficiency the second contribution of this study has been to identify 'impartiality' as a key operant resource-based capability (Ngo and O'Cass, 2009). Based on the results of this study we define 'impartiality' as: the degree to which an organisation offering solutions is unbiased when identifying the most suitable products for the customer, no matter whom the supplier, in concurrence with Galbraith (2002).

Thus, the ability of a MVSP to be impartial requires the combination of several operant resources: 'human', (e.g., a company's senior executives setting the organization's strategy and structure to ensure that impartial solutions can be developed and delivered); 'organizational', (e.g., the culture of

the company being one where customers' interests are genuinely put first); 'informational', (e.g., the sharing of information between customers and suppliers [and between suppliers] about components for the solution, processes and costs); 'relational', (e.g., recognizing the benefits of ceding control of some partnerships where this results in a better outcome for the customer). In this respect, the inter-relatedness of operant resources provides evidence for how MVSPs innovate to develop capabilities which underpin their solutions. This finding supports Evanschitzky *et al.*'s (2011) contention that innovation within one component of the solution might lead to innovation in other parts.

Impartiality is likely to have an important influence on trust between a customer and its suppliers. Whilst specifying the 'best' solution might involve recommending competitors' products (Davies *et al.*, 2006; Foote *et al.*, 2001), true impartiality suggests that the solution might not even involve technology/product replacement, with a possible solution designed to extend the lifecycles of customers' existing products. Impartiality can thus enhance a supplier's integrity in the eyes of its customers, so facilitating improved relationship marketing. Being perceived as impartial should enable a manufacturer to engage with customers about a wider range of issues, beyond the narrow confines of its own products. It might also enable a manufacturer to limit the extent to which a customer engages with competitors. A MVSP has the advantage over a SVSP in that whilst its solutions might exclusively comprise other manufacturer's products, this is not necessarily the case (see Figure 1). Becoming a MVSP is not without risks, with a focus on more holistic offerings potentially reducing the manufacturer's focus on product innovation. The cost of making the transformation from SVSP to MVSP is also likely to be high if new staff have to be recruited or existing staff re-trained. It can also be questioned whether customers actually want multi-vendor solutions from a manufacturer. Customers that are technically proficient might develop solutions themselves, although in industries with complex products and fast-changing technologies it is more likely that customers will require solutions from product experts. In the context of this study we particularly note the juxtaposition of product/engineering heritage and impartiality. We find that MVSPs need to use their product/engineering heritage to develop market credibility, whilst combining it with impartiality in service delivery to promote trust with customers. For MVSPs to be trusted by their customers, impartiality (as well as technical proficiency) appears a critical capability.

5.2 Managerial implications

Developing solutions is an attractive opportunity for manufacturers seeking growth beyond their core product markets. However, the difficulties of developing and delivering solutions are well documented, e.g.,, having account managers capable of selling solutions rather than products. We therefore advise managers to carefully consider their customers' requirements and their own resources to determine whether this might be an effective strategy. To become a trusted advisor might require manufacturers to be impartial and willing to specify vendor agnostic solutions. The solution might even include competitors' products, although if a manufacturer has powerful product-based SBUs then this

approach may be problematic. The best solution starts with a strong understanding of a customer's business problem. The development of the solution then involves working with partners both within and external to the focal manufacturer. The delivery of the solution requires skilled engineers capable of solution integration and management. Above all a solution must be in the best interests of the customer, with true impartiality demonstrated by a manufacturer overcoming internal friction towards the promotion of the products of other suppliers. This suggests that leaders need to consider how to effect culture change in order to embrace an impartial solution focus across all SBUs and functions within the manufacturer.

5.3 Limitations and further research

The main limitation of the study is the generalizability of the findings, which are confined to the aerospace/defence, IT and telecommunications sectors. Further understanding of the applicability and nature of impartiality in terms of solutions, particularly in other sectors, would therefore be valuable in terms of the wider applicability of the research. Another limitation is ambiguity in the distinction between a SVSP and a MVSP. At a certain level of granularity even a single vendor solution is likely to contain components from other suppliers. Our research suggests that the distinctive feature of a MVSP is the provision of solutions which include other OEMs' products; although we acknowledge that the distinction between a component and a product is not always clear. Since our study did not include SVSPs this position on the solution continuum is a theoretical extreme. Further research could identify whether it is important to distinguish between SVSPs providing all their own components and those providing only some of them.

Future research could explore the processes required to effect organisational culture shifts sufficient to make manufacturers capable of delivering truly impartial solutions. Perhaps more importantly, research should explore whether product heritage or impartiality is dominant in successful solution innovation across different industrial and customer contexts.

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