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**FACTORS INFLUENCING THE CHOICE OF SOLUTION-SPECIFIC
BUSINESS MODELS**

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FACTORS INFLUENCING THE CHOICE OF SOLUTION-SPECIFIC BUSINESS MODELS

ABSTRACT

Services are receiving an increasing amount of attention in project-based firms. This has led project suppliers to employ new business models; the project supplier can offer services as an additional component of the project or take full responsibility for the operation and maintenance of the facility throughout its life-cycle. In this paper, we build on the idea that within the context of project-based firms, assessing business models requires a solution level of analysis which implies services as integral parts of project offering. We analyze business models in five solutions that were delivered by a power plant supplier firm. The evidence clearly demonstrates that there are variations in business models at the solution level. The paper further contributes to existing research by empirically identifying factors that influence the choice of business model for a particular solution. Finally, we formulate propositions on how these identified factors influence the choice of a business model for an individual solution.

Keywords: Project-based firm, business model, integrated solution, solution specificity, project business

FACTORS INFLUENCING THE CHOICE OF SOLUTION-SPECIFIC BUSINESS MODELS

1. INTRODUCTION

As in the traditional manufacturing business (Baines et al., 2009; Wise and Baumgartner, 1999; Vandermerwe and Rada, 1988), also project-based firms, which focus a specific part of their activities in projects (Artto and Kujala, 2008), are placing more and more emphasis on services in their offerings (Artto et al., 2008). The term “servitization” is used to describe this trend from a pure project or product deliveries towards integrated solutions in which services have a leading role (Rothenberg, 2007; Vandermerwe and Rada, 1988; White et al., 1999). These integrated solutions are bundled offerings of goods, services, knowledge, support, and self-service (Davies, 2004; Vandermerwe and Rada, 1988). In addition, customers of capital-intensive systems are increasingly interested in the life-cycle costs of their investments (Stremersch et al., 2001). This has led project supplier firms to develop not only additional service components for their project deliveries but also solutions that seek to optimize the systems’ total operation and maintenance (O&M) costs during their life-cycle (Ivory et al., 2003; Wise and Baumgartner, 1999). These life-cycle solutions provide potential benefits because they maintain a larger share in the customers’ businesses, suppliers have more responsibility for long-term successes, project suppliers have more opportunities to maximize profit and can capture a larger portion of the overall value stream (Davies, 2004). Furthermore, it has been suggested that firms that have O&M involvement in the solutions’ use-phase should formulate business models that support life-cycle solution deliveries; both the project supplier firm and its customers can reap benefits with the design of integrated

packages for optimal life-cycle performance (Ivory et al., 2003; Markeset and Kumar, 2004).

Despite the potential benefits of servitization, prior research suggests that there are a number of factors that may discourage firms from providing integrated packages with more services (Cohen et al., 2006; Mathieu, 2001b; Rothenberg, 2007; Vandermerwe and Rada, 1988; Wikström et al., 2009). General literature on business strategy and business models suggest that the firm's products and services, markets and customers, technology, capabilities, value proposition and revenue creation logic, or past performance and industry characteristics are factors to be considered in the choice of a business model (Chesbrough and Rosenbloom, 2003; Morris et al., 2005; Siggelkow, 2001; Slywotsky et al., 1998; Tikkanen et al., 2005). It has also been suggested that there are several contextual factors that affect the choice of business model for a project-based firm such as industry logic, the relative size and frequency of project deliveries and project novelty (Kujala et al., 2008). Prior research has focused on business models and their applicability at the firm level (Siggelkow, 2001; Tikkanen et al., 2005; Hedman and Kalling, 2003). However, it has been suggested that in the context of project-based firms business models should be studied based on individual solutions delivered to customers (Kujala et al., 2010). Even though Kujala et al. (2010) focused on the conceptualization of a business model at the solution level, empirical evidence concerning the factors that influence the choice of business model at solution level is scarce. Furthermore, despite the potential advantages and benefits of life-cycle solutions (Ivory et al., 2003; Windahl et al., 2004), the choice of business model for individual solutions is not straightforward; services impact project-based firms' business in various ways (Artto et al., 2008). For example, in some firms operational services may even cannibalize a more profitable

transactional maintenance business (Artto et al., 2008). Similarly, even though life-cycle solutions are sometimes considered the only way to provide full customer satisfaction (Stremersch et al., 2001), they can also pose significant business risks for the client since operational service contracts are complex (Stremersch et al., 2001) and the customer has to rely on the supplier's expertise in managing and operating the solution (Helander and Möller, 2007). Some customers prefer to remain independent of their suppliers (Helander and Möller, 2007) making life-cycle solutions less attractive. In order to increase the understanding of why project-based firms implement different business models at the solution level, we address the following research question:

What factors influence the choice of the business model for a solution delivery in a project-based firm?

