SYSTEM INTEGRATION, INTEGRATED SOLUTIONS AND INDUSTRY ORGANIZATION: A VALUE SYSTEM APPROACH

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Abstract

The present study was set out to contribute to the literature on firm-boundary choice and value system organization in the context of the servitization process of a manufacturer when migrating from system integrator to solution provider. To do so, we moved away single organizational-boundary choice and analysed different strategic moves made by our case-company over more than one decade. As suggested by prior research, our findings highlight that firm-boundary design goes far beyond the explanations provided by the traditional 'exchange efficiency' approach. Theories on firm boundaries are complementary and synergistic and therefore there is the need to combine those approaches. The main contributions of our study are twofold: (1) illustrates and discusses how servitization process influences on manufacturer's positioning within the industry value system (2) adds knowledge on how the different firm-boundary conceptions contribute to value system analysis.

Keywords: System integration, integrated solutions, value system, industry organization.

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INTRODUCTION

Manufacturers have been increasingly implementing "servitization" strategies (Vandermerwe & Rada 1988) to achieve market de-commoditization and non-price-based differentiation (Matthyssens & Vandenbempt 2008). Empirically based cases illustrate how companies, such as Rolls-Royce, ABB, Caterpillar, and GE, have shifted from standardized product offerings to customized solutions (Wise & Baumgartner 1999; Foote et al. 2001; Davies 2004; Koudal 2006; Auguste et al. 2006). Selling integrated solutions (ISs) is a way of supplying combinations of systems, knowledge, and lifecycle services (Windahl & Lakemond 2010). "Firms making the transition to becoming IS providers find they need to transform almost every aspect of the way they do business – from their business strategies and positions in the value stream, to their capabilities, organizational structures and mindsets." (Brady, Davies, & Gann, 2005:364).

Firm-boundary choices and firms' strategic positioning within the value system are essential concepts; however, the existing research on solution integration is largely grounded in the resource-based perspective (Windahl & Lakemond 2010). Moreover, prior research on servitization neglects the firm boundary discussion despite the fact that servitization strategies may have important effects on organizational boundaries (Gebauer et al. 2012) and thus the industry architecture (Brusoni et al. 2009). Finally, the research on firm boundaries can be considered theoretically biased toward transaction cost economics (TCE) because researchers appear to neglect the contribution of other approaches, such as identity, competences, and power (Santos & Eisenhardt 2005). Thus, a firm boundary definition of servitization must be considered by applying multiple approaches that are more relevant than the theoretically narrow transaction cost approach (Coe et al. 2008; Sturgeon 2008).

We consider the implications of servitization and its consequences on firm positioning within the value system. Our framework combines three complementary research streams that consider firm boundary decisions by using complementary levels of analysis and theoretical lenses: 1) servitization and solution integration (Brady et al., 2005; Davies, Brady, & Hobday, 2006; Davies, 2004; Hobday, Davies, & Prencipe, 2005), 2) value system architecture and organization (Gereffi et al. 2005; Humphrey & Schmitz 2008; Jacobides & Billinger 2006; Jacobides et al. 2006), and 3) organizational boundaries (Santos & Eisenhardt 2005; Poppo & Zenger 1998; Schilling & Steensma 2002; Yang et al. 2010; Leiblein & Miller 2003; Argyres & Zenger 2012). Although only a handful of studies exist on those sub streams in the context of servitization, we address the need to integrate these studies and create a theoretically grounded approach that considers the boundary decisions of manufacturers when becoming solution providers. Specifically, we address the following research question: "How does the transformation from a system supplier toward a solution provider influence the firm's re-positioning within the industry value system?" The main contributions of our study are twofold: (1) the study illustrates and discusses how the servitization process influences system integrators' boundary decisions and their positioning within the industry value system; (2) the study adds knowledge on how the different theoretical firm boundary concepts contribute to value system analysis.

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

SERVITIZATION AND SOLUTION INTEGRATION

In search of novel value propositions that increase the performance and/or reduce the cost of customers, manufacturers have been moving from offering stand-alone products to bundling goods and services as integrated solutions (Matthyssens & Vandenbempt 2008; Sawhney 2006). Integrated solutions are often extensions of the modular system-based business model, based on adding consultancy and advanced services to a broad spectrum of standardized components and compatible interfaces that are easily reconfigurable in customized bundles (Davies et al. 2007; Davies et al. 2006). In the case of complex systems in particular (Hobday, 1998), long-term integrated solutions are composed of 24/7 lifecycle services ranging from training, the provision of spare parts, equipment repair, and maintenance to more advanced services, such as remote services, asset and information management, financial services, consultancy, operational and performance services, and turnkey solutions (Davies et al. 2006; Brady et al. 2005).

Transitions from products to solutions are often described as step-by-step pathways (Oliva & Kallenberg 2003; Matthyssens & Vandenbempt 2008; Penttinen & Palmer 2007). During this migration, firms must adopt a broader view toward the value chain (Wise & Baumgartner 1999) and change their positioning within a dynamic value system (Gebauer et al. 2013) while revising their value propositions, learning to serve (Lusch et al. 2010), and developing new capabilities (Davies 2004). Whereas vertical integration appears to be a common pattern for firms when moving downstream (Osegowitsch & Madhok 2003), Baines, Lightfoot, and Smart (2011:950) present two positioning practices between conventional manufacturers and conventional service providers: 1) focusing on product-centric services while keeping a tail in production operations, or 2) combining original equipment manufacturer and product-centric services. Davies et al. (2007) propose two ideal types of organizing the integrated selling and delivering of solutions: 1) the system integrator that coordinates the integration of components supplied by other firms and 2) the vertically integrated system seller that produces all product and service components in a system. The authors found no evidence to support either of these pure types and suggested the rise of a complex hybrid form combining the advantages of both pure types. Conversely, what is typically accepted is that the value system will be reshaped (Matthyssens & Vandenbempt 2008) when firms move "from productification of services to service-ization of products, and from the emergence of specialists to all-in-one service provider and integrator" (Brusoni et al., 2009:209).

Thus, positioning becomes a central notion. It refers to a firm's decision about which value-adding activities should be performed internally and which should be outsourced to suppliers, partners, distributors, and/or customers (Baines et al. 2005). Positioning could be defined as boundary-related decisions that include considerations related to the product range and decisions of investing/divesting in infrastructural activities but also decisions regarding moving downstream into servicing and upstream into component manufacturing (Chandraprakaikul et al. 2010). For instance, system integration is a deliberate "strategic business activity" that facilitates firms to "shape their boundaries and their position in an industry value stream" over time while "enabling them to decide who to compete with, who to collaborate with, what to make in-house, and what to outsource" (Hobday et al., 2005:1136). Thus, system integrators are often involved in the setting of an industry architecture (Jacobides et al. 2006; Prencipe 2003).

FIRM BOUNDARIES IN SERVITIZATION

Drivers of organizational positioning and, consequently, the determinants of organizational boundaries or "the demarcation between the organization and its environment" (Santos & Eisenhardt, 2005: 491) are at the core of our study. Whereas horizontal boundaries are set by "the scope of product/markets addressed", vertical boundaries are defined by "the scope of activities undertaken in the industry value chain" (Santos & Eisenhardt, 2005:492). Santos and Eisenhardt (2005) suggest four conceptions of firm boundaries: 1) exchange-efficiency, 2) power, 3) competence, and 4) identity. Whereas the three last conceptions are more strategic and have broader outcomes, the efficiency perspective is tactical, with its focus on discrete make-or-buy decisions (Santos & Eisenhardt 2005) at specific linkages of the value chain. Particularly, the transaction cost stream neglects the consideration of value creation and value appropriation processes inherent to firm boundary choices (Argyres & Zenger 2012), lacks a systemic approach (Reitzig & Wagner 2010), and ignores the interaction of different firm boundary mechanisms (Santos & Eisenhardt 2009). Because our study has a strategic perspective aiming at exceeding discrete transactions to consider the value system as a whole, we will focus on strategic explanations of firm boundary choices based on identity, competence, and power perspectives. By doing so, we also highlight the interdependence, complementarity and synergistic potential of these theoretical frameworks when explaining firm boundary decisions (Brahm & Tarzijan 2012; Novak & Stern 2009; Yang et al. 2010; Lafontaine & Slade 2007; Santos & Eisenhardt 2005; Poppo & Zenger 1998; Schilling & Steensma 2002).

