ORGANIZING FOR SOLUTION BUSINESS:
INTERNAL VS EXTERNAL RESOURCE INTEGRATION

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Abstract:

Despite increased importance of solution business, we know surprisingly little about manufacturers' strategic logic for seeking access to, and integrating resources required for developing and delivering solutions to extensive customer needs. Existing literature identifies two alternative approaches for organizing solution provision: the systems seller approach; where the firm primarily uses internal resources; and the systems integrator approach where the firm integrates resources residing outside its boundaries. This paper investigates in detail the systems seller and systems integrator approaches as two opposing strategic logics for accessing and integrating resources required for solution provision. The paper applies an abductive approach where literature on solutions, strategic networks, firm boundary decisions, and organizational modularity is combined with rich empirical material to identify and conceptualize the premises for choosing an appropriate organizing approach for solution provision. We draw on two in-depth case studies of global manufacturers, Wärtsilä and Kone, operating in the metal engineering sector. The cases represent manufacturing companies that have increasingly transitioned to solution based business, but have followed very different paths. This paper contributes to solution research by increasing understanding of manufacturing firms' organizing approaches for solution business, the drivers prompting these choices, and the related organizational challenges and opportunities.

Keywords: solution business, service transition, resource integration, industrial manufacturer

Competitive paper

INTRODUCTION

Commoditization pressures and heightened competition have increasingly prompted product manufacturers to transition to service intensive business (e.g., Wise and Baumgartner, 1999; Spohrer & Maglio, 2008). In this transition, solution based business has been identified as an attractive alternative, as it builds on synergistic spillovers between the firm's core product and service operations (Fang et al., 2008).

Solution provision involves the integration of products and/or services into a seamless whole that meets customer specific needs and offers greater potential for value creation than the individual components would have alone (Hakanen & Jaakkola, 2012). Thus, solution providers need the ability to access and integrate a broad set of resources and components from different organizational functions, units, or actors (Windahl & Lakemond, 2006; Davies et al., 2007; Jaakkola & Hakanen, 2013). Existing solution literature identifies two alternative approaches for organizing solution provision: the systems seller approach; where the firm primarily uses resources based in the organization; and the systems integrator approach, where the firm integrates resources residing outside its boundaries (Davies et al., 2007). In this paper, we explore the strategic logics for resource integration that lead firms to choose between these organizing approaches for solution provision.

These ideal solution approaches and reasons for their adoption are seldom compared or contrasted in extant research. As Gebauer et al. (2013) note, most research on solution business considers it to be an effort of a single firm. Studies addressing strategies for transitioning to solution business predominantly focus on the solution provider's integration towards the customer, and provide little insight into resource integration among the suppliers involved in creating the solution (see e.g., Helander & Möller, 2008; Nordin & Kowalkowski, 2010; Storbacka, 2011). Some recent research has examined resource integration efforts among solution providers by applying the network perspective (e.g. Windahl & Lakemond, 2006; Hakala and Jaakkola, 2012, Gebauer et al. 2013), thereby addressing cases where providers operate as systems integrators. This research has shown that solution providers draw upon various network configurations (Gebauer et al. 2013), and the way in which resources are integrated affects solution performance (Frankenberger et a., 2013) and value creation by the various network actors (Jaakkola & Hakanen, 2013). However, these studies do not investigate why system integration was chosen as the strategic logic by the firm pursuing service transition, and have as yet provided fairly limited insight on the strategic logic for network set up for solutions delivery (Frankenberger et al., 2013).

Existing research in the field of integrated solutions, despite recognition of the different organizational configurations for solution delivery, and the growing preference for network based models, has shown remarkably little interest in systematically examining the alternative approaches for accessing and integrating resources, or the drivers and implications of choosing a particular strategy for solution provision. Why some manufacturers prefer internal versus external resource integration strategy as they transition to solution based business is therefore insufficiently understood. Although various theoretical perspectives, such as transaction cost economics and resource dependence theory, have been used to study forces driving the choice between vertical integration and inter-firm collaboration, the relevance and manifestations of such drivers in the solution context have remained relatively unexplored.

To fill these gaps in existing research, the purpose of this paper is to investigate in detail the systems seller and systems integrator approaches as two opposing strategic logics for accessing and integrating resources required for solution provision. These approaches can be argued to represent different ways of creating value through solutions, and lead to different organizational configurations for solution provision. We examine the drivers prompting firms to choose between these approaches and discuss the implications of such choices.

The paper applies an abductive approach whereby literature on solutions, strategic networks, firm boundary decisions, and organizational modularity is combined with rich empirical material to identify and conceptualize the premises for choosing an appropriate resource integration strategy of solution provision. This study contributes to solution research with a new empirically grounded understanding of the approaches through which manufacturers access and integrate resources required of a successful transition to solution based business.

The paper is organized as follows. First, we review relevant literature to gain insights on organizing approaches for solution provision, followed by methodology and description of the cases. The findings report drivers for selecting a certain solution approach in the two case companies, and present the associated benefits and challenges. We then discuss these findings and reflect upon them with reference to existing literature, and finally draw the conclusions from this study.

