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The path to outcome delivery: Interplay of service market strategy and open business models

Ivanka Visnjic[a], Andy Neely[b], Marin Jovanovic[c,d,*]

[a] Department of Operations, Innovation and Data Sciences, ESADE Business School, Ramon Llull University, Av. Pedralbes, 60-62, 08034 Barcelona, Spain
[b] Institute for Manufacturing, Department of Engineering, University of Cambridge, 17 Charles Babbage Road, Cambridge CB3 0FS, UK
[c] Department of Industrial Economics and Management, KTH Royal Institute of Technology, Lindstedtsvägen 30, SE-100 44 Stockholm, Sweden
[d] Escuela Técnica Superior de Ingenieros Industriales, Universidad Politécnica de Madrid, c/ José Gutiérrez Abascal, 2, 28006 Madrid, Spain

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ABSTRACT

Firms in a variety of manufacturing sectors as well as the software industry have increasingly embraced services alongside their product portfolios in order to improve financial performance. Yet, the key question "How do service market strategy change and the accompanying business model change interact, and how does their interplay affect value creation?" remains open. Relying on twelve case studies of firms that have shifted towards providing highly advanced services (e.g. outcome-based contracts), theoretical propositions concerning the interplay of market strategy and business model on value creation are derived. The firms studied report two interdependent changes: first, they evolve the market strategy from provision of pure products to provision of services and then outcomes, in order to achieve a better fit with customer needs and to grow their service businesses. Second, they rely increasingly on partners and suppliers to provide new activities that are outside their competence base. This 'open business model' allows them to grow their new service businesses effectively and efficiently. At the same time, however, the shift to a service market strategy requires enhanced accountability to customers and increases the threat of penalties in the case of failure, while reliance on partners and suppliers leads to loss of control over the activity system and increases the threat of failure due to third party dependency. Thus, this paper finds that the success of firms that shift to services and outcomes hinges on their ability to balance the trade-off between increased value (i.e. growth, efficiency and effectiveness) and increased uncertainty associated with service market strategy/open business model interplay.

1. Introduction

The shift to provision of services – often referred to as servitization – became a prominent trend in a number of industries (Rabetino et al., 2018; Cusumano et al., 2015; Vandermerwe and Rada, 1988). Manufacturing and software firms have pursued service market strategy in order to achieve differentiation in increasingly commoditized product markets and increase their financial performance (Cusumano et al., 2015). For instance, industrial manufacturers such as Caterpillar and Atlas Copco offer maintenance and monitoring services for their equipment. A biopharmaceutical company, Pfizer, complements its products with a range of healthcare solutions that range from patient diagnostic tools to the tools that help track patient compliance with medications.

The most advanced stage of this shift to services is an outcome-based market strategy, whereby the firm guarantees the outcome (result) that the customer requires and combines diverse products with the service offer (Ng et al., 2013; Suarez et al., 2013; Visnjic et al., 2017). For instance, GE Aviation, a subsidiary of General Electric, and Rolls-Royce, the aerospace and defense company, began as manufacturers of airplane engines (product), then included services such as maintenance in their portfolio (product plus service), and finally shifted into selling 'flying hours' by guaranteeing the availability of their engines (outcome) (Ng et al., 2013; Batista et al., 2016; Howard et al., 2016).

Most scholars agree that services and outcomes create higher value for the customer and, consequently, firms create growth opportunities pursuing these strategies (Sawhney et al., 2004; Fang et al., 2008; Visnjic Kastalli and Van Looy, 2013; Kowalkowski et al., 2017). However, for the service and, especially, the outcome-based market strategy to be executed effectively and efficiently, it needs to be accompanied by change in the business model used to deliver the service or outcome (Forkmann et al., 2017b; Kindström, 2010; Visnjic et al., 2016).

It remains unclear what this business model change entails and how value creation is affected by it. Consequently, the interdependencies

* Corresponding author at: Department of Industrial Economics and Management, KTH Royal Institute of Technology, Lindstedtsvägen 30, SE-100 44 Stockholm, Sweden.
E-mail addresses: ivanka.visnjic@esade.edu (I. Visnjic), adn1000@cam.ac.uk (A. Neely), marinjo@kth.se (M. Jovanovic).

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between a shift to service market strategy and a change in the business model, including their combined impact on value creation, are not well understood (Forkmann et al., 2017a; Hacklin et al., 2017; Visnjic et al., 2017; Zott and Amit, 2008).

This is, indeed, an important concern and represents a gap in the literature, especially since empirical evidence suggests that a shift into services can represent an implementation challenge that not only results in faltering growth but also destroys value (Fang et al., 2008; Visnjic et al., 2017), damages the firm's performance (Kohtamäki et al., 2013; Suarez et al., 2013; Visnjic Kastalli et al., 2013; Josephson et al., 2016) and ultimately risks firm survival (Benedettini et al., 2015).

Thus, the question addressed in this research is: "How do market strategy change and business model change interact in response to the shift into services and outcomes, and how does their interplay affect value creation?" To answer this question, we studied 12 firms (11 manufacturers and software providers, and one pure service provider) from 6 diverse sectors that shifted to services and outcomes. As expected, the results show that firms gradually extended their market portfolios to provide additional services, ultimately guaranteeing the provision of outcomes. As firms progressed along this path, the range of activities that needed to be executed in order to deliver the additional services, and to ultimately guarantee outcomes, also increased. As some of these activities lay outside their competency base or could be delivered more efficiently by other firms, they were forced to collaborate with partners and outsource to suppliers, thereby 'opening up' their business models (Chesbrough, 2007, 2010, 2012; Tushman et al., 2012; Kortmann and Piller, 2016) so as to deliver those services effectively and efficiently (Zott and Amit, 2008; Gawer, 2014).

The simultaneous shift to service market strategy and the opening up of the business model carries two implications. On the one hand, embracing service market strategy grows the service business, whilst opening up the business model increases the effectiveness and efficiency. Thus, the interplay of service market strategy and open business model creates value yet, it also increases risks and uncertainties. For instance, embracing an outcome-based market strategy implies accountability to the customer´s outcome and the imposition of penalties if those outcomes are not met. At the same time, opening up the business model implies less control over the activity system for the firm and greater risk of partner/supplier opportunism or failure to coordinate activities with them. This paper refers to this value creation and accumulation of risks and uncertainties as 'accountability spread', and argues that the ability to find the market strategy/business model combination that optimizes the trade-off between increase in value creation and increase in risks and uncertainties may determine the sustainability of servitization.

2. Theoretical foundations

2.1. Shift from product to service market strategy

Some product-centric firms have embarked on an extensive shift into services over recent decades (Neely, 2008; Santamaría et al., 2012; Baines et al., 2017). As products became more commoditized, service offerings came to represent a means of differentiation (Bharadwaj et al., 1993; Wise and Baumgartner, 1999; Ulaga and Eggert, 2006; Antioco et al., 2008), particularly in mature industries (Cusumano et al., 2015). Consequently, manufacturers and software providers began gradually to create value by providing services more efficiently and/or capitalizing on the complementarities between products and services (Anderson and Narus, 1995; Visnjic et al., 2016) and growing the service business (Visnjic Kastalli et al., 2013; Kowalkowski et al., 2017).

As a result, firms are broadening the range of services offered with the provision of outcome-based service as the most advanced service stage (Jovanovic et al., 2016; Ng et al., 2013; Visnjic et al., 2017). Outcome delivery entails offering guarantees to deliver specific outcomes required by the customer, where the firm coordinates provision of diverse products and services necessary to ensure that performance is delivered (i.e. maintenance and repairs) (Ng et al., 2009; Howard et al., 2016). The 'power by the hour' contract, in which an airplane engine manufacturer charges an airline 'by flying hour' for guaranteeing the availability and reliability of their engines, is a good example. Thus, 'power by the hour' is not only a product and service contract bundle (product-service system or solution) or an engine-plus-maintenance leasing agreement (substitution service or subscription) but also a full performance guarantee, where the engine manufacturer incurs penalties in the event that the outcome or result does not meet the target.