Building on prior research on business models at the firm level, the aim of this paper is to engage in an empirical analysis to identify the factors that influence the choice of the business model at the solution level. We have studied five individual solution deliveries at a power plant supplier company. In this paper we make a distinction between three different types of solutions: (1) transactional project deliveries, (2) project led solutions, and (3) life-cycle solutions. Transactional project deliveries are simple system deliveries to a customer with little or no additional service components. A project led solution, includes a traditional project delivery as well as a long-term O&M service component, which are offered and sold to the customer as distinct components. In project led solutions, operational services are an important part of the offering, but the core delivery project is the main focus. Operational services that are offered by these firms are standardized and are provided to customers that are eager to outsource for flexibility reasons (Gebauer, 2008).

Finally, in a life-cycle solution the project and service components are offered as a single integrated solution, emphasizing the life-cycle performance of the offering. In the case of integrated solutions, the provider must identify and solve each of the customer's business problems by providing services to design, integrate, operate and finance a system during its life-cycle (Davies et al., 2006). Stremersch et al. (2001) approach solutions using a definition of "full service" that extends the traditional product offering so that it covers customer needs that arise after the delivery of a system. They state that a full service strategy dominates the provisions of goods and bundled or unbundled services. Furthermore, they see an offering as a solution that is viewed as a service activity and suggest that this is the only way to fully satisfy customer needs (Stremersch et al., 2001). Life-cycle solutions transform a project supplier's business model from a project delivery focus in to a project product's use-phase with a focus on the total life-cycle of the system. There is often a gap between what the supplier considers to be a solution and what is actually a solution for the customer (Tuli et al., 2007). From the supplier's perspective, solutions are often viewed as bundles of products, software, and services that create more value for customers (e.g., Galbraith, 2002). However, this view does not often capture the customer's perspective of a solution (Tuli et al., 2007). Instead, solutions should be viewed as a set of customer-supplier relational processes (Normann, 2001; Tuli et al., 2007) and a supplier should adopt a service-dominant logic (Lusch and Vargo, 2006; Vargo and Lusch, 2004) in its solution business. Life-cycle models emphasize the use-phase performance of a solution, which also illustrates how servitization blurs the distinction between manufacturing and service activities (White et al., 1999).

2. THE SOLUTION SPECIFICITY OF BUSINESS MODELS IN PROJECT-BASED FIRMS

The discussion of business models is usually strategy-related and subsequently takes place at the organizational level (Hedman and Kalling, 2003; Siggelkow, 2001; Tikkanen et al., 2005). Some strategy scholars, however, propose that the analysis of business models should not be restricted to the firm or business unit level. For example, Slywotsky et al. (1998) suggest that firms should be more careful when designing their businesses and design business models in an innovative manner, suggesting that there are potential benefits in employing multiple business models within one firm. Magretta (2002) and Chesbrough and Rosenbloom (2003) suggest that a firm can have several distinct business models simultaneously. Building on these suggestions, Kujala et al. (2010) argue that in the context of a project-based firm, business models should be studied on the level of a single project solution. Their empirical analysis supports their argument by pointing out that different project solutions employ different business models within a project-based firm. This calls for an analysis of business models on the level of individual solutions.