LITERATURE REVIEW

APPROACHES FOR ORGANIZING SOLUTION PROVISION

A transition to solution business can be viewed as a type of servitization strategy intended at creating a gradual change in the organizational mindset, capabilities, and processes regarding how value creation and delivery through products takes place (Salonen, 2011). Thus, instead of selling product functionalities, firms are increasingly beginning to engage customers in relational processes "comprising the definition of the customer requirements, customization and integration of goods and services, their deployment, and post-deployment customer support" (Evanschitzky et al., 2011). Solutions developed in this way are expected to result in unique offers to complex customer problems and provide added value through tailored combinations of products and services (Evanschitzky et al., 2011; Jaakkola & Hakanen, 2013).

The provision of customized solutions for extensive customer needs necessitates the integration of a broad range of resources and capabilities, either within or between organisations (Tuli et al., 2007; Cova & Salle, 2008; Jaakkola & Hakanen, 2013). A firm operating as a *systems seller* is responsible for the entire solution development and delivery, comprising activities such as system design, interface and component specifications, product development, production and the integration of the components into a system, and the provision of services to operate and maintain a system over its life cycle. A system seller produces the product and service components internally and is highly integrated vertically. The *systems integrator*, on the other hand, acts a coordinator and integrator of components and resources provided by external suppliers and partners. The system integrator is a prime contractor for the customer, responsible for system design, selection and coordination of suppliers, and integrating the components into a customer specific solution (Davies et al., 2007). While most solution providers would fall somewhere in between these ideal types, this dichotomy provides a useful platform to investigate the different organizational configurations for solution delivery.

The decision between the systems seller and systems integrator approach relates intimately to decisions concerning the alignment of firm boundaries. As noted by Santos and Eisenhardt (2009), boundary decisions are central in defining the firm's domain of action and can be used purposefully in constructing market positions. Available theoretical perspectives used to analyze firm boundary decisions include the exchange *efficiency* view that applies transaction cost economics and focuses on cost minimization (Dyer, 1996; Williamson, 1983, 1985); a *power* view that considers how firms control exchange relations (Pfeffer & Salancik, 1978; Thompson, 1967); a *competence* view that places firm resources and capabilities as a key driver (Brusoni, Prencipe, & Pavitt, 2001; Penrose, 1959; Peteraf, 1993); and the *identity* view that focuses on the cognitive frames of firms that are used to define the firm's appropriate domain of action (Dutton & Dukerich, 1991; Porac, Thomas, Wilson, Paton, & Kanfer, 1995; Tripsas, 2009). (Santos and Eisenhardt, 2009)

We draw on these available theoretical lenses as they have been applied in different literature streams in the field of solution business, strategic networks, firm boundary decisions, and organizational modularity to consider drivers relevant to firms as they choose between internal vs. external resource integration. We also consider some of the implications of these decisions on the focal firm.

DRIVERS AND IMPLICATIONS OF INTERNAL INTEGRATION STRATEGY

Firms adopting a systems seller approach internalize new resources needed for solution provision through acquisitions. According to Davies et al. (2007), the industrial marketing literature has traditionally advocated the benefits of a vertically integrated system seller approach. Page and Siemplenski (1983), for instance, argue that "if the system is well conceived, the superior 'fit' of its components, which we will call interfacing efficiency, results in competitive advantage over systems constructed out of separate components".

The transaction cost economics view (Williamson, 1985) emphasizes contracting hazards inherent in any transactions and suggests advantages for organizing production to use internal suppliers (Hoetker, 2006; Gulati et al., 2000). Securing ownership of resources is considered wise particularly in certain market conditions: Market transactions become too risky and unreliable when there are a *small number of buyers and customers,* there is *high asset specificity* that prevents effective switching, or transactions are very *frequent* (Stuckey & White, 1993). Through ownership linkages the firm can protect itself against appropriation under conditions of uncertainty and asset specificity (Jaspers & van den Ende, 2006). Rationale to integrate may also relate to the *lifecycle stage of the market*: firms may forward integrate to create markets for new products/technologies, or in declining markets, it may make sense to integrate vertically in anticipation of growing bargaining power of more consolidated supplier/customer markets. Companies may also integrate to gain more market power in situations where integration would create barriers to entry (Stuckey & White, 1993).

Ownership provides the firm formal authority to determine supplier activities which is important when there is a high level of *task interdependence* between the supplier and buyer (cf. Jaspers & van den Ende, 2006). In some cases, it is preferable to optimize components for a particular configuration whereby an integrated system results in better functionality than combinations of more independent components. Such *synergistic specificity* (Schilling, 2000) resists reliance on resources external to the organization. A high level of task integration also mitigates appropriation concerns as knowledge spillovers are reduced; as noted by Hoetker (2006), internal suppliers enable easier communication and lowered opportunism. The need for firms to maintain in-depth *knowledge about core components* supports the use of internal suppliers (Gatignon et al., 2002).

Primary challenges of the internal integration strategy include inflexibility and high level of organizational inertia (Achrol, 1997). Furthermore, high integration limits learning from outside actors. In dynamic markets characterized by increasing knowledge-intensity and specialization, internal integration may result in critical inefficiencies (Achrol, 1997). As Gebauer et al. (2013) note, manufacturing firms may not be able to master internally all the activities needed for moving from products to solutions.