As a manufacturer embarks on a trajectory to embrace services alongside its product portfolio or even replace the two by providing outcomes, the change in market strategy may trigger changes in the components of the business model (Demil and Lecoq, 2010; Johnson et al., 2008). The business model represents the design of the activity system, which consists of organizational activities that must be executed in order for the new service to be delivered (Zott and Amit, 2010). Several authors have recognized that service orientation triggers changes across the focal firms' business model (Paula et al., 2013; Reim et al., 2015).

In particular, Bustinza et al. (2013) identify that the servitizing firm shifts from transactional to relational engagement with the other firms involved in the activity system. Indeed, this may mean that a servitizing firm adopts a business model that is closely intertwined with that of a customer. At the same time, Vendrell-Herrero et al. (2017) warn about more frequent appearance of service intermediaries, a specialized service firms that offer wide range of services and position themselves between servitizing firm and its customer. Appearance of an intermediary may affect this relational engagement and warrant a business model that accounts for the interactions with them (the intermediary) as well (Burton et al., 2016). Similarly, Forkmann et al. (2017b) demonstrated how servitization decoupled the relationship between the focal firm and its customers and, on the other hand, coupled between the distributors and customers.

Furthermore, scholars have begun to engage in discussion about capability configuration for servitization (Raddats et al., 2015; Rönnberg Sjödin et al., 2016; Sousa and da Silveira, 2017; Story et al., 2017). Gebauer et al. (2013) argue that manufacturing firms will not be able to master all the required capabilities internally and, therefore, should instead rely on suppliers from various types of service network to execute activities where the manufacturer lacks capability. Finally, Paiola et al. (2013) point out that, besides the options of executing activities internally and externally, there is also an option to execute activities in collaboration with a partner firm, which they refer to as a mixed-capability development. In a nutshell, embracing service and, in particular outcome-based strategies, forces firms to rethink the way they create value for customers but also the way they do their business (Desyllas and Sako, 2013; Hacklin et al., 2017; Priem et al., 2017).

2.2. Business model changes

Independently from the service market strategy, business model change has received increasing attention in management research over the last 15 years (Foss and Saebi, 2017; Massa et al., 2017). Setting out to understand the theoretical foundations of value creation in an e-business, Amit and Zott (2001) observed that a firm´s decision on *what* products and services to deliver to the customer, which represents the basis of its market strategy, is distinct from its decision on *how* to deliver those products and services. They coined the business model as a crucial value-creation construct that explains *how* firms deliver value, which they defined as 'the activity system design'. Furthermore, novel design of the activity systems, which represents business model innovation, emerged as a prominent research area in its own right (Amit and Zott, 2012; Hacklin et al., 2017; Sanchez and Ricart, 2010; Zott and Amit, 2010).

One of the changes that has received considerable attention is the

shift to the open business model (Chesbrough, 2006; Chesbrough, 2007; Saebi and Foss, 2015). Zott and Amit (2010) argue that an activity system may exceed the boundaries of one firm and grow to represent a system of interdependent activities that transcends the firm's boundaries and spans the ecosystem of firms interconnected by virtue of their value-creation functions. The shift to an open business model represents a redesign of the activity system, involving more of these external firms in the execution of selected activities.

Manufacturers are increasingly adopting open business models as they integrate consumers and other external parties into value creation and value capture (Randhawa et al., 2016; West and Bogers, 2014; Kortmann and Piller, 2016). Opening up a business model is often justified by improving profitability through saving costs by co-developing (von Hippel and von Krogh, 2003) and/or capturing value from complementary resources (Alexy et al., 2017). Furthermore, research demonstrates that open business models allow firms to leverage the capabilities of their ecosystem partners to achieve greater innovativeness as well as effectiveness and efficiency (Chesbrough, 2012; Gianiodis et al., 2014). Strategic openness may also allow firms to reduces uncertainty and facilitates coordination in delivering complex value proposition (Dattée et al., 2017). For instance, some firms choose to establish a dynamic control over different stakeholders, while relying on them to provide products and services to each other (Dattée et al., 2017; Gawer, 2014; Gawer and Cusumano, 2002).

2.3. Interplay of service market strategy and open business models

The choice of the business model, therefore, represents an important factor in the successful implementation of the market strategy. Besides the interplay between business model and *market* strategy (how they decide to tackle customer needs) (Zott and Amit, 2008), scholars have studied the interplay between business model and competitive strategy (positioning vis-à-vis competitors) (Casadesus-Masanell and Ricart, 2010; Teece, 2010) and business model and *technology* strategy (which technologies they decide to focus on) (Baden-Fuller and Haefliger, 2013; Chesbrough, 2010; Gambardella and McGahan, 2010). In the case of technology strategy, it has been widely acknowledge by now that technology breakthroughs is not sufficient, and new business models that support their commercialization are needed in order to exploit business opportunities (Chesbrough and Rosenbloom, 2002; Tongur and Engwall, 2014; Velu, 2015; Willemstein et al., 2007).

Similar to technology strategy, service market strategy represents an important complement to the business model change since it triggers a major change in value creation and value capture (Chesbrough, 2011; Kortmann and Piller, 2016; Randhawa et al., 2016). For instance, Witell and Löfgren (2013) acknowledged the importance of the change in business model by unpacking the effect that the change from services-for-free (where services are a product support and promotion tool) to services-for-fee (where services represent a business in their own right) market approach has on the business model design. However, while these represent notable contributions that shed light on the importance of the interplay between the two value-creation constructs, it is yet to be uncovered *how* this interplay influences value creation for the manufacturer or software provider. Indeed, it is already known that market strategy and business model change carry implications for value creation *independently* (Sosna et al., 2010; Chesbrough, 2010; Sinfield et al., 2012; Hienerth et al., 2012; Martins et al., 2015). It has also been established that the interplay between the two is important and determines the success of the company (Teece, 2010; Zott and Amit, 2010). Yet, very little is known about how the two interact or become coordinated in the endeavor to deliver value. This represents a pertinent question in the case of service – and particularly outcome – strategies, given that the shift to highly advanced services is coupled with fundamental redesign of the underpinning business model (Forkmann et al., 2017b; Visnjic et al., 2017). Thus, this study has centered on the question: 'How do market strategy change and business model change interact in response to a shift into services and outcomes, and how does this interplay affect value creation?'

3. Methodology

3.1. Research design

The nature of the research question prompted a thorough investigation of changes in the market strategy and business model, their independent implications for value creation as well as their interdependency. The case study methodology was chosen to allow us to collect rich observations on complex relational processes (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). Moreover, we opted for an inductive multiple case study design (Yin, 1994).

As suggested by Glaser and Strauss (1967), theoretical sampling was chosen, selecting cases would make it possible to illuminate the relationship between constructs of the market strategy and the business model (Suddaby, 2006; Eisenhardt and Graebner, 2007). In this theoretical sampling, it was decided to identify firms that already had experience providing the most advanced forms of services and outcomes. This facilitated mapping out the entire evolution of the service portfolio that preceded this advanced stage as well as the corresponding business model changes.

The sampling was approached by first identifying the sectors flagged by the academic literature and academic experts where servitization was particularly pronounced. Review of the academic literature and discussions with academic experts identified six sectors: (defense and construction) equipment manufacturing, construction, utility, rail transportation, IT, and consulting (Davies et al., 2007; Neely, 2008, 2014; Josephson et al., 2016).

Second, firms were selected from within these sectors by relying on practitioner-oriented publications, trade press and industry experts. The primary focus of this research was to make a selection from sectors with different degrees of *concentration in the customer base*, knowing that sectors with higher concentrations of customer base are better placed to deliver customized solutions and outcomes (Davies et al., 2006). The sample included firms such as defense and transportation solution providers that tended to have one or two customers, as well as consulting and IT providers that had hundreds of customers. Overall, six firms operated in a single-customer ecosystem, two operated in ecosystems with multiple similar customers dominant within a geographic area and, finally, four firms operated across different ecosystems with multiple customers.

The six sectors varied in aspects other than the aforementioned concentration in the customer base. For instance, IT hardware, software and services have shorter product lifecycles than the other sectors, particularly rail transportation and the utility sector (Cusumano et al., 2015). Furthermore, the aerospace and defense sector has a highly concentrated user customer base (Ng et al., 2009; Batista et al., 2016), particularly compared to equipment manufacturing and IT hardware, software and services (Oliva and Kallenberg, 2003; Suarez et al., 2013; Visnjic Kastalli et al., 2013).