ORGANIZATIONAL IDENTITY AND FIRM BOUNDARY DECISIONS IN SERVITIZATION

Servitization requires companies to shift their business logic from a product- to a service- and customer-centric logic (Galbraith 2005; Galbraith 2002a). This transformation toward a service- and customer-centric logic requires an improved understanding of how customers experience value (Brady et al. 2005) and a reversion of companies' traditional product-forward view of value creation when providing solutions (Johnstone et al. 2008). The bundling of goods and services requires the value proposition to be reassessed to facilitate the creation of value-in-use for customers (Baines et al. 2007; Johnstone et al. 2009). Thus, "customer solutions embody the new service dominant logic" (Tuli, Kohli, & Bharadwaj, 2007:1). Indeed, the value migration involves a business model change (Davies 2001; Davies 2004; Wise & Baumgartner 1999; Auguste et al. 2006) and requires balancing elements from both goods- and service-dominant logics (Windahl & Lakemond 2010). Firms redefine their identity when shifting from manufacturing toward solution provision (Jacobides & Winter 2005). Changes in identity are often related to major organizational changes (Clark et al. 2010) and the need for new knowledge (Nag et al. 2007). Literature on identity considers boundaries as a mindset that determines firm scope (Kogut 2000) and where "organizational boundaries should be set to achieve coherence between the identity of the organization and its activities" (Santos & Eisenhardt, 2005:500). Thus, identity drives interpretation and action while guiding key strategic choices, such as "whether to make an acquisition, enter a new market, or divest a division" (Tripsas, 2009:441).

CAPABILITIES AND FIRM BOUNDARY DECISIONS IN SERVITIZATION

In the case of engineering-intensive capital goods sectors, the provision of advanced services and solutions calls for the development of new core competences, such as system integration and project management, IT capabilities, consulting, financial competences, delivery, and post-sales service capabilities (Davies et al. 2006; Penttinen & Palmer 2007; Brady et al. 2005; Hobday et al. 2005; Ceci & Masini 2011; Gebauer et al. 2013). Therefore, companies may either integrate or change their position in the value system to not only leverage the use of existing resources and core capabilities by following a diversification strategy (Penrose 1959) but also acquire those needed capabilities that firms do not currently possess. Consequently, whereas a boundary choice could be conceptualized as "a choice of resources for the organizational portfolio", firm boundary "is dynamically determined by matching organizational resources with environmental opportunities" (Santos & Eisenhardt, 2005: 497).

Previous studies have shown that to obtain these new capabilities, firms must move within the value stream as they transform toward system integrators (Davies 2004; Michael Hobday et al. 2005). As suggested by Reitzig and Wagner (2010:1185), due to the existence of vertical knowledge-based complementarities, "conducting a given upstream activity increases the marginal value of engaging in a different downstream activity in a firm's value chain". Although service capabilities are important, particularly system integration and project management are key core competences for system engineering companies when supplying complex product systems (Davies & Brady 2000). A system integrator is not only a simple assembler of physical subsystems and components but also a knowledge integrator that plays a strategic role in designing and developing the system (Brusoni & Prencipe 2001). Indeed, system integration is recognized as a core dynamic capability (Prencipe 2003) that facilitates the transition from one product generation to another (Hobday et al., 2005), allowing companies to offer improved services for the current systems while gaining knowledge from these services to improve future systems and working practices (Davies 2004; Baines et al. 2011; Osegowitsch & Madhok 2003).

STRATEGIC POSITIONING AND FIRM BOUNDARY DECISIONS IN SERVITIZATION

Frequently, the successful development and deployment of new services is also related to the degree of control a firm exercises over a service value chain (Raynor & Christensen 2002). Following the resource dependence (Pfeffer & Salancik 1978) and industrial organization (Porter 1980) traditions, firms may change their positioning within the industry value system to reduce the causes of external uncertainty and to control strategic relationships, knowledge (Garud & Kumaraswamy 1993) and resources. Thus, organizational "boundaries determine the sphere of organizational influence, including its degree of industry control and its power over the external forces" (Santos & Eisenhardt, 2005:491). Accordingly, firms may go downstream to offset customers' bargaining power or to improve product differentiation by providing a better service for customers and strengthening the firm's brand (Porter 1980). Appropriating successive markups (Joskow 1985), dominating the linkages where purchasing decisions are made (Pil & Holweg 2006; Gereffi 1994), and establishing industry standards downstream while ensuring the consolidation of the main products on the original upstream market are also relevant reasons. Conversely, firms can move upstream to raise rivals' costs (Salop & Scheffman 1983) and establish entry and/or mobility barriers to gain power (Chatterjee 1991; Porter 1980) and reduce

the dependence on a single supplier while guaranteeing a strategic supply under favorable conditions (Carlton 1979; Porter 1980). Although mergers and acquisitions are traditional ways of internalizing environmental sources of uncertainty, the control of the value system can also be achieved successfully without full ownership by using quasi-integration, alliances, franchises, and joint ventures (Porter 1980; Harrigan 1984; Mahoney 1992; Pfeffer & Salancik 1978).

The distribution of power is central when explaining the dynamics of value systems (Sturgeon 2008; McGahan 2000). It is relevant to understand who are the key actors, how the value system is governed (Adams & Brock 1982), how the inter-firm division of labor is organized (Gereffi et al. 2005; Gereffi 2001), and how the value is created and distributed within the value stream (Ivarsson & Alvstam 2010). Several concepts were developed to address these issues. For example, "platform leaders" (Cusumano & Gawer 2002) and "keystones" (Iansiti & Levien 2004) are used to describe situations where firms have the power of setting standards. Governing "bottlenecks" within industries is a necessary condition to achieve an "architectural advantage" (Grant, 2010:82). Jacobides (2011) identifies three ways to achieve industry architecture dominance: enhancing mobility across the value chain, redefining roles and responsibilities by examining other players' needs, and becoming a less replaceable bottleneck within the industry architecture.

In project-based businesses with oligopolistic market structures, many of the world's largest manufacturing corporations have been establishing competitive advantages from new forms of vertical control through forward vertical integration (Davies 2004; Wise & Baumgartner 1999). Thus, firms move vertically as they attempt to safeguard their domain from commoditization and leverage their knowledge base or try to package their services with higher margin activities (Cacciatori & Jacobides 2004). Vertical control is needed to guarantee access to end customers to enter into a higher-return business (Wise & Baumgartner 1999; Hax & Wilde II 1999; Davies et al. 2006). Furthermore, a vertically integrated structure can be a way to guarantee that product specifications and services can be adjusted to diverse customer needs (Chandler 1980).

RESEARCH METHODOLOGY

RESEARCH METHOD

We use single case study as our research strategy for analyzing the effects of servitization on the positioning of Wärtsilä within its value system. Case studies are an appropriate choice when studying questions that have not been studied comprehensively (Leonard-Barton 1990) and are justified if the study intends to explore and describe in further detail the presence of an important phenomenon and its driving forces under uncommon and difficult-to-replicate conditions (Eisenhardt & Graebner 2007; Siggelkow 2007; Dubois & Gadde 2002; Dyer & Wilkins 1991; Dubois & Araujo 2007). Using the shipbuilding value system as context and a Finland-based global provider of lifecycle power solutions as the focal company, the unit of analysis in this study is the positioning of Wärtsilä alongside the value system while making individual boundary choices and implementing strategic maneuvers required for the integration of new solutions and lifecycle service delivery. By combining induction and deduction, we could categorize our analytical process as abductive reasoning. Triangulation combining different sources of active and passive data was applied to corroborate the accuracy of the data (Yin,

1994), increase the reliability of our study (Beverland & Lindgreen 2010), and identify different aspects of the phenomenon under consideration (Dubois & Gadde 2002).