DRIVERS AND IMPLICATIONS OF EXTERNAL INTEGRATION STRATEGY

More recently, researchers have begun to argue that a truly customer oriented viewpoint requires that manufacturers redefine themselves as providers instead of producers and engage in a collaborative effort among different actors in a value network (Davies et al., 2007; Windahl & Lakemond, 2006). Inter-organizational relationships and networks can provide a flexible source of diverse resources needed for creating customized offerings (Håkansson et al., 2009), and companies with no internal production operations have the advantage of freely selecting and tailoring multivendor systems based on unique customer needs. Firms' external networks expand the range of capabilities that can be integrated to create solutions (Galbraith, 2002; Hoetker, 2006) and foster greater efficiency as firms can specialize in component supply and/or systems integration. Moreover, increasingly common modularity and open standards enable firms to specialize in component supply and/or systems integration (Hoetker, 2006).

Firms adapting a system integrator approach create solutions by integrating resources provided by their external partners and suppliers. Such a configuration can be considered a strategic network, which refers to an intentionally planned and mobilized network that is of strategic significance for the firms, and contains a specific set of organizations with agreed-upon roles and distributed tasks (see, e.g., Jarillo, 1993; Gulati et al. 2000; Möller & Rajala, 2007). When transactions between firms are embedded in a history of prior relationships, there is enhanced trust between firms that mitigates the moral hazard and opportunism anticipated by the transaction cost economics perspective (Gulati et al., 2000). Supporting this view, Yang et al. (2010) found that network density promotes partnering over non-partnering as a dense network would increase trust and reduce the uncertainty of contracting. In other words, external integration strategy may be feasible also in market conditions generally favoring internalization of resources.

Schilling and Steensma (2001) develop a comprehensive approach for analyzing factors that determine whether flexibility advantages associated with loose networks outweigh synergy gains of hierarchical integration. They argue that heterogeneity in the market for inputs and outputs generally lead to greater use of modular organizational forms (Schilling & Steensma, 2001). Inputs refer to any kind of resources used to carry out a firm's activities. In the conditions of increasing specialization, firms need to resort to market based mechanisms to access the differentiated capabilities (*heterogeneous input*) and to work with the best available suppliers (Pisano & Teece, 1989; Hoetker, 2006). At the same time, transaction cost economics suggests that the producer may suffer from supplier's opportunism, including hold-up, below peak effort, and misappropriation of proprietary information (Williamson, 1983).

Heterogeneity in demand, on the other hand, will pressure firms to develop ways to efficiently reconfigure available inputs to meet these demands. When the market is characterized by different customer types with varying demands and there is a wide range of inputs available to satisfy these demands, reliance on extensive inter-firm collaboration such as partnerships and alliances enable firms to specialize in particular activities, such as systems integration, and to combine these with other producers' activities in a flexible manner (Schilling & Steensma, 2001; Möller, 2006). *Technological change* shortens product life cycles (Qualls et al., 1981) and the organization typically needs greater flexibility to respond to changes in demand (Hitt et al., 1998). On the other hand, it can also be argued that in fast changing industries there is less time to build a deep understanding of a technology and to codify it thus favoring organizational structures that rely on internal communication (Hansen, 1999).

Although synergistic specificity and concern for knowledge spillovers indicate need of increased ownership integration, certain *product-system related factors* enhance firms' ability to rely more on market based instead of hierarchical coordination mechanisms. It is possible to effectively contract out components if the product-system is already mature with standardized interfaces and well understood interdependencies, and specialized suppliers exist (Chesbrough, 2003). The development of standard component interfaces, facilitated through the presence of industry standards, reduces synergistic specificity, enables information hiding, and lowers asset specificity (Sanchez & Mahoney, 1996; Baldwin & Clark, 2000). Hoetker (2006) argues that the advantages offered by market based contracting are best exploited under conditions of *product modularity* whereby the producer can access superior capabilities of its suppliers, but can mitigate the problems related to opportunisms and communication. More specifically, modularity enables information hiding (Baldwin & Clark, 2000) whereby knowledge of the component's inner workings does not need to be shared thus lessening need for communication and the risk of misappropriation. Opportunism is also curtailed by the possibility to more easily change suppliers than in the case of nonmodular products.

However, the external integration strategy has potential drawbacks as well. Ties formed with external partners place constraints on ties with others: partner choices may *lock* a firm into a particular trajectory, which may have significant performance consequences (Gulati et. al, 2000). Extensive externalization may also hamper a firm's innovative capacity. As noted by Pavitt (2003), existing product architectures need to be upgraded on a regular basis to bring technological progress and to overcome performance limits. When relying on modular organizational form, the focal firm needs to maintain *sufficient knowledge* across technological fields and various components to successfully manage its external network of suppliers and partners (Hoetker, 2006). Furthermore, the knowledge based view of the firm maintains that effective communication is significantly easier within firm boundaries (Kogut & Zander, 1996) thus placing limits on the effectiveness of market based mechanisms in new product development activities. As noted by Chesbrough (2003), excessive outsourcing can result in a modularity trap where lead manufacturers are no longer able to incorporate novel components based on new technologies into the product. Therefore, firms should bear in mind that product-system architectures may change over time and the firm may limit its ability to react to or shape these developments if it engages in extensive outsourcing.