The final selection included 12 firms, from the 6 sectors chosen (see Table 1 for SIC codes): 3 equipment and solution providers (2 from aerospace and defense, 1 from construction), 2 rail transportation providers, 2 utility equipment and services providers, 2 construction and maintenance services providers, 2 IT hardware (computer), software and consulting services providers, and 1 consulting services and solutions provider. While 11 firms were initially product providers that shifted into services and outcomes, the last firm on the list was in fact a service provider that shifted into advanced services and outcomes. This firm was treated as a comparative baseline in the data analysis, in order to identify potential differences in patterns between the 11 product 'natives' and this service 'native'. The results showed, however, that the patterns closely resembled those of the two IT hardware and software providers that shifted to consulting services and solutions.

Table 1
Company information table (latest available).

	Sector	SIC Code	Clients (range)	Employees (range)	Revenues (million $)
BAB	Aerospace and Defence Equipment and Solution Providers	3721	< 10	1000–10.000	< 1000 m
BOB	Train and Train Manufacturer	4011	< 10	1000–10.000	1000–10.000 m
CAR	Construction Equipment, Services and Consulting	3531	10–100	1000–10.000	< 1000 m
HIC	Train and Train Manufacturer	4011	< 10	< 1000	< 1000 m
IBA	IT Hardware, Software and Consulting Services	7371	> 1000	> 10.000	1000–10.000 m
MAG	Construction and Maintenance Services	3531	10–100	1000–10.000	1000–10.000 m
NIS	Consulting Services and Solutions	8748	10–100	< 1000	< 1000 m
ROR	Aerospace and Defence Equipment and Solution Providers	3721	10–100	> 10.000	1000–10.000 m
STR	Utility Equipment and Services (Water)	5084	> 1000	1000–10.000	1000–10.000 m
SMS	Utility Equipment and Services (Energy)	5084	10–100	> 10.000	N/A
SWO	IT Hardware, Software and Consulting Services	7371	< 10	< 1000	< 1000 m
VIN	Construction and Maintenance Services	3531	100–1000	1000–10.000	1000–10.000 m

Choosing on average two firms from each sector helped the process of isolating patterns that were consistent across firms and across sectors. More specifically, a 2-step analysis was performed where, first of all, firms within the same sector were compared, isolating patterns for each sector, and then the patterns across the sectors were compared. This helped to strengthen replication logic and increase construct validity (Yin, 1994). Pair-wise comparison was made within a sector resulting in sector-specific conclusions, which could then be followed by cross-sector comparison producing generalized insights. The sample of 12 cases was large enough to extract theoretical insights from the data (Glaser and Strauss, 1967; Eisenhardt, 1989). This sample also facilitated the detection of patterns that are consistent across the large variety of sectors (Edmondson and Mcmanus, 2007). Table 1 provides an overview of the cases.

3.2. Data collection

For each of the case firms, interviews were conducted with over 42 informants lasting approximately 90 min each. Informants came from the ranks of top management (e.g. Chief Executive Officer, Chief Information Officer, managing consultant, business lead). The right profile and seniority of the respondents took priority over the number of respondents within the firm. This research focused primarily on interviewing top management because of the all-encompassing and strategic nature of the topic and the questions we sought to obtain. This seemed sufficient to obtain a coherent picture of the firm's product and service portfolio and its business model.

The interview structure rested on the core constructs of the service market strategy and business model research outlined earlier (Kvale, 1996). Firstly, respondents were asked to outline their market strategy, explain how it had evolved, and describe what were the intended and unintended (desirable and undesirable) implications of the strategic change on value creation. Then, they were asked how the business model had changed, and what were the implications of this change. Probing further, questions were posed about the interdependencies between market strategy and business model change they had described, as well as the shared implications for value creation.

While focusing on the constructs derived from the literature, more general labels were used to describe them. For instance, the primary researcher sought to obtain a full picture of the content, structure and governance of the firm's business model (Zott and Amit, 2010) by asking 'who provides which activity and how is this provision organized?'. The primary researcher then asked explicit questions such as 'what is the firm's market strategy, and how did it change over the last period?', 'what is your business model, and how did it change over the last period?', 'how and why did you involve partners in these activities?' 'how do you create value within your market strategy and business model?', and 'how do you capture that value?'.

3.3. Data analysis

Interviews were recorded and then transcribed, while background data were collected from secondary sources in parallel (Yin, 1994). Transcripts were first coded with respect to their fit with the broad categories defined in the literature (market strategy and business model/activity system design)(Corbin and Strauss, 1990). During the second coding, new subcategories were allowed to emerge with particular emphasis on the change (Corbin and Strauss, 1990; Birks and Mills, 2011). For *market strategy change*, important changes in scope, time and outcome were recognized. Similarly, for *business model change,* three subcategories of activities that were the most affected by the shift to an outcome business model were distilled: these were labelled *internal, supplier*, and *partner*. After analyzing the business models of each individual firm independently, two researchers instituted an independent cross-firm analysis. The resulting insights were compared across the categories and sub-categories, with the aim of identifying patterns and arranging them in a coherent 'story line' that explained the firm's value creation change. The researchers then compared the resulting insights to obtain a coherent narrative. Differences in the analysis were resolved by re-examining data from the interviews.

In an effort to validate understanding of the characteristics of individual firms' business models, firm representatives were first invited to workshops where the analysis of their business model was presented and/or informants were sent their business model profiles. Second, the results of the cross-firm analysis were shared with diverse group of academics and practitioners, including the informants from the case-study organizations. All comments presented on individual-case or cross-firm analysis were accepted and incorporated into the overall analysis. Table 2 summarizes efforts related to the data collection, analysis and validation.

4. Findings and propositions

Insights offered by respondents easily lend themselves to being categorized into three broad areas: the shift towards service and outcome-based market strategy and the corresponding implications for value creation; the shift towards open business model and the corresponding implications for value creation; the interplay of the two and the implications of this interplay for value creation. In the Tables below, supportive findings from each of the 12 cases are presented: Table 3 summarizes the changes that firms made as they shifted from a product into a service and outcome market strategy and from a 'closed' towards a more open business model. Tables A1, A2, respectively, offer quotations that link these changes to value creation and increase in risks and uncertainties. In the subsequent section, we elaborate on these findings are explained and a number of interlinked observations, which are then summarized in a conceptual framework, are derived.

Table 2
Data collection, analysis and validation.

Code	Interviewees	Observations	Workshop /conference attended
BAB	Business Lead, Service Design Engineer Capability Manager, Head of Capability Development, Head of Systems Engineering, Head of Strategy and Planning, Head of Programme Governance, Head of Service Unit	Several company visits, workshops, speeches	YES
BOB	Director, Predictive Asset Management, Business Development Responsible, Service Contract Manager, Monitoring Specialist	A company visit	YES
CAR	Manager Supply Chain Solutions, Vice President Business Development	A company visit, speeches, workshops	YES
HIC	Maintenance Delivery Manager, Head of Maintenance Delivery, Chairman and CEO	Two company visits	YES
IBA	Managing Partner and General Manager, Consulting Services Leader, Executive Partner (2), Client and Programme Executive, Banking and Financial Markets Executive Architect, Senior Managing Consultant	Several company visits, workshops, speeches	YES
MAG	Director of Information Systems - Chief Information officer (CIO)	A company visit	NO
NIS	CEO Europe, Vice President UK	A company visit	YES
ROR	Head of Business Analysis, President of Services Business, Head of Services Research and Development	Speeches	YES
STR	Director, Strategy and Regulation (CEO), Chief Information officer (CIO)	A company visit	NO
SMS	Director and the CEO	A company visit	NO
SWO	Director, CEO, Executive Partner	A company visit, speech	YES
VIN	Commercial Director	–	YES

* For each firm in the sample the case histories were supplemented by internal documentation and archival records. In addition, the reports were mailed back for validation to the firm representatives.