CASE-SELECTION AND SAMPLE

Case selection is a recurrent challenge to theorizing from cases (Eisenhardt & Graebner 2007; Dubois & Araujo 2007). A "purposeful" (Patton, 2002:45) and straightforward "theoretical" sampling (Glaser & Strausss, 1967:45) was chosen as the case selection method in our research. The shipbuilding value system is itself an interesting framework because it is a global, mature, and cyclical industry. Those features are typically identified as key external factors driving firms toward servitization (Wise & Baumgartner 1999; Oliva & Kallenberg 2003; Matthyssens & Vandenbempt 2008). Over the last 15 years, the industry has witnessed the consolidation of Chinese shipyards as new relevant players and a change in the business cycle from a boom peaking in 2008 to a strong stagnation onward. In addition, we consider Wärtsilä as both a proper case for illustrating the phenomenon under consideration and a clear opportunity for unusual research access (Eisenhardt & Graebner 2007; Yin 1994). Reporting net sales of almost 4.8 billion Euros and almost 19 thousand employees (Wärtsilä 2013), the company is an "information-rich case" worthy of in-depth study (Patton, 2002:231). Facing both increased competition in the market for ship engines and sustained growth of its installed base, the company has been implementing active servitization strategies while constantly redesigning organizational structure and boundaries. In such exceptional circumstances, a special single case can be a very powerful example (Siggelkow 2007) while becoming a useful case in point to evaluate and question both novel and old theoretical associations (Dyer & Wilkins 1991).

RESEARCH CONTEXT: THE SHIP-BUILDING INDUSTRY STRUCTURE

As an extremely globalized industry (Cho & Porter 1986), shipbuilding is a mature, cyclical and capital-intensive business, which is highly dependent on the world economic cycle and, consequently, on trade volume and transport demand (Stopford 2009). Historically, the industry has been characterized by significant government interventions. From a downstream-upstream perspective, the shipbuilding value system can be defined by certain linkages, such as ship operators/ship owners, shipyards, system suppliers, component suppliers, and raw material providers. On the demand side, the oversupply has often led to increase the bargaining power of global owners/operators. On the supply side, the industry can be divided into shipbuilding (500 relevant yards, mainly located in Asia) and marine equipment (CESA 2010; Ecorys 2009). A shipyard can be divided into several primary and support activities. The most important primary activities are the material purchasing (70% of the total cost), steel pile-up and cutting, keel laying (assembly, pre-outfitting, and painting), assembly and launching, outfitting, sea trial, and delivery. In contrast, "ship design" is one of the most important activities in terms of added value among the supporting activities (Stopford 2009). Finally, yards involve thousands of suppliers (mechanical equipment, such as engines and propulsion systems, navigation equipment, shipboard systems, automation and electrical systems, steel, paints and isolation, furniture and decoration, and cargo-related equipment).

Composed of engines, reduction gears, thrusters and propellers, water jets, seals, and bearings, a propulsion system represents an important part of the total cost of the ship. Major suppliers

(Wärtsilä, MAN, Rolls-Royce, MAK-Caterpillar, and Mitsubishi) rely on network strategies to ensure a global presence (often through licensing) while combining the localization of production in low-cost countries with constant investments in technology and R&D to maintain competitiveness. The two related but divergent target markets are: 1) Propulsion systems and engines for yards and 2) services for ship operators. Whereas the aim of shipyards is to meet the standard reliability and legal requirements at the lowest possible cost, ship operators typically demand uninterrupted operations at the lowest possible lifetime costs. Furthermore, ship operators in different market segments also have different needs in terms of professional support and operational guarantees, ranging from ship operators who want spare parts and a low-cost service to those who need full-service contracts. A high percentage of the profit is obtained from offering after-sales lifecycle services to ship operators.

DATA COLLECTION PROCESS

The data collection process lasted from April 2011 to December 2012. The data collection began with an exhaustive review of documents describing the shipbuilding industry (Stopford 2009; IKEI 2009; Ecorys 2009; Cho & Porter 1986; CESA 2010; Marine Institute 2005; SAJ 2010; SAJ 2011). Furthermore, we conducted an in-depth analysis of Wärtsilä's website and annual reports from 2000 to 2012. On these grounds, we synthesized the data by mapping the shipbuilding value system and firm boundary evolution. The next step was the development of a semi-structured interview questionnaire and a detailed data collection protocol to guarantee the case reliability (Yin 1994). To capture the wide range of perceptions and meanings inherent to any complex process of boundary transformation, we used multiple respondents during the data collection period (Dubois & Araujo 2007). Consequently, we met people working in services and ship power business units and in industrial operations and supply chain management. To guarantee the possession of in-depth knowledge, the persons selected met one of the following two criteria: either the persons have worked for the company for over 10 years (the time period of our case analysis) or they hold a position in the hierarchy that implies making decisions directly related to our unit of analysis. Through these initial meetings, we identified new key people to be interviewed.

We conducted 15 face-to-face interviews with executives from various organizational levels. The interviews lasted between 47 and 105 min, with an average duration of 66 min. In every case, the interview was recorded with permission from the interviewee and transcribed verbatim immediately after the meeting (473 pages total). To ensure the anonymity of respondents, direct quotes are identified only by a code. In several cases, we contacted some participants again to clarify inconclusive topics or to further develop insightful ideas. We ended the interview process when the additional evidence added by new interviews became near irrelevant. The information from interviews was complemented by other sources of evidence to strengthen the validity of our case (Yin 1994; Gibbert et al. 2008). We analyzed the company's annual reports, official slides, and website. We also collected information by in situ researcher observation (once a week over 18 months). This strategy offered us the opportunity to analyze a few nested (Gibbert et al. 2008) firm boundary choices with a real-life perspective and thus to overcome the complexity of this fuzzy process (Yin 1994). The qualitative content of the transcriptions and other evidence was analyzed from the first interview on. Following the fieldwork, a combination of descriptive strategy and thematic pattern-matching analysis was applied when examining the data. The

former approach allowed us to make a chronological description of the main changes in our case boundaries over a 12-year period while identifying causal events and including different variables (Yin 1994). Finally, key informants reviewed a draft version of our report. This reinforces the validity of our study (Yin 1994; Gibbert et al. 2008).

RESULTS

SOLUTION INTEGRATION AS AN OPPORTUNITY FOR GOING DOWNSTREAM IN THE SHIPBUILDING INDUSTRY

Based on secondary data from the shipbuilding industry and qualitative insights from Wärtsilä's annual reports, we illustrated how our case company has been shifting its position in the shipbuilding value system while migrating from engine manufacturer to system provider and, later on, to solutions provider (providing integrated solutions). The first strategic step began to be implemented in the late 90s. In search of operational flexibility and technical integration efficiency and affected by their exposure to demand volatility, shipyards began to demand turnkey systems from their suppliers. For example, yards demanded propulsion systems rather than the components individually because the system procurement strategy enables the use of only a single lifecycle service provider. Turnkey solutions simplified ship owners' daily processes while increasing operational reliability and cost efficiency. Becoming a subsystem integrator was convenient for component suppliers because these suppliers have the best knowledge of their components and because fulfilling such a role was an opportunity to add aftermarket services as part of the total offering.