In this paper we address business models with regard to the role that services play in an offering. We suggest that solution offerings in project-based firms are situated along a continuum that has traditional transactional projects with minimum product services at one end (Oliva and Kallenberg, 2003; Mathieu, 2001a) and integrated service and project offerings as a life-cycle solution at the other end (Davies et al., 2006; Ivory et al., 2003; Oliva and Kallenberg, 2003; Stremersch et al., 2001; Vargo and Lusch, 2004). Ongoing full-scale operational outsourcing after project delivery is in between the two extremes (Cohen et al., 2007; Oliva and Kallenberg, 2003). The continuum represents the role that

services play in the solutions, not the potential for benefits related to the solutions. We illustrate and describe three distinctive solution offerings along this continuum in Figure 1. These solution types are transactional project delivery, project led solution and life-cycle solution. We address that these distinctive solution types require the project supplier to utilize different project-specific business model types in offering and delivering them.

Figure 1. Characteristics of a Project delivery, Project led solution and Life-cycle led solution

Scholars have used different definitions for the business model concept and there is not an agreement which elements it should consist (Morris, Schindehutte and Allen, 2005; Pateli and Giaglis, 2004). In this paper we build on the framework presented by Kujala et al. (2010). Based on a literature review, they proposed six elements for the analysis of the key characteristics of business models in project-based firms. We consider their framework useful for this research because it was created in the project business context. The six elements that we use to analyze the characteristics of business models at the solution level are: customers, value propositions, competitive strategy, position in the value stream, internal organization and capabilities, and value creation logic (Kujala et

al., 2010). In Table 1, we present a characterization of the three different types of business models for transactional project deliveries, project led solutions and life-cycle solutions in these six elements.

Table 1. Key characteristics of the three business models for transactional project delivery, project led solution and life-cycle solution (Modified from Kujala et al., 2010)

Business model element	Transactional project delivery	Project led solution	Life-cycle solution
Customers	Customer's independent strategies and in-house technological know-how (Helander and Möller, 2007; Markeset and Kumar, 2003)	O&M non-core process, will to outsource for flexibility (Gebauer, 2008; Oliva and Kallenberg, 2003; Windahl et al., 2004)	Relying on a supplier's expertise, will to engage in long-term relationships (Davies, 2004; Penttinen and Palmer, 2007; Windahl et al., 2004)
Value proposition	Cutting-edge product, assistance and spare-parts to ensure the proper functionality of the system (Galbraith, 2002; Gebauer, 2008; Markeset and Kumar, 2004)	Reduction of initial investment and guaranteed operational cost (Gebauer, 2008)	Co-development of a solution that offers best performance and outcome (Davies, 2004; Davies et al., 2006; Vargo and Lusch, 2004)
Competitive strategy	Based on the best product and quick on-request services (Cohen et al., 2006; Gebauer, 2008; Stremersch et al., 2001)	Cost leadership on operational cost, standardization (Gebauer, 2008)	Differentiation and pro-active co-creation of the customer's requirements (Crespin-Mazet and Ghauri, 2007; Davies et al., 2006)
Position in the value network	The management of supplier network, services and non-core business (Cohen et al., 2003; Davies, 2004; Helander and Möller, 2007)	OEM's often use network service companies that limit customization (Davies, 2004; Oliva and Kallenberg, 2003; Windahl et al., 2004)	Large share of value stream, the role of external partners and a network of customers (Cova and Salle, 2008; Davies, 2004; Windahl et al., 2004)
Internal organization and capabilities	Core capability in products, separate service units, product R&D (Galbraith, 2002; Helander and Möller, 2007; Oliva and Kallenberg, 2003)	Localization and centralization of tasks, service capacity utilization (Helander and Möller, 2007; Oliva and Kallenberg, 2003)	Customer-facing units, the strategic role of marketing, business/ market competencies, solution repeatability (Davies et al., 2006; Vargo and Lusch, 2004)
Logic of revenue generation	Transactional revenue, the possibility of installed base profits (Cohen et al., 2006; Markeset and Kumar, 2005; Slywotsky et al., 1998)	Accepting operational risk worth a premium, revenue sharing possible (Oliva and Kallenberg, 2003; Sawhney, 2006)	Gain-sharing, performance guarantees, solution profits, pricing on second-best options (Davies et al., 2006; Sawhney, 2006; Slywotsky et al., 1998)

Business model literature points out several factors that might influence the choice of business model at the organizational level including customer behaviour, technology, market opportunity and competition (Chesbrough, 2007; Magretta, 2002). Existing literature in the project-context also suggests several contextual factors that affect the performance of certain business models (e.g., Kujala et al., 2008). These include, for example, the complexity of the project and its organization (Hobday, 1998; Wikström et al., 2009), the experience of an organization in delivering services (Wikström et al., 2009), the project size and the risks that are involved (Cova et al., 2002). Prior research has not been very specific in terms of if and how these factors (or other factors) might influence the choice of business model at the solution level.