4.1. Market strategy shift

Representatives of each of the 12 case firms reported that they added services and then went on to make the transition to outcomes with the objective of maximizing coverage of customers' functional needs. For example, a significant 'step' in the expansion of the market strategy would be for a defense system provider to expand its portfolio from delivery of a standardized military aircraft to a 'guarantee of an air combat capability with certain technical specifications over 20 years'. Subsequently, this could be expanded with the defense solution

Table 3
Market Strategy Change and Business Model Change summaries.

Market strategy change	Business model change
BAB: Scope- From spare parts delivery to spares inventory management. Time- From ad-hoc supply of spares to a multi-year contract (up to 5 years). Outcome- Now guaranteeing spares availability for target cost (price/km of vehicle use).	Internal- New activities to manage the inventory, investments in inventory IT systems. Suppliers- Increase in complexity of the supply chain- number of suppliers. Partners-Started partnering for delivery of spares for partner's vehicles.
BOB: Scope- From train sales to through-life train asset management service portfolio. Time- From ad-hoc maintenance service provision to multi- year contracts. Outcome-Now penalty clauses and revenue share incentives (e.g. energy efficiency).	Internal-New data diagnostics experts and systems service business model adoption. Suppliers-New technical support and spares supply contracts w/ suppliers. Partners-Started partnering for provision of technical support and spare supplies.
CAR: Scope- From warehousing to 24 supply chain (SC) related services. Time- From commodity services of 1–2 years, to customized 5-year contracts. Outcome-Contracts w/ guaranteed availability of inventory including maintenance, repair and operations (MRO) processes.	Internal-Developed internal knowledge on inventory management. Suppliers-Subcontracting the transportation services. Partners-Partnering w/ consulting and software firm to develop SC software
HIC: Scope- From trains to train solutions (refurbishment, full rebuild and cleaning). Time- From ad hoc to 7–9 years and finally 27 (7 + 20) years. Outcome- Charging for usage guaranteeing availability, reliability and cleanliness.	Internal-Hired with well-trained and experienced service staff that do a range of jobs. Suppliers-Extended contracts with their suppliers into spares supply. Partners-Partnering with depot developers to finance train ownership.
IBA: Scope- From hardware to services and integrated solutions. Time- Post-merger integration IT projects last between 36 and 60 months. Outcome- A structured process to assess the possibility and the level of guarantee.	Internal-Came up with structured engineering process to assess guarantee offerings. Suppliers-Collaborate to fill their skills gaps (e.g. for specialized software). Partners-Global research network (3500 pure researchers)
MAG: Scope- From blue-collar services (road repair) to all city support services. Time-From one-off projects to 5- year contracts and above. Outcome- Revenue-sharing agreements based on cost targets	Internal-Substantial expansion through acquisition of support-service providers. Suppliers-MAG relies on the supply network of small local service providers. Partners-Partnering with IT provider to generate data for all city support services
NIS: Scope- From connecting clients to research community to helping in problem definition. Time- Developing into long-term relationships where NIS works closely with clients. Outcome- Vouching with reputation that found solution does not exist elsewhere.	Internal-NIS hired PhDs in diverse fields to translate and generalize problems. Partners-NIS nurtures network of 2 million researchers
ROR: Scope- From selling engines to selling engine capacity. Time- From ad-hoc supply of spares to long-term contracting for capability. Outcome- Guaranteeing engine performance, in terms of availability and reliability.	Internal-Monitoring room to track engines in real-time on civil aircraft. Suppliers-Extensive product and technology supply chain. Partners-Integrated solution delivery in partnership w/ other service firms
STR: Scope- From clean water to all-water and 'door-to-door' solutions. Time- Working under 20-year rolling contracts. Outcome- Delivery of service is measured by 20 KPIs. (e.g. leakages, quality).	Internal-Investing in data analytics using social media for customer support. Suppliers-Outsourcing to third parties (e.g. private drains and sewage leakage). Partners-Partners with engineering firms for designing and building water wells.
SMS: Scope- From energy data reading to smart meter installations and data analytics. Time- Starts with pilots (install one or two smart meters), to get long-term renewal contracts (3 years and more). Outcome- Paid for quality data only; not all data collected	Internal-Invested in data analytics competencies. Suppliers-Relies on workforce solution providers for management of field workers. Partners-Partnering with offshore wind farms solution providers.
SWO: Scope- A set of 8 interrelated IT support services to citizens. Time- The partnership, which is set to run for an initial period of 10 years, began in 2007. Outcome- Provider makes 100% of the profits and covers 100% of the losses.	Internal-Created entirely new organization with novel organization- a JV with clients. Suppliers-Each of the partners brought its own suppliers Partners-Services partly provided by the three JV partners- city councils.
VIN: Scope- From ad-hoc construction services to facility management solutions. Time-From ad-hoc services to 3–5 years contracts to 25–40 years contracts. Outcome-Contracts for facility service availability with response time penalties.	Internal-Consolidated scattered service outlets in a consolidated service chain. Suppliers-New service data IT system for a nationwide network. Partners-Partnering with an IT company to ensure full integration with the client's system.

provider taking responsibility for design of the aircraft incorporating certain specifications, for the availability of the system through its working life, and for all related services (e.g. maintenance, monitoring) that are necessary to vouch for such a capability.

The analysis of the market strategy changes confirmed that 11 manufacturers and software providers were increasingly shifting towards services and outcomes, and the one consulting services provider was adding additional services and shifting into outcomes as well. This comes as no surprise given that this was sampling criterion. However, by analyzing the service portfolio expansion of case-study firms, we managed to unpack the overall shift and isolate three separate phases of expansion towards the outcome-based market strategy. First, the firms expanded their portfolios by expanding the ***scope*** of the services or adding new services. For example, a construction equipment provider (CAR) began by offering basic warehousing services and then gradually expanded the value proposition to cover the complete spectrum of logistic services, including procurement and transportation. On many occasions, these 'new services' had been previously executed by the customer. The project manager at the construction equipment manufacturer explained, "*We start with the simple services. Let's say warehouse management, plus transportation, and people. And after having seen what we do, how we work, the level of quality we deliver, the customer makes some more enquiries for new, more complex services, like customer support, inventory management, packaging services*."

Second, the firms extended the ***time frame*** of the service, vouching to provide the required service over an extended period. Here, the services changed from the transactional to the relational; once the long-term contract has been signed, two members of the organizations would invest more time in building relationships with each other and working more collaboratively. For example, an equipment manufacturer shifted from 'on demand' maintenance of trains, delivered upon the request of the customer ('when customer calls') to a regular maintenance contract spanning several years with a preset maintenance schedule. A senior executive explained, "*Management spotted the opportunity to move from a project-based business into a more long-term relationship with customers. The customers got one large contractor (referring to the firm under study). Having (only) one provider supplying the whole range of services gives them office economies of scale*."

Third, the firms shifted from providing services as activities or processes to ***guaranteeing*** the outcome of those services or a performance corresponding to the activity executed. In this example, a supply chain consultancy guaranteed a certain level of inventory combined with an assurance covering the availability of the stock rather than charging for hours spent on warehouse management and transportation service.

Observation 1a. Firms extend their market strategy into services and, finally, outcomes using three different phases: first, expansion of the scope of services, second, extension of the service time frame, and third, adding performance guarantees related to their product-service portfolio.

Besides revealing the phases in the transition from products to services, analysis uncovered the motivations associated with this shift.

First, by expanding the scope of the service portfolio, firms assume the responsibility of coordinating different product and service activities on behalf of their customers. More specifically, they begin by managing the multitude of services that are interdependent and tangential to customers' own core businesses, where they can be more cost effective than the customer. For example, several years after the UK rail privatization, train manufacturers took over train maintenance from the train operators – after the latter recognized the link between manufacturing and maintenance.

Second, with a long-term contract, the firm can improve the quality of the service. More specifically, securing a long-term contract that will generate revenues over a number of years means that the firm can justify larger upfront investments in the assets or systems that would improve the quality of service delivery. For the equipment manufacturers involved in supply-chain service provision, securing a long-term contract to manage the supply chain on behalf of the customer justified investments in the design of a specialized IT system that would offer a better supply chain service. Conversely, if there would be no long-term contract and consequent uncertainty in future revenues, the firm would not make this investment. Similarly, a project manager at one of the rail transportation firms explained, "*If we extend contracts to 15, 20 year contracts… it works well for us because we can invest. So, on a 7-year contract, we can't really invest and we also have the incentive conflict, because the way you optimized on the 5–7 years would be different than for 20 years*."