Based on the above review, we attempt to examine why solution providers prefer internal integration through the systems seller approach vs. external integration in the form of the systems integrator approach.

METHODOLOGY

This research utilizes the case study methodology, which has been recognized as a suitable method for developing in-depth understanding of complex phenomena through direct interaction and cooperation with a limited number of firms (Gummesson, 2000; Yin, 2003). We draw on two in-depth case studies of global manufacturers operating in the metal engineering sector.

The case firms Wärtsilä and Kone were selected through purposeful sampling (Patton, 2002): they both have in the past decade undergone a major reorientation towards solution based business but have adopted very different paths to solution provision. Wärtsilä has, as a result of its transition, integrated more products into its portfolio, essentially increasing its level of internal integration, whereas Kone has realized the transition to solution business through collaboration with partners. Thus on the continua between systems seller and systems integrator, Wärtsilä resembles more closely a systems seller and Kone a systems integrator. The selected cases provide for an opportunity to compare and contrast these ideal types, greatly enhancing our understanding of the contextual conditions that govern choice of particular modes, and enabling an analysis of the benefits and drawbacks that result as a consequence of this decision.

These cases selected have been investigated using the abductive approach. Under this approach, the researcher typically enters the field with some preliminary theoretical frameworks, which are then adjusted as directed by empirical findings (Locke, 2010; Dubois & Gadde, 2002). Such continuous movement between the empirical and the model world is seen as critical for the process of theorizing from case study research (Locke, 2010).

Main data collection method for the study was in-depth interviews, complemented with seminars and workshops where research findings were discussed with representatives of the case firms. Empirical data comprises 36 interviews with positions of informants ranging from manager to division head. The interviews, lasting between 1-2 hours, were recorded and transcribed. Most of the interviews were conducted between the years 2006-2009, with follow-up interviews in both firms in 2010 and 2013.

We followed the thematic analysis method whereby data is analyzed and reported according to identified themes and constructs (Lee, 1999). In this process, and as is consistent with the abductive approach, constant comparison is important whereby data collection and analysis take place recursively (Suddaby, 2006), and drive further data collection efforts.

EMPIRICAL FINDINGS

SYSTEMS SELLER: CASE WÄRTSILÄ

Wärtsilä is a global provider of power solutions for the marine and energy markets headquartered in Finland. In 2012 the firm had net sales of 4.7 billion Euros and is composed of three divisions: Ship Power (28% of net sales), Power Plants (32%), and Service (40%). The findings reported here concern the firm’s ship power division and related service operations.

The ship power division’s most important product group has traditionally been its medium speed diesel engines. Wärtsilä has built its position on global markets on technological leadership and has consistently innovated new to the industry products based on proprietary technologies Since the late 1990s Wärtsilä has sought to enhance its technology based differentiation by transitioning to solution-based business. Consequently, the firm has consistently enhanced its capability to offer integrated solutions consisting of the engine, propulsion equipment, and related control and automation systems. These solutions are designed to optimize life cycle performance, for instance in the form of greater fuel efficiency, environmental friendliness, and operational reliability. Wärtsilä also offers comprehensive maintenance and operation agreements through the installation’s life cycle.

Wärtsilä operates very much in the system seller mode in that it has chosen to internalize the key resources required in solution provision. Accordingly, the firm has grown its product portfolio and capabilities through acquisitions of related businesses. The first major acquisition took place in 2002 when Wärtsilä acquired a global supplier of marine propulsion systems based in the UK and has from thereon continued with a series of acquisitions in the fields of automation, naval architecture, and maritime engineering. Its most recent and largest acquisition took place in 2012 when the firm acquired a UK based manufacturer specialized in environmental solutions and gas systems for the marine and oil & gas sectors. Wärtsilä currently possesses the most comprehensive offering portfolio in the industry, which includes ship design, engines, generating sets, reduction gears, propulsion equipment, automation and power distribution systems, sealing solutions, emission control, gas containment and handling systems, and control systems. It also has the most comprehensive global service network in the industry.

The data reveals a number of factors that have driven Wärtsilä's adoption of a system seller approach. First, the interviewees discussed Wärtsilä's market situation. In early 2000 when the firm embarked on the solution transformation, it had roughly a 50% global market share in its core product, the medium speed main engine, making it difficult to significantly grow in this product segment. Instead, Wärtsilä could leverage its market power by expanding horizontally into product segments that are logically related to the main business. Wärtsilä has targeted firms that have given it a substantial market position in the relevant product segments. In some cases, the firm has even acquired firms in related industries in anticipation of growing industry consolidation. Through its strategy to internally integrate more resources as part of the total solution offering, Wärtsilä has become a major or even dominant actor in several related product segments: one interviewee noted that in some cases, Wärtsilä has delivered more than half of the value added in a particular ship type. This strategy of internalizing resources has thus allowed Wärtsilä to grow in a logical manner, and gain significant market power making it an important partner for shipbuilders and owners.