In this paper, we address this void in the research. We base our analysis on the three different solution-level business models proposed in this paper; transactional project deliveries, project led solutions, and life-cycle solutions. We build on the assumption that there are a number of factors that influence the choice of a business model for a solution delivery. In this paper we aim to identify and assess factors that have an impact on the choice of one a business model for a solution delivery,

3. EMPIRICAL STUDY: THE POWER PLANT SUPPLIER FIRM

In order to empirically assess the factors that influence the choice of a solution-specific business model, we collected data using the single embedded unit case study method (Yin, 1990), referring to multiple cases in a single context (firm). An embedded unit case study design is considered appropriate for developing an in-depth understanding through a detailed analysis of the factors that a firm faces when making decisions regarding the

choice of business model for a solution delivery. Furthermore, an embedded unit design is advantageous because it allows for the control of a number of different external factors that might affect the choice of business model.

In this paper, we present data that was collected from Consolidated Power Company (CPC, a pseudonym), a multinational power company with annual sales of around 5.5 billion Euros as of 2009. CPC is a multi-business company and in this research we focus on its business as a supplier of power plants. CPC offers various distinct solutions to the power industry. Five of their solutions were selected for analysis. CPC's projects are flexible, ranging from simple equipment deliveries to full-scale turn-key deliveries. The company also offers an extensive service portfolio for its power systems, including O&M services. In O&M services, the O&M unit's offering includes the management of all aspects of the operation and maintenance of a power installation, including operations and maintenance planning, day-to-day operations, scheduled and unscheduled maintenance, training and human resource activities, technical support, logistics and security. The scope of the O&M contract is tailored to a customer's needs. CPC has had an active O&M branch for the last 10 years.

In order to understand the factors that influence the choice between business models used for transactional project deliveries versus those that were used for service-focused deliveries (project led solutions or life-cycle solutions), we focused on analyzing business models that included services as part of the solution. In other words, we focused our analysis on project led solutions and life-cycle solutions. This enables us to understand the factors that have influenced the decision to offer a service-focused business model or the factors that might further impede reliance on services as part of the business model in future projects. Along these lines, the five solutions that we included in

the analysis all have an engineer, procure, construct (EPC) - project delivery followed by a long-term O&M service contract. These components are offered either as a project led solution or as a life-cycle solution. In four of the cases, the customer was first offered and sold a power plant project that was based on the customer's specifications in the EPC project tender. The O&M contract was offered separately, after the original EPC project offer. These cases are defined as project led solutions due to a clear separation between the two components. These represent a project led solution business model. The fifth case is an integrated solution, consisting of both a project and an O&M service, defined as a life-cycle solution. Accordingly, a life-cycle solution business model describes this solution type.

The basic characteristics of the cases are presented in Table 2. The customers of the five cases are categorized as representatives of customers with three distinct customer segments: independent power producers, captive customers, and state utility customers.

Table 2. Key information on the five case solutions

Solutions	EPC project scope	O&M service scope	Customer segment	Solution type
Solution A	100MW	10-year O&M agreement	Captive customer = Industrial user of electricity for the metal industry	Project led solution
Solution B	40 MW	7-year O&M agreement	Captive customer = Industrial user of electricity for the construction industry	Project led solution
Solution C	10 MW combined heat and power	12-year O&M agreement	Independent power producer	Project led solution
Solution D	100MW	2-year O&M agreement	State utility	Project led solution
Solution E	1. Project development 2. Integrated delivery: 75MW and 15-year O&M agreement		State utility and Independent power producer	Life-cycle solution

In order to assess the factors that influence the choice of business model for each of the five solutions, we used multiple data sources. The main data was collected in interviews. Altogether, 15 interviews were conducted. Those interviewed represent various positions in the organization including EPC project managers, O&M service sales managers and O&M contract managers for each of the cases. Fifteen semi-structured interviews were conducted. Ten of these were conducted in person and five of them over the phone. The interviews lasted for about 45-60 minutes each. Recordings were made during the face-to-face interviews and detailed notes were taken during the telephone interviews. Additionally, we analyzed company-internal material and customer satisfaction survey data in order to gain more insight into each of the cases and to understand the factors that influenced a specific business model decision.