Finally, by guaranteeing the results that the customer is seeking, firms take on the risks and uncertainties formerly shouldered by the customer. From the firm´s perspective, this creates value by securing long-term revenue streams. As one project manager illustrated, "*it's pretty much delivering performance… the majority of our contracts tend to be, what we call line-based (recurring) fees, guaranteed cutoffs, guaranteed availability, guaranteed inventory returns, whereby in fact we take the risk. And obviously, with risk comes reward*". In return for reduced uncertainties, guaranteeing performance leads to growth in revenues for the firm.

Observation 1b. Each of the phases associated with the shift into services creates value for the company in a specific way: scope expansion reduces complexity and increases efficiency, time frame extension increases revenue security and allows for upfront investments, performance guarantees reduce customer uncertainties and secure growth for the manufacturing firm.

At the same time, the firm becomes exposed to certain risks and uncertainties. To start with, the firm espouses the operational risk associated with new service activities.

Second, a consequence of signing a long-term contract creates what we refer to as 'dynamic uncertainties', or the uncertainties associated with changing environmental conditions. This is especially true if leasing of equipment is associated with the long-term contract. For example, train manufacturers are beginning to offer ´trains as a service´ charged on a 'per day' basis in a contract that spans years and even decades instead of selling the train and offering on-demand maintenance. This increase in the time frame from on-demand to long-term contract induces (at least) two sources of uncertainties related to changing environmental conditions: the risk of volatility in financial markets and the changing interest rate. A manager illustrated the multitude of environmental factors that can change: "*You make a commitment. And the trouble is, a lot of that is not that easy. Things (referring to unexpected costs) come along that you don't expect. Things change. Other people's margins change. They (referring to partners and suppliers) put their prices up. And, you have to then redistribute your cost profile."*

When firms make the transition from delivering a service as a 'process' (e.g. delivering warehousing activities on demand or in a long-term contract) to guaranteeing a service outcome (e.g. guaranteeing reduced inventory levels), they espouse performance risks and uncertainties. This risks and uncertainties stem from the inability to foresee all the factors that may prevent the firm from meeting performance targets and incurring penalties associated with the failure to do so. For example, at the onset of service provision, one of the train manufacturers that started offering train services faced thousands of pounds in penalties on a daily basis due to its failure to make available the agreed number of trains each day. Similarly, the IT hardware and service provider (SWO) that embarked on a joint venture with its customers faced losses of £ 18 million in a single year, due to its inability to deliver the services to the expected level of efficiency. For instance, Head of Maintenance Delivery at HIC explained, "*We had to fix the price of the contract before we actually started the deal, so it meant we had to sort of take a punt on the labor rates based on our experience*."

Observation 1c. The shift into services and outcomes creates different types of risks and uncertainties: scope expansion introduces operational uncertainties (uncertainties of being able to perform a new service activity), time frame expansion introduces dynamic uncertainties (uncertainties associated with changing environmental conditions) and performance guarantees introduce performance uncertainties (uncertainties of being able to meet product/service performance criteria).

4.2. Business model shift

Besides changing their market strategies, the firms also reported changes in their business models. As they increased the scope of the service portfolio, ***the range of activities*** needed to be performed began to increase as well. When these activities were closely related to the activities they already performed and where they had substantial competencies or the potential to develop certain competencies in the future, firms made a decision to execute these activities on their own. For example, an ICT hardware and consultancy services provider continued to produce standardized products – such as mainframes – because they were necessary 'entry tickets' to provide through-life support and consulting. They also started to design a business process model and develop an appropriate ICT architecture for their customers, as this was closely related to their existing activities.

As the shift in market strategy progressed into more encompassing and longer services, service activities began to appear that fulfilled the contract requirement but were unattractive from the financial standpoint or unrelated to the firm's competencies. This prompted firms to open up their business models. First, having to deal with financially unattractive ´simple´ service activities led firms to outsource these activities to suppliers who were prepared to execute them on behalf of the firm for a competitive price. For example, a facility maintenance provider outsourced cleaning services, a logistics service provider outsourced transportation, a train manufacturer outsourced painting, and a logistics provider outsourced transportation.

Second, the time frame expansion and the performance guarantees increasingly triggered the need for more complex service activities that required specialized competencies or assets. These services were far removed from the firm's core activities and competencies and, therefore, required collaboration with specialized partners. For example, a water utility firm increasingly partnered with construction expert firms on the design and delivery of complex water containers, while an equipment manufacturer with supply-chain consulting solutions partnered with software designers to develop state-of-the-art software for supply chains and logistics. The collaborations with partners tended to be much more complex than outsourcing agreements with suppliers and, as the number of partnerships increased, so did the complexity.

Observation 2a. Firms are extending their activity systems with additional activities using three different modes: first, internal delivery (when the activities are close to their competencies), second, supplier outsourcing (when activities can be performed more efficiently externally) and, third, partner collaboration (when specialized external competencies or assets are necessary).

While extending its service portfolio assures growth through creating value for customers, extending the activity system provides the opportunity for efficiency and innovation. To start with, internal execution of new activities related to the firm's competence base helps to achieve economies of scope internally. More specifically, as the volume of similar activities grows, the firm can cross-leverage their fixed assets (e.g. IT infrastructure) on a higher volume of activities.

For the service activities that require very few competencies or commoditized services, providers achieved lower cost bases by outsourcing the activities to the cheapest suppliers. Stated differently, outsourcing these service activities to the (commoditized) sub-suppliers ensures that the service activities are provided most cost effectively. Explaining how efficiency of the activity system is achieved, a senior executive commented, "*We manage suppliers. We manage the in-boundary fix and flow and then the outbound flow to the customers*".

Further, in the case of some of the sophisticated new service activities, firms were prompted to reach out to partners in order to leverage their competencies. Relying on collaborators with complementary skills and competencies allowed the firm to generate complementarities and, in particular, to combine their respective expertise to innovate. Explaining how they managed to design a new IT system for supply chain management, a senior manager responsible for the supply chain consulting services commented, "*We've set up an alliance some time ago to work with SAP on the latest aftermarket software. We created a live SAP module for the next generation of service part management.*"

Observation 2b. Each of the modes associated with the activity system expansion creates value for the firm in a specific way: internal delivery of related activities realizes economies of scope, supplier-led execution of commoditized activities increases efficiency, and partner-led execution of the sophisticated yet unrelated activities lead to complementarities and innovation.

At the same time, activity system redesign exposes several uncertainties and risks. As mentioned earlier, when a firm starts to perform new activities (even if related to their capabilities), they become exposed to operational risks and uncertainties simply because they are novel. An ROR manager explained, "*some of these other more innovative ideas are a bit riskier because they've not been tried before and I can't quite imagine it, because it's new and different.*"

Besides these internal uncertainties, informants also reported uncertainties related to opening up the activity system to suppliers and partners, including the customers themselves. These uncertainties were often rooted in difficulties securing adequate interface standards (e.g. long-term contracts) and in the resulting lack of accountability of suppliers. One of the senior executives described a situation where it had taken accountability for the performance of the train over a long period of time, but it struggled to convince its suppliers to guarantee provision of spare parts over the same period of time. In an arrangement where the train was sold as opposed to leased with a performance contract, the customer would shoulder the uncertainties of not being able to procure spare parts.

New uncertainties also appeared in the collaboration with partners. In this context, they were often related to the unforeseeable challenges in cross-boundary coordination and changes in incentives. Furthermore, in the advanced contracts with performance guarantees, customers often assumed the role of the partner and, thus, the expansion of the activity system would change the incentives of the customer himself. For example, once the long-term performance contract was signed and the train manufacturer assumed responsibility for through-life provision of a functioning train, the key employees of the customer – train operators – were less concerned about the wear and tear of the train and began to drive more recklessly, leading to more frequent train malfunction. Besides uncertainties associated with the incentives and coordination, in the case of the partners, analysis also revealed uncertainties associated with innovation. Stated differently, coordination and incentives were more uncertain because they also carried the inherent uncertainties of (joint) delivery of a novel set of activities.