As the company initially began to build a solution based strategy, it felt that the resources to be integrated would be very difficult to effectively contract from the market. The reason for this was that the firm's potential partners already had a direct and ongoing relationship with the customer and it would have been very difficult to convince them to forego that direct relationship in favor of organizing behind a solution integrated by Wärtsilä. Thus, the nature of the potential supply market was not considered conductive to a strategy that relies on external integration.

The interviewees also took up factors related to organizational learning and capability development. Respondents at Wärtsilä feel that internal integration of many of the key resources has enabled it to acquire a deep understanding of many independent, but related knowledge fields that enable it to co-create better solutions with its customers. For instance, through acquisitions of ship design offices, the firm is able to advice its customers how the ship needs to be build and designed to facilitate better operating economy, and through integration of automation capabilities, it has an intricate understanding of how individual system elements can intelligently work together as part of a total solution. The overall system needs to be designed and integrated exactly right or it will not perform optimally for the purpose it has been built, resulting in suboptimal operating efficiency. By taking overall responsibility, Wärtsilä guarantees that the provided solution performs according to customer specifications and maintains functionality through the life cycle. Such guarantees can be difficult to give if the firm cannot rely on internal control and coordination mechanisms.

Internal resource integration also facilitates better coordination among the different solution elements. As an example, for the overall solution to perform optimally, the manufacturer sometimes needs to make adjustments in individual products that result in suboptimal configurations in individual products, but improves the performance of the total system solution. This kind of optimization is difficult unless internal coordination mechanisms can be utilized. Also, internal coordination mechanisms make it easier to reduce unnecessary safety margins connected with performance specifications of individual system components thus improving the solution's performance efficiency in the customer's process.

Regardless of the many benefits related to the strategy of internal integration, the interviewees pointed out that the approach is not without challenges. Firstly, internal integration is costly and resource intensive. Secondly, Wärtsilä needs to ensure that it has a balanced portfolio where all the individual components are competitive in their own right. Thus, it is crucial that they target the right kinds of companies when integrating resources through acquisitions. Thirdly, great care needs to be taken to ensure that the firm fully exploits the benefits of internal integration and ensures that the different solution elements have been pre-engineered together for superior fit between the system elements. As mentioned by the interviewed managers, this can be a challenge when the firm is concurrently engaged in product and solution based business whereby R&D efforts that would benefit the solution strategy contradict interests of independent product businesses. To overcome this challenge, the firm needs to have a very clear and consistent technology strategy that has support from top management.

SYSTEMS INTEGRATOR: CASE KONE

Kone is a Europe-based global provider of elevators, escalators, automatic doors and related services. In 2012 the company had annual net sales of 6.3 billion Euros. Service and new equipment sales accounted for roughly an equal amount of the company's turnover.

The elevator industry has traditionally been local and fragmented. Today's large multinationals, including Kone, have grown through series of acquisitions, as the global elevator industry has slowly consolidated into a global industry. Today a limited number of large multinationals together control about 60% of the global market with the rest of the market share being divided among smaller manufacturers. Kone is among the top four manufacturers in the industry.

Similar to Wärtsilä, Kone defines itself as a technological leader and has developed several breakthrough innovations – such as an elevator design without machine rooms – that have changed the industry norms for elevator technologies. However, as the industry has increasingly matured, the technological gap between Kone and its competitors has increasingly diminished, and new innovations are diffused more rapidly among competitors than before. Consequently, in addition to enhancing operational excellence, Kone has redefined itself as a provider of people flow and access solutions. To support this reorientation, Kone has invested extensively in enhancing its understanding of end user experience and behavior, as well as the processes and priorities of the direct buyer - usually the building developer. As a result, the company has been able to develop offerings that better link with these processes. Kone is particularly interested to exploit the digitalization trend that will increasingly make buildings more intelligent whereby solutions are redefined and extended with software capabilities. For instance, the firm is working on smart solutions for office buildings that recognize the user and their access rights, and guides them to the intended destination- without the user having to press any buttons or open any doors. The company also offers full life cycle services to the installed base.

In contrast to Wärtsilä, Kone has not grown its product scope as it has transitioned to the integrated solution model. Instead, its strategy is to "connect and develop", which means that Kone seeks to find the right partners, so that the solution can be co-developed, and then sold under Kone's brand.

In terms of market dynamics, Kone does not view that it would be a viable strategy to acquire its partners to deliver more complete end-user solutions for people flow. The main reason for this is that Kone's partners belong to completely different industries – many of them somehow related to ICT, such as access control and mobile communication. Some of these adjacent industries are also highly fragmented. For instance, the largest supplier in the access and control field controls about 5% of the global market. Thus, Kone would have very limited market position in that industry should it choose to enter it. Also, the customer touch points in these industries are typically different. By integrating partners into its solutions, Kone offers an additional market channel for its partners through certain narrowly defined solution offerings, while the partners can still sell other parts of their portfolio independently.

Furthermore, Kone feels that the potential for learning, for both Kone and its partners, is greater in the system integration mode. As an interviewee explained, if Kone were to acquire some of its partners, they would become part of an elevator company, which would limit their ability to continue innovation in their respective industries. By collaborating, both parties can continue independent innovation efforts while enjoying cross-learning opportunities. As an example, in access control companies are usually concerned with aspects such as people's rights to certain places and monitoring their working hours. In the elevator business, firms are interested in facilitating the physical flow of people in buildings. These form separate, but complementary knowledge areas with clear inter-firm learning opportunities.