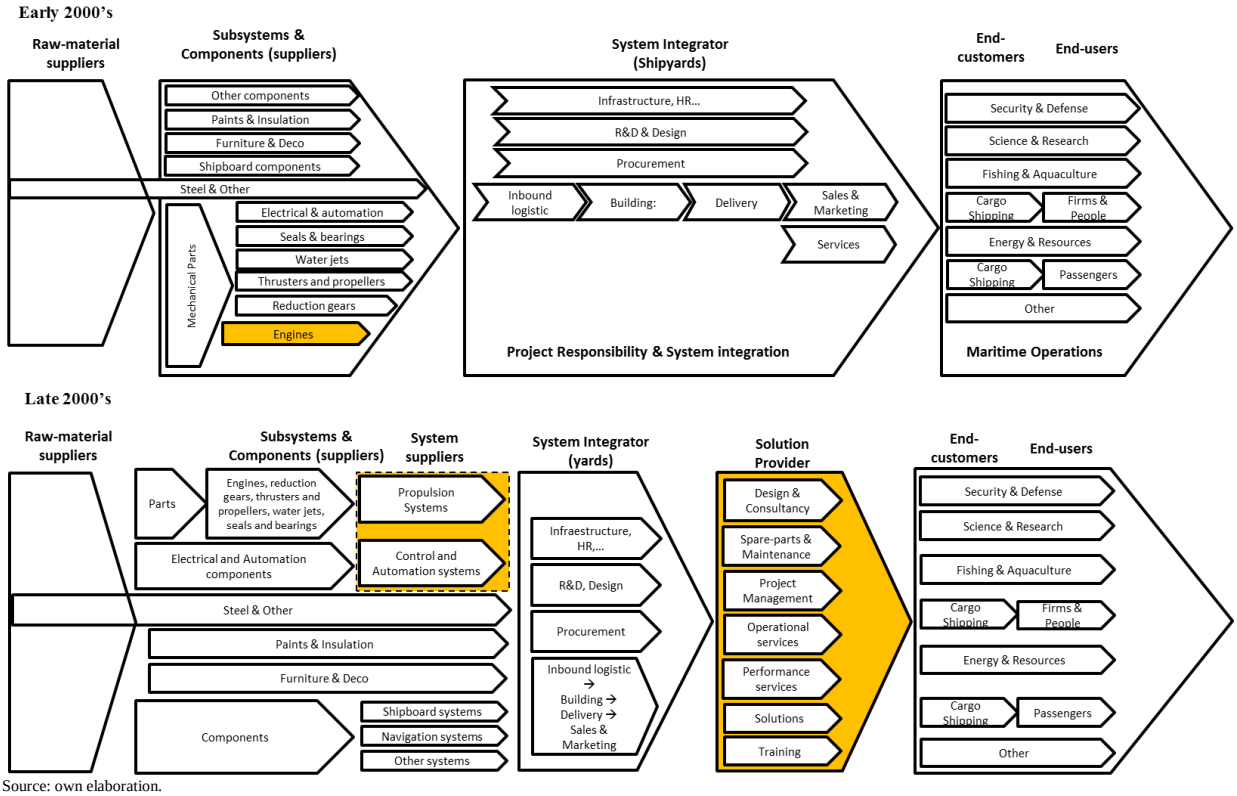
Wärtsilä seized the new competitive conditions by strengthening the ship power supplier concept, which aimed to cover "the ship's entire propulsion system" (Wärtsilä, 2001:20). At that time, this move suggested a clear strategic commitment toward the consolidation of the system business (Salonen et al. 2006). Accordingly, the company had "shifted the emphasis in its business from engine delivery to total systems customized for individual customers" (Wärtsilä, 2001:22). In the following years, Wärtsilä extended this concept to its entire propulsion, control, and automation systems portfolio. "We plan to expand this business further with new, complementary products by increasing the role of design and engineering and by forging alliances with other companies in the market" (Wärtsilä, 2003:8). Considering the competitive pressures from low-cost countries, system integration was thought of as a differentiation strategy based on the combination of "lowered total cost and enhanced performance for the buyer" (Salonen et al. 2006). Indeed, this approach was also recognized in the annual report: "Wärtsilä has an important role in assisting yards to develop their competiveness, as our ship power supplier concept offering complete propulsion systems reduces engineering costs and speeds up construction time" (Wärtsilä, 2002:8).

Controlling key physical systems and the acquisition of service capabilities to guarantee the lifecycle performance of the system became critical factors to assure system reliability and the profitability of the new business strategy (Salonen et al. 2006). The acquisition of a company specialized in propulsion systems (2002) and an agreement for manufacturing propellers (2004) were the initial steps. Wärtsilä also acquired several service providers to focus "on developing new service products and accelerating deliveries" (Wärtsilä, 2003:4). Maintenance and

operational services provision for the systems sold became a necessary constitutive component of the new value proposition, providing means to maximize the customer value and create competitive advantages, revenues, and profits (Gebauer et al. 2012). Although Wärtsilä already had services (field services, spare parts, and projects), they were still sold rather unbundled.

Over subsequent years (2004-2011), the development and/or acquisition of new capabilities to offer solutions and agreements composed of systems and services to support customer processes (Mathieu 2001a) while achieving better integration between product and service units (Galbraith 2002b; Davies et al. 2006) became the company's strategic target. Wärtsilä expanded its capabilities in project engineering and management, consultancy, ship design, engineering, and environmental services while expanding its service network with new offices, workshops, and facilities worldwide. This new strategic focus meant a transition toward a total solution provider. As such, Wärtsilä intended to 1) develop the service scope and bundle products and services in integrated packages, 2) expand the global service network by acquiring different companies strategically located around the world, and 3) bring the company closer to its customers by understanding and anticipating their needs to offer tailored lifecycle solutions. Yet, this change toward larger systems, services, and solutions required the company to move downstream closer to the end customers (Wise & Baumgartner 1999; Tuli et al. 2007). Furthermore, Wärtsilä moved upstream to complement its downstream expansion. From 2006 on, the company engaged in various joint ventures and licensing agreements to manufacture low-speed and dual-fuel, medium-speed engines (Figure 1).

Figure 1. Racing downstream: Wärtsilä's shifting positioning within the shipbuilding value system.



Source: own elaboration.
Wärtsilä's positioning within the value system is highlighted in orange.

Therefore, Wärtsilä has also maintained its position in the value chain as a system supplier for shipyards. Accordingly, industrial operations to balance the goods- and service-dominant logics (Windahl & Lakemond 2010) remained an imperative for the company (Salonen 2011). Indeed, a detailed analysis of the last 12 annual reports of Wärtsilä allows us to translate this transformation into systematic and quantifiable strategic moves from 2000 to 2012 (Table 1).

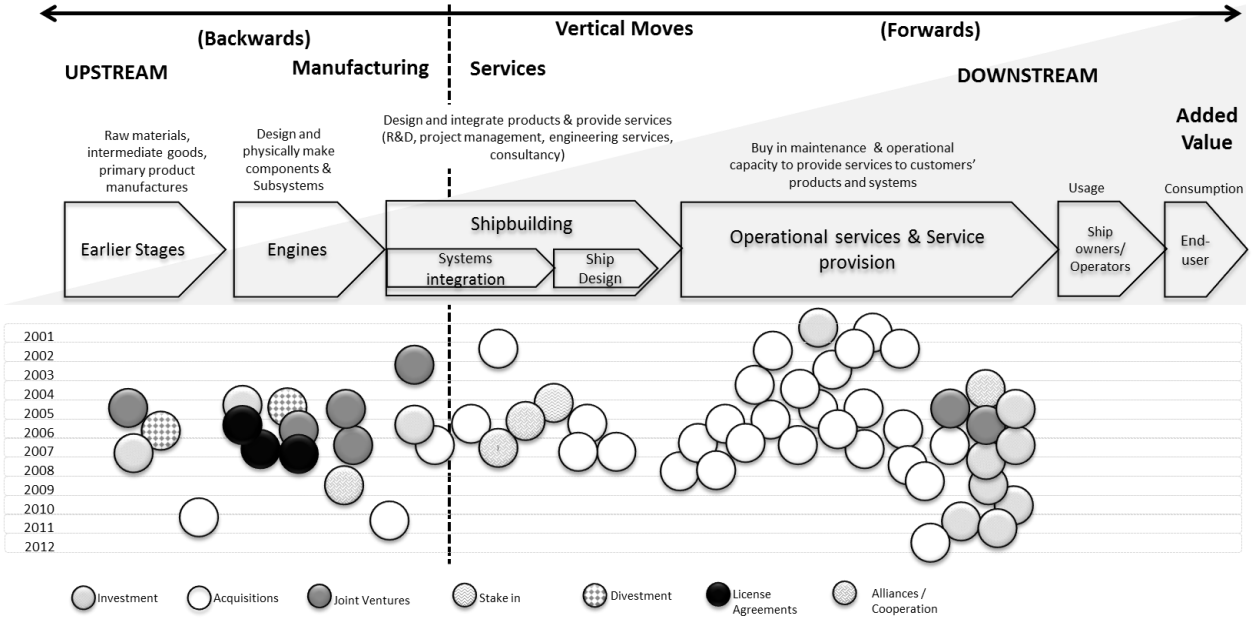
Table 1. Wärtsilä's strategic moves along the value system (2000-2012).