Observation 2c. The expansion of the activity system, following the shift into services and outcomes, creates different types of uncertainties: internal uncertainties (uncertainties associated with the ability to execute a new service activity internally), supplier uncertainties (uncertainties associated with supplier incentives and coordination) and partner uncertainty (uncertainty of partner incentives and coordination related to the novel activities).

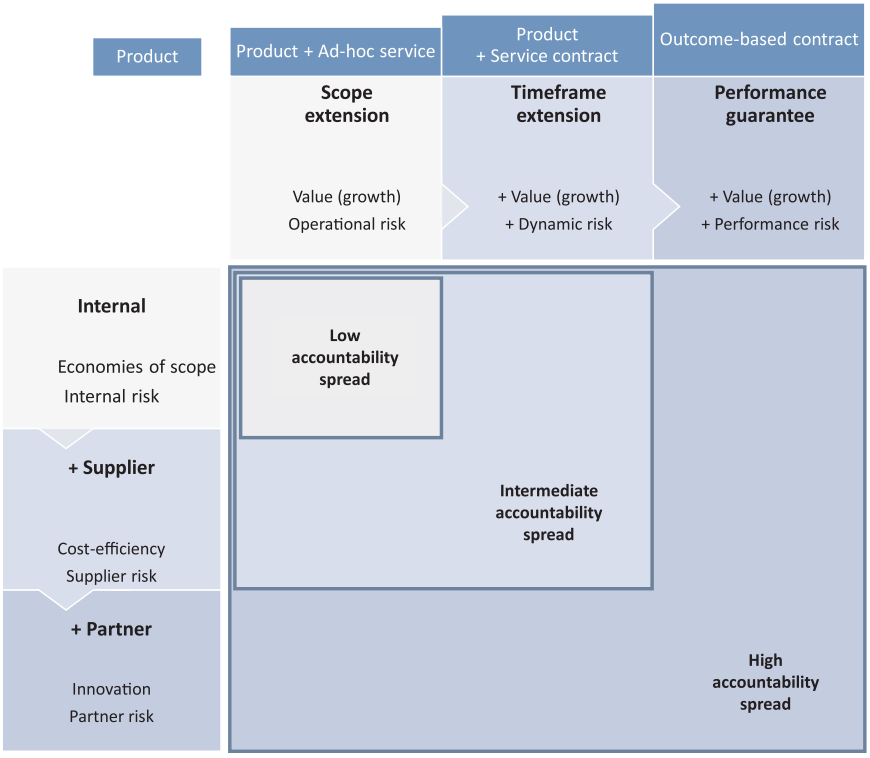

Fig. 1. Interplay of Service Market Strategy and Open Business Models.

4.3. Relationship between market strategy shift and business model shift

Fig. 1 below presents the conceptual framework and summarizes propositions related to the shift to a service/outcome market strategy, a shift to an open business model, and their relationship. More specifically, Fig. 1 portrays the phases of the service market strategy shift (horizontal axis) and the corresponding modes of opening up the business model (vertical axis).

As illustrated by the horizontal axis, the shift to service market strategy consists of three different phases: extension in the scope of services, extension in time frame and inclusion of performance guarantees. In the aforementioned example, the manufacturer of train vehicles started with the (on-demand) delivery of the maintenance service, then signed a 7-year contract to provide that maintenance service, and finally evolved into a performance-based contract spanning more than 20 years and guaranteeing availability, reliability and cleanliness of the fleet of trains.

Not only are these phases sequential, but this research paper also suggests that the performance guarantee almost always encompasses time-frame extension and scope expansion and that the time-frame extension almost always encompasses scope expansion. For instance, a firm that commits to a performance-based contract guaranteeing the availability of equipment (performance guarantee) very often has to be prepared to sign this contract over a certain period of time (time-frame extension) and to guarantee availability, i.e. to accept responsibility for maintenance of the equipment (scope expansion).

Observation 3a. Three modes of the market strategy shift/service portfolio expansion are sequential and interrelated. Performance guarantees encompass time-frame extension and scope expansion, while time-frame extension usually encompasses scope expansion. Manufacturers tend to approach this shift gradually, initially with scope expansion, followed by time-frame extension, and finally with performance guarantees.

As illustrated by the vertical axis, the business model shift/activity system expansion consists of three qualitatively different modes: the addition of internal activities, the addition of activities performed by the supplier, and the addition of activities performed by partners. These three modes of the business model shift are **not** necessarily interrelated with each other but are triggered by the phases of market strategy shift/service portfolio expansion. More specifically, service scope expansion leads to internal activities, time-frame extension likely encompasses supplier activities, and performance guarantees often lead to the inclusion of partner activities.

A good example of the interrelatedness between service expansion modes and activity system expansion modes comes from the supply chain service and consulting, performed by one of case-study firms. The equipment manufacturer started with on-demand delivery of a warehousing service and then went on to procure from time to time several services that were related to supply-chain management, such as warehouse-inventory management. These services were delivered internally, by leveraging existing warehousing used for their own equipment (internal activity). Gradually, they replaced this portfolio of individual services with a long-term service contract for management of the customer's supply chain, including the transportation of inventory directly linked to warehousing. While the supply chain contract included transportation as the responsibility of the firm in this case study, it was not best placed to deliver cost-effective transportation services internally. Thus, it decided to take on the responsibility but to outsource this commoditized service to specialized suppliers (supplier activity). Finally, the case-study firm shifted from a long-term supply chain service contract to a performance-based supply chain service contract, where it guaranteed availability of the inventory to their customers. In order to discharge this responsibility, they partnered with an ERP system provider to design new specialized supply chain management software (partner activity).

Observation 3b. Three modes of the business model shift/activity system expansion are interrelated with the modes of market strategy shift/service portfolio extension. Internal activities are likely to emerge with extension of the scope of services, supplier activities are likely to materialize with time-frame extension and partner activities are likely

to appear with more complex performance guarantees. In line with the market strategy shift/service portfolio extension, business model shift/activity system expansion begins with new internal activities and then increasingly 'opens' the activity system by including supplier and partner activities.

As stated earlier, each phase of service portfolio extension brings its own value creation potential (1b) as well as uncertainty and risk (1c). As these phases are sequential (observation 3a), the value creation potential as well as the risks and uncertainties accumulate. In other words, as manufacturers and software providers progress in the provision of additional on-demand services, then on to those services with longer time frames, and finally to performance guarantees during those time frames, they accumulate growth opportunities and secure future revenues. However, in addition to this increase in growth potential, they also accumulate risk and uncertainty, at first operational, then dynamic, and finally performance uncertainty.

At the same time, the effect of each phase of service portfolio expansion on activity system expansion implies that the same 'cumulative effect' occurs with activity system value creation opportunities and uncertainty. More specifically, service scope expansion prompts internal activity expansion; time-frame extension prompts supplier activity expansion, and performance guarantees prompt partner activity expansion. As a result, activity system value creation opportunities (economies of scope, then cost-efficiency, and then innovation) and risks and uncertainties (internal, supplier, partner uncertainty) accumulate as well.

This paper refers to this cumulative increase in value creation potential and uncertainty, on both the market strategy and business model sides, as an **accountability spread**. This label was chosen because, with service portfolio expansion, a firm increases its accountability to the customer whilst opening up the activity system spreads accountability for the delivery of service activities by its partners and suppliers.

Observation 3c. A market strategy shift to services and the consequent shift to an open business model introduce a cumulative effect in terms of service portfolio value creation and service portfolio risk and uncertainty, coupled with an increase in activity system value creation, and activity system risk and uncertainty. This step-wise expansion in value creation potential and uncertainty is labelled, the accountability spread.