In terms of solution development and its underlying value proposition, key is development of well-functioning interfaces, so that the different solution components can be seamlessly and effortlessly integrated. As emphasized by a Kone respondent, the difficulty is not to integrate the different subsystems together, but rather to do it with high process efficiency, so that solutions can be mass produced. In other words, the value added of the provided solutions is limited if integration is done case by case. Instead, the solutions have to be "productized" with standard interfaces, so that they can be efficiently assembled, installed, and maintained. Development of these standard interfaces requires joint R&D efforts between Kone and its partners. Also, Kone needs to ensure its own capability to host subsystems provided by its partners in the form of hardware and software platforms.

As with the case of internal integration, this mode of solution provision has its own challenges. One particular challenge concerns partner management. In Kone's case, there are currently very few industry standards that facilitate building of functional interfaces between different system elements. Thus, it needs to work with partners on a case by case basis to co-develop particular solutions. This may create concerns for lock-in with certain partners, which means it is crucial to choose the right partners and ensure long-term alignment of interests.

DISCUSSION

Our findings demonstrate that the system seller and solution integrator approaches both present viable options for industrial manufacturers to transition to solution based business. The system seller largely relies on internal resources in solution provision. The systems integrator, on the other hand, relies primarily on external coordination of resources. Several possible drivers are behind choice of appropriate strategy.

As is highlighted in the solution selling literature, a transition to solution based business represents a transition downstream in the value chain (e.g. Wise & Baumgartner, 1999; Davies, 2004) linking the firm closer with its customers. Regardless of whether this is done in the system seller or system integrator mode, it is typical of solution business that a single organization acts as a prime contractor and manages the customer interface (Galbraith, 2002; Davies et al., 2006), while integrating products and/or services into a seamless whole (Hakanen & Jaakkola, 2012). Success in solution business thus requires an ability to secure collaboration of external resource owners to enable access to needed solution elements (Windahl & Lakemond, 2006; Jaakkola & Hakanen, 2012).

Our cases suggest that the way in which these external resources can effectively be accessed depends on the *nature of the market for resources to be integrated.* More specifically, if it is difficult for the solution provider to secure collaboration of key external resource owners, it needs to resort to acquisitions, which leads to a systems seller approach. On the other hand, if the solution provider finds that it is easy to secure collaboration of key external resource owners, it can rely on partnerships and act as a systems integrator. In the solution context it seems that a key determinant relates to whether or not it is in the interest of external resource owners to use the solution provider as a channel to market. In the case of Wärtsilä, the firm felt that it would be difficult to convince external partners to collaborate in development of a Wärtsilä branded solution because the potential partners were strong market actors that shared the same customer contact point. Thus, even though these potential partners were not direct competitors, it would have been difficult to persuade them to step back in the value chain. Thus, access to these resources required internalization through acquisitions. In the case of Kone, the customer contact point for the potential partners is different and many of the ancillary industries such as access control are more fragmented. An offer to join a Kone branded solution provides an additional channel to market for these external resource owners, instead of presenting a challenge to their existing operations and customer relationships. It thus seems that the decision to utilize external vs. internal resource integration mechanisms can be partly understood through the *power view.* The solution provider needs to control the customer interface, and the way this can be done depends on the nature of the market for resources to be integrated.

Secondly, a key driver for selection of the systems seller vs systems integrator approach relates to the *strategic role of resources* to be accessed and integrated as part of the solution offering. More specifically, our cases suggest that the focal firm is likely to adopt the systems seller approach when it wants to expand internal resource scope beyond the core product business, while a systems integrator approach is chosen when the firm wants to leverage external resource scope to enhance its current core product business. These rationales that emerged through the cases studied are somewhat counterintuitive to existing understanding of solution business. In fact, a transition to solution business is typically seen as a type of servitization process (Vandermerwe & Rada, 1988) where the importance of products gradually diminishes in favor of services (Oliva & Kallenberg, 2003), so that the firm begins to increasingly derive its revenues and profits from services (Wise and Baumgartner, 2003). Our cases suggest that such a view does not paint the full picture. In fact, an important objective of the case firms' solution transformation process has been to secure profitable growth of the firms' product businesses, and the system seller and system integrator approaches have been different ways to meet this objective.

For Wärtsilä, acquisition of external product related resources has been a way to grow the scope and therefore scale of products sold in a situation where further growth would otherwise not have been difficult due to a dominant market position. Thus, internalization of external resources has been a way to expand internal resource scope beyond the core product business. However, emphasis has been put on integration efforts, so that these newly acquired resources can be sold as value added solutions instead of individual products or product bundles. In the case of Kone, the firm feels that it can still continue to grow and develop as a manufacturer of elevators and escalators and has not seen a need to expand beyond its core product scope in the form of acquisitions. Instead, a key objective of its solution transformation has been to leverage external resource scope to enhance the competitiveness of its existing product businesses. Thus, while the firm does not see the value of venturing outside its core product scope through internalizing of resources, it believes that integration of related products into elevators helps to improve the competitiveness of its core product offering, thereby enabling it to sell more of this core offering as part of people flow solutions. Thus, these different organizational configurations that are used to transition to solution business can also be interpreted as fundamentally different organizational logics used to grow and enhance the profitability of the firm's core product business.