Value system stage / Move mode	Earlier Stages	Engine-related Manufacturing	Shipbuilding		Operational services and service Provision	TOTAL
			System integration	Ship Design		
Investment	1	1	1		24	27
Acquisition	1	1	3	3	23	31
Stake in				1		1
Joint venture	1	5	1		2	9
Alliances/Cooperation		2	2		2	6
License Agreement*		8				8
Divestment	1	1				2
TOTAL	4	18	7	4	51	78

Source: own elaboration based on Wärtsilä (Annual Reports from 2000 to 2012).
* Wärtsilä has around 20 license agreements worldwide. Only the new license agreements signed during the period are included in the table (but not the extensions).

Pictorially, our servitization map illustrates that whereas upstream strategy was based mostly on joint ventures, alliances, and license agreements, investments and acquisitions were the chosen mechanisms for the downstream value migration from 2000 to 2012 (Figure 2). Undoubtedly, these steps have affected the organizational boundaries. Based on face-to-face interviews, next we explore and discuss what reasons have driven these changes?

Figure 2. Servitization map: changing position within the Value system.



Source: own elaboration based on Davies (2004) and Wärtsilä (Annual Reports from 2000 to 2012).
* Each sphere represents one strategic move, including new companies, workshops, offices, service facilities, and training / education centers.
** Wärtsilä has around 20 license agreements worldwide. Only the new license agreements during the period are included in the table, but not the extensions.

IDENTITY, POWER, AND COMPETENCE: WÄRTSILÄ AND THE MAIN REQUIREMENTS FOR THE DOWNSTREAM JOURNEY

RECONFIGURING ORGANIZATIONAL IDENTITY AS A SOLUTION PROVIDER

Industry structure and competitive dynamics have required change in the business model of the leading ship engine manufacturers. Thus, Wärtsilä initiated a strategic transformation process to become a customer-centric organization. This strategic step has been broader than the change from an engine maker to a system integrator, as it involves a major transformation that challenges the existing business logic, capabilities, and organizational culture, as suggested by Davies et al. (2006). Because designing, producing, and delivering a solution is a relational process, customer proximity is a central issue for total-service suppliers (Tuli et al. 2007; Windahl & Lakemond 2010).

> "In the beginning of 2000, we really started to focus on customer relations. It also meant that we started to become proactive instead of purely reactive. You could say that we were sitting and waiting until somebody orders something and then we delivered… And today, we actually really want to be customer focused rather than product focused so whatever our customers need, we are there to really help them and also develop relative solutions then, meaning that we really look at customers over the lifecycle." (Vice president 2)

> "In 2009, when the world started to change more to this kind of solution thinking… we wanted to aim at building different kinds of solutions and packages, total packages for our customers … so basically, not a lot of changes [have been made] in the strategy of services during the years that I've been here, but it's been changing more and more from a product-oriented to customer-oriented mindset… If we move from, or have been moving from products to services, the main issue is here, in cultural changes." (Manager 1)

To achieve the new strategic vision, identity change has triggered a major transformation that has been in progress over the last few years (Gioia & Thomas 1996). Changes in both the Ship Power and Service top management teams were used in Wärtsilä "as boundary-mechanisms to reshape identity" (Santos & Eisenhardt, 2005:503) and align the strategy and organization while designing service-oriented structures (Galbraith, 2002; Neu & Brown, 2005). Divisions that used to work individually "must suddenly start collaborating and integrating" (Matthyssens & Vandenbempt, 2008:326). The Ship Power division was reorganized into five customer segments in 2007, and its headquarters was relocated to Shanghai, closer to the main yards, in 2008. To achieve synergies through joint operation, Wärtsilä Services was subjected to major reorganizations in 2009. The target of such reorganizations was to provide its customers a wide range of innovative one-stop-shop solutions that optimize customer operations and maximize the efficiency of the different systems throughout the system lifecycle. Emphasis was placed on a more proactive sales function and in-depth customer interactions. Prior studies underline the importance of close customer interactions in complex service and solution exchanges (Tuli et al. 2007). For instance, Kohtamäki et al. (2013) find that the relational form of social capital moderates the link between R&D services and profits.

> "When I came, we just had a big organizational change. The two main aims were to empower the people in general management in the organization on various levels all the way down to the country leadership of the Services business so that those leaders there actually would be empowered to make the decisions there close to the customers and thereby be able to react quicker to the customers and react with their knowledge, which is of course, let's say, better to the customers because they are closer." (Director 2)

Although back-end divisions were already in the process to become suppliers of standardized and replicable components and services, the next step was to shape the front-end system responsible for combining components and services into end-user solutions. In 2010, Wärtsilä established Marine Lifecycle Solutions to balance the front-end customization pull and back-end standardization push (Davies et al. 2006). Using a team leader philosophy, ad-hoc customer facing units are tailored for every single project based on transitory, multidivisional, and multi-skilled teams.

The last step of this still ongoing identity transformation was the reorganization implemented in 2012. "To further strengthen competitiveness and to serve customers more effectively, Wärtsilä has changed its organizational set up within Ship Power and Wärtsilä Industrial Operations" (Wärtsilä, 2013:212). Consequently, "Ship Power is today organized by product lines, namely 4-stroke, 2-stroke, Propulsion, Flow & Gas, Environmental, and Solutions, which includes both the Electrical & Automation and Ship Design product lines. One shared sales organization is responsible for customer relationships, uncovering customer needs, and for the sales network globally." (Wärtsilä, 2013:21). The Industrial Operations (WIO) division was also renamed to PowerTech, focusing mainly on "assembly, test running, and finishing of products" (Wärtsilä, 2013:41). The restructuring process has clearly involved a change in both the company's identity (culture, values, goals, objectives, incentives, and attitudes) and organizational structure while reconsidering the scope of vertical positioning.

> "We realized that if we want to do business with our Services division, from the new building phase, we also need to be closer to the ship owners and partner with the ship owners from that very moment… Thus, throughout the years, Wärtsilä's position has actually been shifting quite a lot from being just, you know, a supplier to a shipyard that many times tries to shop for price and for, you know, the minimum performance or quality that they can get within a certain price limit and so on, to being closer to the customer and to try to gain a position in which a customer goes to the shipyards and says already from the beginning 'I want this equipment on board my ship.'" (Director 3)

ALIGNING CAPABILITIES WITH THE SOLUTION PROVIDER STRATEGY

As suggested by Nag et al. (2007), identity change toward a customer-centric organization has also increased the need for developing new knowledge and capabilities to create and implement innovative solutions for a wide range of different customer segments (Brady et al. 2005; Penttinen & Palmer 2007; Ceci & Masini 2011).

> "Several acquisitions during the year have broadened the skill base and enabled the entry into new types of services." (Wärtsilä, 2009:14).

> "Wärtsilä's service business has expanded both through acquisitions and organically. During recent years, Wärtsilä has acquired new capabilities within propulsion, automation, and boiler services, which are being copied globally to other relevant Wärtsilä locations." (Wärtsilä, 2010:53)

Many interviewees arrived at similar conclusions when analyzing the rationality behind Wärtsilä's strategic moves during the last 15 years: two important drivers to explain these moves are broadening the service portfolio and acquiring expertise and capabilities, both to become a lifecycle solutions provider.