5. Conclusion and discussion

The market strategy and business model changes by manufacturing firms and software providers seem to exhibit two concurrent tendencies. On the one hand, firms change their market strategy by expanding the scope of their services, extending the timeline of services and guaranteeing the performance of both product and services. As a consequence, the manufacturer´s activity system is enlarged with additional activities that are delivered either internally or through outsourcing to suppliers (if more efficient delivery is needed) or through collaboration with partners (if additional competencies are required). This enlarging and opening up of the business model generates value through economies of scope (internally), through greater cost effectiveness (by commoditized suppliers) and by introducing innovation (through partnerships). Indeed, these two interlinked changes help manufacturers and software providers to create value by growing, and doing so efficiently and effectively. Yet, at the same time, these firms accept greater accountability in terms of customer outcomes and, thus, customer-oriented uncertainties and risks (operational-, dynamic-, and performance-related). This is coupled with relinquishing control over the activity system to suppliers and partners, and accumulating associated risks and uncertainties (internal, supplier and partner uncertainty). This two-fold increase in the potential for value creation and uncertainty is labelled, 'the accountability spread'. It is argued in this paper that a firm embarking upon this journey needs to consider where it wants to place itself in relation to this risk-reward trade-off, and what kinds of capability it possesses that will allow it to materialize the potential for value creation whilst containing the uncertainty. Judicious identification of appropriate levels of accountability spread in combination with management's capacity to actualize value creation potential and to curb uncertainty represent key capabilities in the shift to services.

5.1. Academic contributions

This study relates to the literature on servitization and service market strategies, and on business models, in several ways. It contributes to the understanding of the shift to service market strategy by delineating change steps that the firm makes on the level of its portfolio. Indeed, the notion that product-oriented firms add layers of services to their products is not new (Chase, 1981; Vandermerwe and Rada, 1988). However, while the notion of adding services based on different activities (e.g. adding maintenance followed by monitoring activities) is well-established, further steps that take the service market strategy in the direction of outcomes (i.e. timeline extension and then performance guarantee addition) have not been clearly defined. This also makes a contribution to the literature looking at how firms shift to other, more encompassing, closed-loop value chain market strategies (Kortmann and Piller, 2016). Furthermore, while most of the previous literature provides typologies (Kortmann and Piller, 2016; Visnjic et al., 2017), this study offers the process perspective.

This research paper strengthens understanding of service/outcome market strategies by explaining the value creation and capture rationales that prompt firms to shift to service market strategies and consider the value creation/capture that occurs at each step of the shift to services and outcomes (i.e. different types of growth rationale that promote expansion of activities, extension of the timeline, and addition of guarantees). Moreover, while prior literature (Visnjic et al., 2017) has looked at the value-creating rationales underpinning the shift to service and outcome market strategies *together* with the subsequent shift in the business model, this study unpacks the value-creating implications of the two changes and explore them separately.

This paper contributes to the servitization and open service innovation literatures by advancing another mechanism to explain why and how services, openness and business models are connected (Chesbrough, 2011; Kortmann and Piller, 2016; Saebi and Foss, 2015). Prior literature guided by the seminal contribution of Chesbrough (2011) focuses on the process by which open innovation practices trigger the adoption of a service business model. This is consistent with the assertion of Cusumano et al. (2015) who find that more elaborate innovations require the sale of additional services. This study reveals the opposite relationship to be true as well; findings suggest that the shift to a service market strategy stimulates the shift to an open business model, thereby complementing the findings of Chesbrough (2011) and Cusumano et al. (2015).

Furthermore, recognizing the service market strategy as an antecedent to open business models makes a contribution not only to the open business model literature but also to the broader business model literature. So far, colleagues have focused on technology strategy and other product market strategies as antecedents to business model innovation (Baden-Fuller and Haefliger, 2013; Chesbrough, 2010; Chesbrough and Rosenbloom, 2002; Massa et al., 2017; Zott and Amit, 2008). Furthermore, revealing the service (outcome) market strategy as another antecedent to the open business model offers a lateral contribution to this line of research (c.f. Appleyard and Chesbrough, 2017).

Besides highlighting the antecedence from service strategy to open business model, the mechanisms and value creation/capture rationales by which this happens are unpacked. As with service market strategy, the steps leading to the shift to the open business model and on to the value creation/capture rationales are delineated. Specifically, the study

helps to explain when and how servitizing firms execute activities internally, and engage with suppliers or partners. In doing so, it offers a distinction between supplier relationships, which are mostly driven by efficiency rationales, and partner relationships, which are mostly driven by effectiveness, competence combination and innovation rationales (Kortmann and Piller, 2016). Consequently, this study may also add to the value migration concept as it distills activities related to shift in value-creating forces (Alexy et al., 2017; Hacklin et al., 2017; Slywotzky, 1996).

This research paper contributes to the literature on business models by using a process perspective to explore the steps involved in business model change. Moreover, for each step in business model change, antecedent change in the service market strategy are identified. This interdependence and co-evolution of the service market strategy change and the business model change is very frequently observed in the manufacturing and software sectors, but the process by which it unfolds has been largely overlooked by scholars (Forkmann et al., 2017b; Massa et al., 2017; Priem et al., 2017). Indeed, outlining the process of interdependence supports the efforts of scholars who have separated the market strategy and the business model, and noted their interdependence, but have not yet mapped the process by which this unfolds (Zott and Amit, 2007, 2008).

This study emphasizes that, in order to understand how the interplay of (service) market strategy and business model changes affects value creation (Casadesus-Masanell and Ricart, 2010; Teece, 2010), risk and uncertainty are crucial parameters to consider together with sources of value creation (Reim et al., 2016). Servitization literature has begun to recognize accountability as a business model driver (Visnjic et al., 2017). While Visnjic et al. (2017) define accountability as one of the value drivers behind outcomes, this study advances our understanding by explaining the process through which accountability spread emerges and develops, step by step.

Finally, several lines of research that exists at the intersection but are not entirely connected are linked: servitization and open business models, servitization and open service innovation, servitization and business model change (Kortmann and Piller, 2016; Randhawa et al., 2016). In addition, this study offers some insights that are relevant to platform literature. Accountability spread is conceptualized as a factor that should be considered in conjunction with the shift to open platforms (Dattée et al., 2017; Gawer, 2014).

5.2. Managerial contributions

In managerial terms, this paper makes three important contributions. First, the paper identifies the critical sources of value creation as well as the risks and uncertainties that firms are required to manage if they are to successfully make the shift to services and innovate their business models. Second, the paper highlights the reasons why servitization can be challenging, especially for asset-heavy complex manufacturing firms. Third, understanding the process helps to shed light on the capabilities that are needed to support this shift: (i) capabilities to understand customer's needs; (ii) capabilities to work with suppliers and partners; and (iii) capabilities to identify sources of accountability spread, and to monitor and manage them.

The first set of capabilities is concerned with the extent to which the firm really understands and is able to articulate the customer's business needs. Often phrased in terms of outcome or contracting for capability, the notion here is that truly understanding the customer's business needs is a pre-requisite for developing an appropriate service or solution. Gaining this in-depth understanding requires the firm to 'walk in the customer's shoes', delving into the essence of its business model and how value is created. The second set of capabilities recognizes that rarely does a single firm possess the entire set of skills required to support a particular service or solution. This is becoming a more acute problem as the complexity of technology and its associated applications grows. A consequence is that, increasingly, firms have to open up the boundaries of their business and work more closely with a set of complementary ecosystems partners. Identifying who these partners should be, what role they should play, and how best to coordinate effort between them becomes critical. The final set of capabilities relates to the concept of accountability spread. The issue here is that, as firms take on more responsibility for delivery – e.g. contract for outcomes – they simultaneously involve other firms (over which they have limited control) in the delivery. Consequently, the firm has additional responsibility but reduced control, which inevitably increases risk and exposure.

5.3. Limitations and further avenues of research

The research reported in this paper has some limitations. Relying on twelve case studies makes it possible to obtain fine-grained insights with respect to market strategy change and business model change, but it introduces limitations on generalizability. Translating the findings obtained into larger-scale research efforts – with the aim of assessing the performance impact of different combinations of market strategy – business model choices would certainly be a valid next step. Furthermore, focus has been on the value creation of firms that undergo changes in market strategy and in their business models, with less concentration on the value-creating implications of the customer. Finally, this study is one of the first studies to provide empirical evidence of step-wise interplay between service-market strategy change and business-model innovation; further research in this area is needed. Specific areas of interest include the geographic aspects of 'opening up' the business model that follows servitization, and the use of the platform approach that accompanies this change.