4. RESULTS

In the first step of our analysis, we focus on identifying factors that have influenced the choice of the focal business model for each solution delivery. Based on the analysis, these factors can be classified as: (1) the existence of the customer's maintenance organization, (2) the skill-level of the customer's maintenance organization, (3) the level of complexity of the delivered technology as perceived by the customer, (4) the supplier's marketing approach to the solution, (5) the customer's core business, (6) the customer's financial resources, and (7) the project supplier's or the customer's accustomed business practices and organizational structure. In this section we report the results of each project solution case, focusing on the influencing factors.

4.1 Solution A

The customer for solution A operates in the metals industry. Prior to the solution delivery, the customer had operated two power production facilities using its own O&M organization and staff. As a result, its initial interest was only on a transactional project delivery of a new power facility without a long-term service contract on the supplier side. However, CPC took a proactive marketing approach and introduced its technology. This technology provided a significant improvement over the technology the customer had originally considered but it was new to the customer. The customer was extremely interested in the new technology and in the significant advantages compared to its existing production facilities, but this introduced a problem. The existing personnel did not have the skills and capabilities that were necessary to operate a plant with the advanced technology. This issue was even more critical because the customer's production process was highly sensitive to power outages. These issues led to the successful offering of a project led solution instead of a transactional project delivery, since this solution seemed to be the most feasible option for the customer. As the O&M sales manager stated; *"The power plant was strategic for the customer's process as the customer did not have connectivity to a power line elsewhere. The customer could not trust untrained employees to operate the power plant"*. Despite the customer's clear need for a service component, both the customer and the supplier felt more comfortable negotiating project delivery and O&M contracts separately.

Summary of factors influencing the choice of a business model from the analysis of solution A: The identified factors are: the existence and skill level of the customer's maintenance organization, the complexity of the technology, the supplier's marketing

approach, the customer's core business, and the supplier's and the customer's business practices.

4.2 Solution B

Before the delivery of solution B, the customer already owned and operated two generation systems that had been delivered by CPC. Customer B then set out a tender for a third power generation system and, as with the two previous ones, it planned to operate the new system itself. However, the customer was not fully satisfied with the performance of its existing power generation systems that was due to of a lack of capabilities amongst the customer's staff – they did not possess the knowledge to utilize the existing system to its full potential. Consequently the generation system's performance had deteriorated unexpectedly. In order to respond to the customer's need and to the increased concern for reliable performance, CPC proactively offered the customer a value proposition that included both the project delivery and a life-cycle oriented O&M contract. *"The customer was asked to stick to his core business and to let the supplier to take care of power production"*, the O&M manager explained. This solution allowed the customer to outsource the risk associated with break-downs and deteriorating performance to the party that had the most experience in maintaining and operating the power generating equipment. The customer understood the potential value of the long-term solution and was very enthusiastic about it. However, despite the original integrated value proposition, CPC's project-centric organization drew up the bids for the project and service components separately. This made it possible for the customer to compare the separate project delivery component and O&M service component to

similar components offered by competitors, making the life-cycle solution business model less applicable.

Summary of factors influencing the choice of a business model from the analysis of

solution B: The identified factors are: the existence and skill level of the customer's maintenance organization, the complexity of the technology, the supplier's marketing approach, and the customer's core business.

4.3 Solution C

The customer for solution C was an investor who did not have the capability or the strategic goals to operate a power system. The aim of customer C was to take advantage of a de-regulated electricity market by investing in a production facility that would sell electricity to the grid with a profit over the life-cycle cost of the plant. At the time, CPC's organization emphasized project deliveries and considered the customer's request for a life-cycle oriented O&M service as a tool that enabled project sales. Therefore, despite the customer's request for a life-cycle solution, CPC prepared the project and the O&M service offerings separately in a way that emphasized revenue from the project delivery while compromising longer-term O&M service revenue. Separate design and implementation of the solution parts led to a need for plant layout modifications in the use phase in order to enhance the plant's usability and maintainability.