Based on an analysis of the *strategic role of resources* to be accessed and integrated as part of the solution offering, it therefore seems that the *identity view* is also important when examining firm boundary decisions. In making a decision between systems seller vs. systems integrator of importance seems to be the firm's sense of its identity. Wärtsilä has made a conscious decision to evolve beyond being a manufacturer of diesel engines, while Kone still regards itself as a manufacturer of elevators and escalators and has no intention of changing this profile through acquisitions of related product businesses.

Thirdly, the *nature of resource coordination* needed to provide integrated solutions affects the choice of mode between system seller and system integrator. We find that systems seller is the appropriate mode when internal resource coordination mechanisms are more effective to manage synergistic specificity between the different solution elements. In such a case, the firm may be willing to forego the advantages of specialization to add value through integration efforts that internal coordination mechanisms help to facilitate. In the solution context, the case of Wärtsilä suggests that synergistic specificity manifests itself in the form overall system level optimization, which may require sub optimization on the level of the individual subsystems and products- tasks which are difficult to achieve without internal coordination mechanisms. In the case of low synergistic specificity, we find the systems integration approach can be an effective way through which to benefit from advantages of specialization. However, it is important that the provider develops external coordination mechanisms through interface management to effectively integrate these external resources.

More specifically, as demonstrated through the case of Kone, solution providers operating in industries that are not characterized by high modularity and standardized interfaces need to pay special attention to external resource coordination through interface management. This enables "industrialization" (Storbacka, 2011) of solutions, which has been noted as key to successful value creation efforts whereby the provider learns to move away from case by case integration. More specifically, as noted by respondents at Kone, given the lack of standardized industry interfaces, the firm can provide limited value through solutions if it integrates loosely with multiple resource providers and undertakes case by case integration efforts. However, by tightly partnering with selected actors, the solution provider can collaborate on interfaces to develop modularized offerings that can then be cost effectively integrated and deployed to the customer.

The *nature of resource coordination* that is needed to provide integrated solutions can be interpreted as a reflection of the *competence view*. As noted by Hoetker (2006), the knowledge based-view of the firm suggests that firms organize to facilitate communication and transfer of knowledge between units taking part in product development, which tends to favor internal organizing principles. At the same time, knowledge specialization favors collaboration with external resource providers. In the solution context, the presence of synergistic specificity seems to determine which of these drivers is stronger. Also, an important factor relates to technological distance. When the resources to be integrated belong to fundamentally different types of industries with different knowledge bases, the advantages of specialization become apparent, thus favoring external integration.

Finally, based on the cases studied, we would argue that the system seller and system integrator approaches result in different *strategic benefits and challenges* for the provider. As discussed by informants at Wärtsilä, one primary driver behind its solution strategy has been to conquer more market space by internalizing different product components and adding value through knowledge and engineering services in the form of product service bundling. Thus, the systems seller approach can be used to gain market power and to erect barriers to entry for potential competition. This is especially so if the focal firm is the only one that has achieved internal integration of key resources required for solution provision, *and* if internal integration enables it to provide significantly more added value compared to modes that rely on external integration. The system integrator mode, on the other hand, is associated with greater strategic flexibility and possibilities for inter-firm learning. It seems that this advantage is more valuable in industries where different subsystems draw from distinctly different fields of knowledge and the ways in which these knowledge fields intersect through solution integration is undergoing rapid change. In the case of Kone, the construction industry is increasingly affected by the digitalization trend whereby building solutions are being redefined and extended with the help of ICT based capabilities. Consequently, many of its partners in system integration come from the ICT industry whereas Kone's roots are in the metal engineering industry. In such a case, Kone deems that it is more sensible to flexibly draw on external resources that complement its existing capability base.

In terms of *strategic challenges*, we find that the main challenge of the systems seller approach relates to resource lock-in. In fact, as evidenced through the case of Wärtsilä, the systems seller approach can result in a difficult dilemma for the solution provider. In principle, a solution provider should try to find the best possible solution for the customer, instead of trying to sell as many products as possible (Galbraith, 2002). However, by adopting the systems seller model, the firm diminishes the flexibility of its offering whereby it needs to be certain that the acquired resources are competitive in their own right. This is important as customers are tempted to unbundle solutions that do not consist of the best possible elements (Johansson et al. 2003). Also, given that the focal firm has spent considerable resources to integrate resources to its portfolio, it needs to make sure that these resources are fully exploited by undertaking internal development aimed at enhancing interoperability of different solution components- thus achieving what Hannaford (1976, p. 141) calls a seller-designed system, which consists of a set of standardized components that have been designed beforehand and that can be adapted to different customer needs.