Appendix

See Appendix Table A1 and A2.

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Table A1
Representative quotes related to value creation.

Market strategy change and value creation			**Business model change and value creation**		
Scope	Time	Outcome	Internal	Suppliers	Partners
MAG: So, two years ago, we really didn't have any environmental business, now it's one of our growth engines, partly through acquisition and partly through growth. And we are now one of the key players in recycling services. About two years ago we didn't do it at all. What we've been up to in some of the counties is combining that with highways and actually sort of bundled services to our clients. So actually we could take all of that from you. Much better value for money, we can start coordinating the services and get economies of scale out of it. So as a business, we're looking for how we keep adding on more services to do that. But secondly we tend to be very much blue collar in a sense that all the decision-making and budget management is still done by the local authority. So one of our potential growth areas is, well we can actually take some of that [decision making] off you and do more of the budget management.	**HIC:** …we renewed the [7-year long] contract for twenty [years]. Then we have got a whole life [of the train], and that helps us because we can invest. **SMS:** We prefer long-term contracts. Three-year [contracts] then become renewal contracts after [three years]. That's what we prefer. With some of the new technology, it starts off with pilots. So, for some of this [energy] metering [services] that we talked about we are sort of installing one or two to get them to see the benefit before we can then go along with another proposition to roll it out to hundred of [customer's] nine hundred stores. **MAG:** So the last five years particularly, the business has changed from a projects-based business into a business where we're a service provider. We actually don't build much at all these days. We don't actually have many one-off projects, it's all long-term contracts of five years plus, typically.	**IBA:** We do upside risk reward based deals where we know we are very good at something because we've done it many times before and it's big, it's multi-year, and it's in the clients' interest to make sure that it's done to world class standards. So where we over-deliver, because it's early, and do all things we said we'd do, than they pay us a bonus, and if we're late than we pay them, in credits, service credits. **STR:** We publish in the public domain 20 KPIs that we are looking to achieve. For example, how much are we reducing leakage by, and how many houses are at threat of low pressure; we measure customer complaints, so if they rung us up and we've not replied and they then send us a letter. We measure whether we polluted any rivers, we measure extraction, we measure these KPIs. And we then monitor our performance against those KPIs, which lead to our strategic intentions.	**ROR:** [explaining the activities developed to deliver engine availability service] from our operations room, we can monitor all our engines all over the world – in the air, in real time. So that we can call up the pilot and say:" Just dial back a bit." Indeed, we can arrange to have spares, or maintenance crews on the ground, waiting for the aircraft to land if we're a bit worried about it and use that real-time data to look at reliability and plan maintenance. And we've got experts there to give advice to people all over the World. **NIS:** Our core knowledge is in understanding how to translate [innovation problems]. Companies normally talk in solutions … a company may come to us and say 'our customers want a new drill which is faster, less noisy, less dusty' and then we analyze it and say 'the problem that you have is that you want to create a hole' and we can help you in finding better ways to make that hole.	**SMS:** We go from the IT world, data analytics etc. all the way down to field operations. We schedule and optimize the blue collar workforce, but not necessarily the people management side (recruitment, training and development). We're a technology company. We add value by using systems to optimize the effectiveness of the work force. We're not the most economic in managing a large blue collar work force so we use specialized companies for that. **STR:** [talking about the construction of water tanks] we don't have our own designers, we don't have our own build teams, we will source those through large third-party contractors and we will sign up with them for 5-year contracts. **MAG:** [talking about taking over a supply services in a city] Obviously we have some key suppliers at the corporate level but we will try to use the local supply chain as well.	**CAT:** The reason our dealers exist is that they provide a value add that we don't think we can provide. They bring agility, knowledge of the local market, the local practices, a relationship and understanding of the local aspects and behaviors, access to the right resources, the right location in the territory that they cover. **NIS:** We've reached about 2 million people over the last 11 years in all projects that we've done, and it's an open network. We approach on average 10,000 people with a Request Proposal, that's a very structured document that we use to actually tell them about the problem that our client has and we're asking them to respond in a non-confidential way.

Table A2
Representative quotes related to accountability.

Market strategy change and customer accountability			**Business model change and loss of control**		
Scope	Time	Outcome	Internal	Suppliers	Partners
IBA: [talking about a new IT solution] So, we've got a 25 million pound opportunity. We've got 24 months for it. It will be across business units. So you will have front office transformation, which is to do with channels, people and revenue. And a back office one which is to do with customer service quality, operational stability and cost reduction. This is dangerous as you're changing everything at once.	**HIC:** Spare parts business is a very long-term business, so you have to think seven, even twenty years in advance. And if you think about a train, it's got about a hundred what we call tier−1 suppliers. So a hundred pieces of kit with a suppliers name on it around a vehicle. Beneath all that is a whole sub-tier, so it's into the thousands of suppliers, and we've got to manage all of that, and it's very difficult, because companies go bust. And if it's a small organization they'll go bust and they'll just disappear, because it might only be ten people. Key suppliers should be big enough not to fail. You can just lose access to everything.	**SMS:** We're testing the water to see how far to go on performance management contracts. The danger with performance management contracts is they become quite inefficient because of the conditions that one enters from a contractual point of view. This is because things change very quickly and you end up with a lot of clauses, which then lead to wrong behavior. So it becomes, in a way it becomes anti-productive.	**MAG:** [talking about challenges when overtaking support service delivery from a city] most of our employees are actually given to us, a lot of our contracts were public sector, utilities, so we actually don't choose our workforce, largely. So a large percent of our cost base is given to us. So how do we make that more efficient? How do we deliver against the commitments we	**HIC:** [talking about taking over the maintenance of the trains designed by competitors] Whenever you interface with somebody else's kit, it is always a risk. Because they won't tell you everything about it. And it's in their interest in the after-sales to keep some of the risk.	**SWO:** [talking about partnering with clients in a joint venture] A flaw in the model is 'I make my money out of the venture, they make their money out of the reduction in the charges'. So I'll do a little role-play: "Dear board, we'd like to put up our prices in line with the contract. Do we all vote for that?" 30% would go absolutely no way.
SMS: [talking about a shift from the energy reading to smart meter installation and managing services] One of the key things is to manage the commercial risks. As that market declines, we have to have the right business model to manage the labor cost down in parallel with the volume reduction as smart meters get put on walls. No one can firmly predict how many smart meters will go on the wall in 2013, 2014, but we're signing up to 5-year contracts so we have to have some sort of revenue protection clauses to protect us.	**IBA:** Lots of the programs might run very well, and to high standard and still be cancelled, because something external hits the environment, which makes it irrelevant or the wrong thing to do. There will be environmental reasons for a lot of them, direct and indirect, economic crisis, changing the law, public opinion, all kind of things.	**SWO:** [explaining the consequences of entering a joint venture with the client; where the budget for the service is set and all the profits and losses from inefficient service delivery are borne by the client]. So I think we lost something like 18 million last year, something like that, I think it might have been more the year before, and of course it's all us.	made to our clients with the workforce, which is exactly the same workforce. So that is a challenge for us and clearly our ability to make margin is pretty much driven on how we can do that more efficiently. **BOB:** Usually when something good is discovered, the company's top management wants it done everywhere throughout the company, and that can put in danger the whole incubation process.	**IBA:** It's very easy to write a back-to-back contract between you and somebody in the ecosystem, that's easy. But that in itself doesn't guarantee that you can deliver on you commitments. So you have to take a business judgment which says 'if I'm going to have to deliver this project, do I just have one supplier or do I need to go to multiple suppliers?', 'how do I manage, how do I mitigate risks that any of these suppliers could fail'. And that's where you get some interesting challenges. We will have a contingency plan against a mitigation plan. So if this fails, this is what we would do and this is how we would recover from it.	Now, the second thing is we say "ok, can we all agree that the answer is 63″, so 70% of us will say yes, 30% will say actually we need now to take this to our members to check, and we go "oh", and then it delays processes, and if we had some major decision to take it would be a disaster. So they treat it as a governance meeting, turning up being briefed, they're not equipped to make a decision.

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