"When we acquire companies, it might be for various different reasons. One reason might sometimes be that we just want to get more net sales, so we are not getting any new types of products, in that we just get more customers. Another reason might be that we get a better share of wallet from the existing customers, so to speak. However, more often it's that we want some new competences, or we might even want some new products from those… Often, there might be good reasons that it's just quicker to get it that way, and if there is some key competence, it might be actually a very long-standing effort to try to build that organically…" (Director 2)

"That (company) was bought mainly for the service business to broaden the scope..., that (other company) was another one which we bought in service... OK, that is just some six years back, which actually broadened the scope so that we can actually be a one-stop provider of services for customers when they come in… actually for broadening the scope and broadening expertise… These are the ones that are more from the expertise point of view, that when somebody asks something, then you have expertise… this is the way we do it now that we have the portfolios, and then, we build up growth plans or development plans for those and see if we missed something. Then, the decision is do we actually build it inside or do we buy." (Director 1)

"…New capabilities... new service networks and we need to strengthen our services portfolio in order to provide services. We need to have a broad portfolio of different kinds of services, so that's why these purchases have also been a part of our growing strategy… because we didn't have in-house competence, for example, concerning EL and automation... Well, this has been strengthening our full scope of being a service provider…" (Manager 1)

The need for new capabilities depends on the industry and customer needs. According to the framework of Brady et al. (2005), the servitization process placed specific pressures on Wärtsilä, resulting in the development of new competences. In addition to system integration, project management, operational services, and consultancy skills, the development of new IT competences has been a necessary condition when moving toward lifecycle solutions. Two examples are logistics tracking (monitoring of product location and transportation conditions) and condition-based monitoring and maintenance (remote follow-up of installations, with maintenance planning based on real-time monitoring and avoiding unscheduled downtime).

"In services, if I look at the bigger attempt that we made, I can't go to the names of the companies, but we also looked at ways of broadening the product scope that we have, and sometimes, it might be something more than just physical products or conventional, industrial services. It might be things like software, for instance. Now that these optimizers and condition-based monitoring are so important for us, of course we might even need some software products or some kind of, let's say software as a service capability or, you name it." (Director 2)

Gaining new service capabilities through acquisitions and, particularly, investing in the development of a global company-owned service network were both major targets and main sources of competitive advantage vis-à-vis competitors.

"Many years ago, we decided that we want to have our own service network all over the world. When we went aggressively into service, acquired a lot of service companies, and strengthened the service business, it took five years and they came (competitors)… they have spots all over the world, [they're] big companies, but really, when you start to analyze where they have competence to do shipping or ship repair or workshop service, they are much, much less than ours ... I think, at least for me, I see that the biggest advantage we have over all competitors is that we are really global and we have people." (Vice president 1)

"Another major difference is that in Wärtsilä, we work through our own companies. We are established in roughly 75 countries, and in those 75 countries, we probably have more than 180 different locations, so it really means that Wärtsilä is really local and is fully owned by Wärtsilä, so they are not agents or dealers, they are our own people, and there are more than 10,000 people in Services, so that's maybe the biggest difference. Our competitors, they don't really have this wide global network of their own people's companies. That's probably our biggest competitive edge." (Vice president 2)

Finally, due to the particular conditions of the industry and customer preferences, the company has not focused on financial services as a source of differentiation.

> "We don't do financing services; what we do is a little bit like Wärtsilä Financing in that we have certain big parts that can cost 1.5 to two million that are needed to proceed with this service agreement with this customer. What we do is that we split it over five years. We don't want the payment directly but we split it over five years, so in reality, he gets a five-year light financing from us. In reality, maybe three years financing for us because if it costs two million before we have our cost back, so..."
> "The customers we have are not interested in this. There has not been any interest from our customers yet; we have tried lately with financing, and the customers say no." (General Manager 1)

REPOSITIONING TO IMPLEMENT A SOLUTION PROVIDER STRATEGY

However, for Wärtsilä, being close to the customer is an opportunity both to access market information and a more profitable business and to acquire influence and new competences upon which the company can build a non-contestable position in the propulsion industry (Porter 1980). As suggested by Kaplinsky (2000), the ability to govern the value system often arises from intangible competences, such as marketing, R&D, design, and branding. By "understanding the anatomy of purchasing decisions", firms are able to make better choices "about ways to shift control over the demand and manage risk" (Pil & Holweg, 2006:80).

> "We have to expand our areas of influence throughout the entire chain... then we have direct contact with the ship owner before he has even started to look for shipyards. We design the ship for them, we sell the design for them, and then they go to the shipyard and say basically you have to build this for me under these specifications." (Director 3)

> "Our ship design capabilities enable us to offer our customer-optimized, highly efficient solutions that create growth opportunities in lifecycle services. By combining our ship power solutions and ship design knowledge, we are able to create increased value for our customers. By participating in the planning and designing phase, we are able to better understand customer needs and thereby establish a stronger competitive position." (Wärtsilä, 2011:23)

Wärtsilä identified ship design as a permeable break/penetration point and thus bought design companies as a way of doing business and of positioning itself in between yards and operators and controlling ship design. This strategic move would favor the company's propulsion systems because Wärtsilä could design the ship such that customers can derive the highest possible value from its systems. Furthermore, this move would enable Wärtsilä to offer solutions and lifecycle service agreements to ship operators (including preventive maintenance). Therefore, entering the ship design market for Wärtsilä became a strategy to achieve upstream market lock-in (Porter 1980) and downstream knowledge by increasing the cost of switching the supplier of propulsion systems and also the company's lifecycle bargaining power over both yards and ship operators.

> "When you design the ship, you decide the systems to be included. After that, only your systems will fit to your design." (Manager 2)

Therefore, power and competence conceptions often become synergetic "when resources are used to exercise influence" (Santos & Eisenhardt, 2005:499). Many other steps in this direction have been activated by the described shift in a company's identity toward a solution provider and combine the need for new capabilities with the intention of controlling the value system.

> "Acquiring, integrating, and developing automation companies has been a step in Wärtsilä's strategy to become a total solutions provider as services broaden the scope of supply to customers and Wärtsilä gains better control of its value chain from design to lifecycle support." (Wärtsilä, 2007:13)

Other example is the recent acquisition of Hamworthy in 2012. This acquisition was an important part of Wärtsilä's growth strategy in the marine gas, offshore, and environmental solutions markets. Hamworthy added new competences and broadened the company's environmental products portfolio (Wärtsilä 2013).

> "For instance, Hamworthy's big acquisition, yes. We deliberately wanted to broaden the scope of the products that we can offer to ships. [This acquisition] actually helped very much, even though we had quite good offerings before that, too, but we still wanted to broaden it, and Hamworthy was very good for broadening certain gas and pumping solutions and many environmental products, and that was really, really clearly an excellent fit with our strategy." (Director 2)

> "Today, I think, buying Hamworthy was partly to get the components, the environmental components, but it was also partly to start the integration between the environmental components and the general, well-known, common Wärtsilä components and start the system integration between the environmental side of the ship and, how do you say, general equipment in the ship because the environmental systems are something new." (Director 4)

However, the acquisition was also implemented for developing a first-mover advantage in a profitable business segment and to control different environmental technologies before knowing which will become the industry standard. Because "standards shape industry architecture" (Jacobides et al., 2006: 1210) and companies can make above-average profits when their technology turns out to be the industry standard (Funk 2003), competences can be leveraged in complementary markets as a way to increase power and to "secure the adoption of the focal organization's industry standard" (Santos & Eisenhardt, 2005: 499).