Summary of factors influencing the choice of a business model from the analysis of

solution C: The identified factors are: the customer's core business, the project supplier's business practices.

4.4 Solution D

Solution D was a new type of power generation technology for the customer, even though power generation was their core business. Therefore, the customer's existing staff did not have the skills and capabilities that were required to operate CPC's advanced technology. Under these circumstances, customer D had the clear intention of purchasing full scale O&M service with the project delivery. Nevertheless, since its key business was in the area of power generation, the customer's long-term strategic intent was to operate the plant itself. To support this strategy it requested an exceptionally short service contract, which lacked a life-cycle orientation. CPC's sales organization also emphasized the project delivery component and the parties had difficulty compromising on a suitable time period for the O&M contract. These issues led to the disintegration of the solution components. The delivery of the project component proceeded while the O&M component was still under negotiation. Furthermore, the lack of co-operation and communication between the project and the O&M teams created tension between the parties while the plant was being commissioned.

Summary of factors influencing the choice of a business model from the analysis of solution D: The identified factors are: the existence of and the skill level within the customer's maintenance organization, the complexity of technology, the customer's core business, the accepted business practices of the project supplier and the customer.

4.5 Solution E

The first customer for solution E was a state utility, which needed greater power capacity but did not have access to the financial resources required for a power production facility. Therefore, it requested bids for a fixed price supply of electricity under a build-own-and-

operate agreement. CPC's development team took up the challenge of designing a life-cycle value proposition for the customer. CPC took on a completely new role and participated as an investor in a consortium. To achieve this, a separate special purpose company was formed that would own and operate the power plant. Within the special purpose company, CPC had the dual role as a solution supplier for the company and a customer through its role as an equity investor in the company. Within this setting, CPC there was a customer interface with both the state utility and with the special purpose company. Due to its new role in the value chain, CPC was able to take a customer's point of view in finding lenders and co-investors for the solution that was life-cycle oriented. The dual role as both the customer and the supplier allowed CPC to formulate a full life-cycle solution that succeeded in creating additional value for the utility, the consortium, and CPC. The life-cycle solution has not experienced any major problems in its use-phase and both CPC and the customer consider it highly successful.

Summary of factors influencing the choice of a business model from the analysis of solution E: The identified factors are: the customer's financial resources, the supplier's marketing approach, the customer's core business

4.6 Conclusions from the empirical study

The five cases reveal a number of factors that influence the choice of a business model for solution deliveries. As we had expected, cases A, B and D illustrate that customers who have an organization in place for maintaining power installations are more reluctant to consider a project led solution or a life-cycle solution delivery. Thus, a customer's existing maintenance organization seems to be a factor driving project implementation with a transactional project delivery business model. On the other hand, the lack of such

an organization or low skill levels in such an organization seem to act as potential drivers for a project led solution business model. No evidence was found that these two factors would promote a life-cycle solution business model. Similarly, the complexity of the technology as it was perceived by the customer was identified as a powerful driver for employing a project led solution business model instead of a transactional project delivery business model (Solutions A, B and D). No evidence was found that the perceived complexity of the technology would lead to the choice of a life-cycle solution business model. Solutions A, B and E illustrate how a project supplier's proactive and life-cycle oriented approach to marketing and sales can act as a driver for employing project led and life-cycle solution business models instead of a transactional project delivery business models. On the other hand, in solutions C and D the project supplier's marketing was clearly focused on the core project delivery, which increased the appeal of a project led solution business model, which was used instead of life-cycle business model

The customer's core business was another factor that influenced the choice of a business model. In cases A, B, C and E the customer's business was outside the supplier's offering. This factor promoted the choice of a project led (cases A, B and C) and a life-cycle solution business models (case E). It was recognized that a customer's financial resources can enhance the choice of a life-cycle solution business model. In solution E, the project financing structure promoted the special purpose company and CPC as one of the sponsors, to adopt a life-cycle view on the project to secure sufficient cash flow over its lifetime. Finally, the accustomed business practices of the customer and the supplier influenced the choice of project led solution business model (cases A and D). In addition, in case C the supplier's product-centric organization encouraged a

solution delivery using a project led solution business model even though the customer requested the delivery of a life-cycle solution. In cases A and B the supplier's initial offering of a life-cycle solution turned into the delivery of a project led solution. An important reason for the selection of project led solution was that during the negotiation and the solution delivery phase both the customer and the project supplier were accustomed to separate project and service components. Accepted business practices also played a role in case D where both the customer and the supplier's product centric organizations were prepared for a project led solution. Therefore, long standing business practices aimed at supporting transactional project deliveries or project led solutions encouraged the choice of those business models. Table 3 summarizes the empirical case findings of the factors that were identified as influencing the choice of a business model in the five cases.