As to the system integrator mode, we argue that the biggest strategic challenge relates to partner lock-in. In contrast to existing research that assumes systems integration to be largely project based activity (Davies et al., 2007), our findings suggest that systems integrators need to also undertake a program to develop a seller-designed system (Hannaford, 1976, p. 141) whereby solutions are not delivered as one off projects. Otherwise the value creation potential of the solution is modest. To achieve such systems, the provider must engage in long-term collaboration with chosen partners, which creates obvious problems in terms of partner lock-in, especially if the provider cannot rely on standardized interfaces whereby extensive efforts are needed to develop proprietary interfaces and partnerships are thus long-term. Here choice of appropriate partners and management of partnerships becomes of paramount importance.

Finally, our data suggest that the alternative approaches provide different opportunities for value creation for the customer. A systems seller internalizes expertise in many closely related knowledge fields and thereby acquires expertise that enables it to perform as a consultative partner for its customers, possessing the best ability to develop an optimal, tailor-made solution for its customers. Furthermore, as a system seller maintains full control over system development, it can coordinate and optimize system functionality, enabling superior performance, efficiency, and guarantees. The value of a solution provided by a systems integrator, in turn, is based on flexibility and innovation through combination of wide-ranging knowledge fields, as they can integrate the resources of superior suppliers in diverse industries. If a system integrator develops well-functioning interfaces and masters effective coordination and integration of diverse resources, it can offer mass-customized solutions that are innovative and customer-specific, yet cost effective.

In summary, through analysis of our two cases, we would argue that the systems seller and systems integrator approaches represent two distinct strategies for resource access and integration. Table 1 summarizes the main findings of this study and conceptualizes the two ideal forms of organizing for solution provision discussed in this paper. The drivers behind these choices can be understood through application of multiple theoretical lenses concerning firm boundary decisions. Regardless of the approach chosen, the solution provider needs to ensure that the way in which it accesses and integrates resources forms an internally consistent pattern of strategic action. It is also important to understand the strategic benefits and challenges of the chosen approach, so as to be able to manage them appropriately.

Table 1. Drivers and implications of selected organizing approaches for solution business

	Systems Seller	**Systems Integrator**
Nature of the market for resources to be integrated	Difficult to secure collaboration of key external resource owners due to competition for the customer interface	Easy to secure collaboration of key external resource owners as solution provider acts as channel to market
Strategic role of resources	To expand internal resource scope beyond core product business	To leverage external resource scope to enhance current core product business

Nature of resource coordination needed	Internal coordination mechanisms to manage synergistic specificity	External coordination mechanisms through interface management to integrate external resources
Strategic benefits	Market power & barriers to entry	Knowledge specialization
Strategic challenges	Resource lock-in	Partner lock-in
Solution value	System performance, guarantees, deep expertise and consultative ability	Flexibility, mass-customization, wide-ranging innovation

CONCLUSIONS

The purpose of this paper was to investigate in detail the systems seller and systems integrator approaches as two opposing logics for accessing and integrating resources required for solution provision. More specifically, we explored the drivers that prompt firms to choose between these approaches, and the implications of such choices. Our study has drawn on a wide range of literature on solutions, strategic networks, firm boundary research, and organizational modularity to identify potential drivers for selecting a certain organizational configuration, and we have examined how such factors reflect on the solution approaches of two global manufacturers, Wärtsilä and Kone, operating in the metal engineering sector.

To our knowledge, this paper is one of the first attempts to refine the solution approaches initially suggested by Davies, Brady and Hobday (2007). The paper has drawn on an abductive approach where literature on solutions, strategic networks, firm boundary decisions, and organizational modularity is combined with rich empirical material to identify and conceptualize the premises for choosing an appropriate organizational mode of solution provision. As a result, we have been able to develop a rich and more thorough understanding of the drivers that prompt industrial manufacturers to adopt a systems seller or systems integration approach to solution business, as well as the associated benefits and challenges of these approaches. Such an in-depth and comprehensive explanation is missing from existing research in the solution field, where very few studies have explicitly discussed the manufacturer's strategic choice between alternative organizational configurations for solution business.

We also contribute to research concerning firm boundary decisions by providing a longitudinal and theoretically inclusive explanation of how firms utilize boundary decisions to shape and constructs markets in patterned ways (Santos and Eisenhardt, 2009). Given the preference of existing research to drawn on cross-sectional data to analyze individual boundary decisions utilizing limited theoretical lenses, such holistic explanations are largely missing from existing research (David & Han, 2004).

As to limitations, the findings of this study rely on in-depth case studies of two industrial manufacturers operating in the capital goods industry. Thus, these findings cannot be readily generalized to a larger population of firms. However, we have purposefully relied on a limited number of case studies to delve deeply into dynamics that govern the choice of a particular organizing form for solution business. In terms of future study, we would encourage replication across more cases to confirm whether the observed dynamics occur in other firms/industries.

In terms of managerial implications, we would urge managers in charge of steering the firm's transition to solution based business to carefully consider the dynamics involved. It is of foremost importance to recognize the different, but interrelated drivers that affect the choice of a proper organizational configuration. At times, these drivers may conflict, for instance when inter-organizational learning through the systems integrator mode is seen as key, but lack of standardized interfaces in the industry make it difficult to work with external partners. Here, it becomes important to determine which driver(s) are most critical for choice of appropriate strategy and how to manage misalignment of other drivers, for instance through development of ways to manage partner-lock in.

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