> "…becoming more environmentally friendly because these new regulations are coming in 2015, and we have had this one scrubber… which is then a huge product that we see future potential in... our future moneymaker. That's why we bought this Hamworthy, who is actually having this kind of scrubber with a little bit different technique… so when the market blooms, Wärtsilä has two options, the existing options of the world to offer…"
> "...and Hamworthy has been fully concentrated on this, so they have expertise, they have a lot of knowledge, competent people that we will then add ... We paid a lot for this company, but it was a good strategic move... So, we need this kind of move in order to really keep our market position and fulfill our promises." (Manager 1)

DESIGNING THE VALUE SYSTEM FOR SOLUTION PROVISION

During more than 12 years, Wärtsilä has been transforming first from a transactional product supplier to a relational system supplier and thus to an integrated solution provider (Penttinen & Palmer 2007).

> "In the middle of the 1990s, you could still say that 80% of our service turn-over was spare parts, 80%. Today, it's pretty much 50-50, 50% is spares and the other 50% is other services, agreements, modernization, and upgrades, whatever lifecycle support solutions there are, and this is continuously changing, so I assume that after five years, it will probably be 40% spares, 60% other related services…" (Vice president 2)

Davies et al. (2007) describe the vertical organization for solution provision using the pure types of agnostic system integrator and vertically integrated system seller as both ends of a continuum, whereas hybrid forms can be considered in the middle. As originally suggested by Chandler

(1980), complex capital goods suppliers may often need a vertically integrated structure to coordinate and guarantee system compatibility and a threshold level of performance (Osegowitsch & Madhok 2003) while ensuring that product specifications and services can be tailored and adjusted to the needs of different customers when supplying systems (Davies 2004).

> "When you provide that type of performance agreement, you need to have control in a sense over everything from the ship design to the equipment that is there and to make sure that it has been built in the proper way... if you want to build a ship that has this type of operating profile or this type of efficiency and so on, what we will sell you is the full system specially engineered for this particular ship design, for example, where all of the interfaces between those products are optimized to work together, when you provide it as a supplier." (Director 3)

> "If you are an integrator, you get a standard product of the propeller, you get a standard product of an engine, and you have to put them together… not matching the performance, it means it's a disaster. It can be sometimes, and still you have two different suppliers, and you have to match them together, meaning there is a lot of work with drawings and this and that and those boats … We have to fit to that shaft and have done this, and there is a lot of work in between there.... Of course, we can promise better warranty terms because we have control of the whole thing … now, we are responsible for the whole line, so we have to fix it or, you know, when the customer is doing something wrong, it's more rigid." (General Manager 1)

Technical aspects, such as lower engineering costs and faster construction time, as well as the dual need to minimize the "cost of response" and maximize the "speed and effectiveness of respond" to particular customer needs (Baines et al., 2011: 952) became relevant drivers for Wärtsilä when deciding how to provide value-based total solutions for the marine industry (Windahl & Lakemond 2010). In particular, customer preferences regarding performance features, such as fuel consumption, emissions, and noise, became a key to understanding the need to control how subsystems must be coupled and how the value system processes are organized (Fine et al. 2002; Baines et al. 2011). In the presence of integral systems (Ulrich 1995), these solutions can only be provided by controlling "knowledge in engineering and manufacturing domains" while allowing "significant dependence for supply in manufacturing capacity" (Fine et al., 2002:73).

> "Since, what shall I say, 2002-2003, the world started to look different at these things, the oil prices started to get squeezed, people become more economically aware, they started to squeeze rates, and ship owners had to start optimizing things, they could not spend money as before, they had to look for a cheaper way to do it, a smarter way to do it, save fuel, save maintenance..." (General Manager 1)

> "Most of our customers really focus on operational expenses today, especially with the type of fuel costs you have. Depends on the customer, but fuel cost is 52-70% for a customer, so obviously, whatever you can do to reduce fuel consumption by 5 or 15% makes a mega difference, of course, and this is really our issue to continuously develop smart solutions to really optimize energy consumption, as an example." (Vice president 2)

> "So, again, if we can be there with a smart solution, and they are maybe based on condition monitoring, maybe remote condition monitoring. Maybe we sit here and follow hundreds of parameters, and we can immediately figure out this is wrong, they should change the trim, or because of weather, they should change the routing, or actually, they should load two engines instead of four, and if they do so, they could save 10% in fuel or something. If I could do this, they would probably be interested." (Vice president 2)

> "So we are working on developing these types of total optimizing solutions if I call it that: energy optimization in various forms. For us, it pretty much translates to... if you have a 12-year-old vessel with some Wärtsilä engines; we probably have solutions for how we can further improve the combustion process or engine so we can save 4% in fuel consumption. Simultaneously, we know exactly what to do to that old propeller so that adds to

> an additional 4% savings, and then, we can show that if we do this based on today's fuel prices, the pay-back time is seven months, many owners listen to us, especially if we somehow are prepared to even guarantee this. So, this is pretty much where development is going and the type of solutions we are working on." (Vice president 2)

In project-based businesses with tailored outcomes, the need for cross-system coordination and knowledge sharing across complementary components and systems also reveals that modularization has limits and, as suggested by Brusoni and Prencipe (2001), highlights the role of the system integrator as a knowledge integrator with a strategic role in designing and developing the system. Controlling the interdependent links in a value system allows companies to capture the most profit, and thus, these component interdependencies will shape firm boundary decisions.

In contrast, the logic of how to design the value system changes when examining the upstream. The company's manufacturing concentrates mostly on "assembly, test running, and finishing of products" (Wärtsilä, 2013:40). In addition to the factories in Finland and Italy, joint ventures (six globally) and alliances are actively used due to localization advantages. Furthermore, Wärtsilä has nearly 1,200 suppliers globally, 300 of which are continuously active in different projects. "Through close co-operation, excellent relations, and the sharing of information with our suppliers, the supply of components and market-conform lead times are secured" (Wärtsilä, 2013: 41). The existence of a strong supply base (Fine et al. 2002) composed of qualified and selected suppliers with, in most cases, little bargaining power (Porter 1980) has allowed Wärtsilä to build its supply strategy on a close network-based cooperation with suppliers and partners as has also been suggested by prior studies (Windahl & Lakemond 2006; Cova & Salle 2008; Gebauer et al. 2013). In this case, it appears clear that many exchange-efficiency "arguments have been cast aside by technological and other innovations" (Osegowitsch & Madhok, 2003: 31). Of course, sourcing choices involve a trade-off between "dependence and independence for knowledge and supply" (Fine et al., 2002: 71), Wärtsilä has been safeguarding intellectual property rights, particularly to defend its business in the secondary market (parts and services).

> "We have very little in-house manufacturing of components and parts, so of course, we are very dependent on suppliers, and we even have a lot of co-development with our suppliers that we develop components and parts together with them, so I would say that they are a very critical part in this chain..." (Vice president 1)

> "I don't think that that has been a strategy to buy part providers… The strategy has not been to buy those. It has been more to outsource, I think, on that side… but of course, for a certain part of the business, it can, of course, be a problem, but I would say that there are many others also doing those kinds of components, so... we are using other suppliers also (dual sourcing, parentheses added) … so it's a certain contract with a supplier, and they have to sign for the intellectual property (IP) rights … but if it's their invention, then it's of course their (product)."(Director 4)

> "…and from the spare parts point of view, I would see that the focus needs to be on securing the availability and the possibility to, how would I say that, protect ourselves from the competition, in the spare parts point of view, meaning that we need to put more focus internally into IP rights and patents when we source from a new suppliers. Then, we need to identify the strategic suppliers, and if there is some threat, then consider the possibilities of buying that…" (Manager 1)

Thinking about the future, Wärtsilä will most likely provide its solutions adopting a hybrid form between a vertically integrated system seller and agnostic system integrator that combines the benefits of both models (Davies et al., 2007).

"Somehow, we need to connect this to some external third-party partners."
"...but we are maybe the integrator… we put together these performers' guarantees, but then we work with some other providers, maybe." (Vice president 2)

"It will kind of happen the same as what happened in the car industry in the 70s, end of the 60s, beginning of the 70s. The car industry started to buy and create system suppliers, which supplied, maybe they developed it for, and they continue to develop it, of course." (Director 4)

Summing up, our results illustrate how Wärtsilä has been shifting its position within the shipbuilding value system while progressively changing its identity from engine manufacturer to system provider and further to solutions provider. Regarding the boundary mechanisms, whereas upstream moves, at the core of Wärtsilä's traditional business, were mostly based on collaborative practices, investments and acquisitions were the chosen mechanisms for the downstream moves as a way of reducing external dependencies and controlling core resources and key linkages in the value system. Consequently, our analysis indicates that identity, power and competence conceptions have independently driven these boundary decisions but, at the same time, these conceptions are often complementary and interdependent.

CONCLUSIONS AND IMPLICATIONS

This study was set out to contribute to the literature on firm boundary choice and value system organization in the context of the servitization process of a manufacturer when migrating from a system integrator to a solution provider. To this end, we separated this study from studies that consider single boundary choices and instead analyzed the patterns of strategic maneuvers made by the case company over the last 15 years. The main contributions of our study are twofold: our study (1) illustrates and discusses how the servitization process influences a manufacturer's positioning within the industry value system; (2) adds knowledge on how the different theoretical firm boundary concepts contribute to value system analysis.

THEORETICAL IMPLICATIONS

As suggested by prior research, firm boundary decisions extend far beyond the explanations provided by the traditional "exchange-efficiency" approach (Santos & Eisenhardt 2005). Theories on firm boundaries are interdependent, complementary and synergistic, suggesting a need to combine theoretical approaches under a single framework (Santos & Eisenhardt 2005; Lafontaine & Slade 2007; Brahm & Tarzijan 2012). Whereas prior research on system integration recognizes repositioning along the value system as a way of moving closer to customers (Wise & Baumgartner 1999) and obtaining new competences (Davies 2004; Brady et al. 2005), strategic moves aimed at increasing the sphere of influence are often neglected. Wärtsilä's identity was transformed toward a highly integrated solution provider to meet customer needs and acquire new capabilities, control the critical components, and minimize the costly technical risks and system incompatibilities at the time of the lifecycle service provision. These types of capabilities have been considered central in the existing industrial service research (Ulaga & Reinartz 2011). However, re-positioning within the value system was a double opportunity for acquiring new competences and also influence upon which the company can build a non-contestable position in the industry and lock-in customers. In this situation, the power and competence notions are symbiotic, but the power conception seems to rule

competence concerns. Yet, vertical integration was not the only governance mechanism applied by our case company. Theories provide a variety of means to achieve strategic influence within the value system (Mahoney 1992; Porter 1980). In the upstream, Wärtsilä applied a broad variety of practices, such as licensing, long-term contracts, strategic alliances, and joint ventures, to access critical capabilities, decrease external dependencies, and increase its sphere of influence.

Aligned with the findings of Pil and Holweg (2006), our case also demonstrated that re-positioning goes beyond adjacent activities and involves detecting profitable points within the value system. Wärtsilä was able to recognize where money can be made (Wise & Baumgartner 1999) as well as "…where, in an industry's shifting value chain, the money will be made in the future" and strategically move to where the money will be (Christensen et al. 2001:74). An early understanding of the importance of key novel industry trends has given Wärtsilä the possibility to dominate, at least temporarily, key sources of competitive advantages. From a strategic perspective, realizing the shift in the ship building industry toward Asia, the Ship Power division moved its operations to China to achieve close proximity to the largest yards. From a technical perspective, the company was able to develop efficient and reliable systems and an innovative portfolio of advanced services, which included ship design to lock-in its markets and IT-based services to improve the system optimization during the lifecycle. Wärtsilä is also well positioned in the race to dominate key technologies meeting forthcoming environmental regulations. Finally, a key pillar for the new positioning has been the focus placed on the development of an own global service network (unlike its main competitors, which are using third parties).

Using a forward-looking interpretation of the results, from the perspective of a single company, our analysis extends the existing research on industry architecture (Jacobides et al. 2006; Jacobides & Billinger 2006; Jacobides & Winter 2005). Even if the focal company cannot select its industry architecture independently of its environment, the focal company can have an extensive influence on it (Jacobides et al. 2006). Particularly, our case supports and extends some of the results of these articles, demonstrating how some industries reintegrate when participant firms change strategies to cope with commoditization and changes in customer demands (Cacciatori & Jacobides, 2005; Jacobides & Billinger, 2006). Our case indicated that once the firms within the value system and industry understood the new rules and opportunities, many of them intended to shift their position along the value system to find rents. Even component suppliers attempted to benefit from the new situation by offering spare parts directly to ship operators/owners or joining networks with other providers to offer a portfolio of after-sales services. Therefore, once the existing division of labor became inadequate to meet the changing needs of the customers, the new situation encouraged industry participants to reshape the value chain while searching for new forms of vertical structures with a new division of labor (Cacciatori & Jacobides 2005). This study responds to the call for power and dependence justifications when analyzing changes in industry architectures (Cacciatori & Jacobides 2005).

MANAGERIAL IMPLICATIONS

Our case highlights some major difficulties involved in the service transition. In addition to difficulties inherent to a strong cultural change, from an engineering-based toward a customer-centric organization, several barriers associated with strategy implementation must be carefully considered. Building strong joint ventures and alliances and learning how to integrate knowledge

and retain people from acquired companies are both critical and challenging. However, creating an extensive service network and finding competent people to offer field services are neither straightforward nor easy processes. Finally, an implicit message that we interpreted from the case is that industry also matters. Even for a such company as Wärtsilä, which has extensive experience in the servitization process in the power plant industry, the value migration has been neither easy nor straightforward (Brax & Jonsson 2009) in the case of propulsion systems for vessels. Industry conditions and customer backgrounds, preferences, and needs are key determinants of the smoothness of this value migration. It can take some time to become familiar with the new practices, roles, and rules in the industry. As suggested by Cacciatori and Jacobides (2005:1854), integrated solutions "often require the emergence of a new 'all-in-one' market", which includes new ways of dealing and pricing as well as persuading customers of the convenience of the new value proposition (Penttinen & Palmer 2007) and educating them to emphasize the lifecycle standpoint (Matthyssens & Vandenbempt 2008).

Furthermore, it is important to consider that eventually, rivalry in service markets will intensify and all services will turn into a commodity (Jacob & Ulaga 2008; Matthyssens & Vandenbempt 2008). This situation can alter the differentiating power of an advanced service strategy over time (Mathieu 2001b). If servitization strategies turn into an industry recipe (Spender 1989), the real sources of differentiation and competitive advantage will be the implementation rather than the strategy itself. Our results highlight that an early understanding of the importance of key novel industry trends has given the company the possibility to dominate, at least temporarily, key sources of competitive advantages. Being the first mover allowed Wärtsilä to re-organize its value system functionally for the new customer-centric strategy. From a technical perspective, the company was able to develop efficient and reliable systems and an innovative portfolio of advanced services. However, because competitive advantages are only temporary, continuous solution innovation has become a necessary condition for success (Fine et al. 2002).

LIMITATIONS AND SUGGESTION FOR FURTHER RESEARCH

Our study also has some limitations that enable us to make suggestions for further research. First, our results are based on a single case study; therefore, other companies either from the same industry (adding Wärtsilä's main competitors and other linkages within the value system) or from different value systems must be analyzed to validate our results. Second, as suggested by Santos and Eisenhardt (2005), research that focuses on relationships among boundary conceptions must adopt a longitudinal approach by applying process research. Although our study cannot be considered longitudinal, we attempted to mitigate this limitation during the data collection. We analyzed the company's annual reports in detail, and in most cases, we interviewed people who had worked in the company for more than 15 years, who have been involved in the transition, and who could provide first-hand information. Finally, an additional opportunity for future research is to complement our discussion by adding further evidence on the nature of value creation and appropriation logics in different positions within the value system (Dietl et al. 2009) and on why value migrates from one value system point to another (Jacobides et al. 2012).

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