Table 3. Summary of factors that were identified to influence the choice of a business model

Identified influencing factor	Summary of the influence
The supplier's or the customer's institutionalized and accustomed business practices	The supplier with product oriented organization was accustomed of designing and offering the project and service components as separate entities (cases A, C and D). Similarly, customers with product oriented purchasing practices were accustomed to compare and select project and service provider separately (cases A and D). Thus, in absent of other influencing factors, the project supplier would be more likely to deliver solutions with transactional project delivery business model or with project led solution business model than with life-cycle solution business model when it has product centric organization, or, if its customers have product centric purchasing practises.
Customer's maintenance organization	Presence of a customer's maintenance organization caused the customer to prefer a transactional project delivery (cases A, B and D). Thus, in absent of other influencing factors, the project supplier would be more likely to deliver a solution with transactional project delivery business model for the customers that have an existing maintenance organization
Skill-level of the maintenance organization	The customers were interested to consider outsourcing of O&M to the supplier (cases A, B and D) because of the low skill level of the existing maintenance organization. Thus, in absent of other influencing factors, the project supplier would be more likely to deliver a solution with a project led solution business model for the customers whose maintenance organization have a low skill level

Perceived complexity of technology	The customers were interested to consider outsourcing of O&M to the supplier (cases A, B and D) because they perceived the supplier's technology to be very complex. Thus, in absent of other influencing factors, the project supplier would be more likely to deliver a solution with a project led solution business model for the customers who perceive the supplier's technology to have high complexity
The customer's financial resources	The customer with limited financial resources was keen to consider a life-cycle solution delivery (case E). Thus, in absent of other influencing factors, the project supplier would be more likely to deliver a solution with a life-cycle business model when the customer has limited financial resources for the capital investment.
The supplier's marketing approach	The supplier marketed a life-cycle solution delivery proactively in cases A, B and E. In cases A and B, the solution was delivered with a project led solution business model and in case E with a life-cycle solution business model. Thus, in absent of other influencing factors, the project supplier would be more likely to deliver a solution with a project led solution business model or with a life-cycle solution business model when it has a proactive marketing approach towards life-cycle solutions.
The customer's core business	Customers who did not consider power generation as their core business were willing to outsource the O&M activities to the supplier (cases A, B, C and E). The customer whose core business was in power generation had a long-term strategy to keep O&M activities in house (case D). Thus, in absent of other influencing factors, the project supplier would be more likely to deliver a solution with a life-cycle solution business model or with a project led solution business model when the customer's core business is outside the supplier's offering.

In the five case solutions that we analyzed, a lack of capabilities amongst the customer's existing operational staff combined with the perceived complexity of CPC's high-performance technology were the main factors that led the customers to outsource the O&M activities to CPC in a project led solution delivery. However, these factors did not seem to drive the choice of a life-cycle solution business model. Instead, the product focused- organizational structure of CPC had a substantial influence in enhancing the choice of a project led solution business models instead of life-cycle solution business model. Another important factor affecting the choice of a business model was the supplier's proactive marketing of life-cycle solutions. The focus on the co-creation of a solution that adds value to the customer's business was a major driver for employing both project led and life-cycle solution business models. The promotion of a life-cycle solution

can be considered beneficial for CPC. Even though project led solutions perform well, they do not fully exploit the business opportunities that are created when a project delivery and O&M services are offered in an integrated manner as in a life-cycle solution. The early involvement of both project sales and O&M sales in the development of a solution allows CPC to secure the sale of a total life-cycle solution during the early phases of the project. It allowed CPC to design and optimize a solution to ensure the lowest possible life-cycle cost early on and to create a unified value proposition that is aimed at creating value for the customer's business as case E demonstrates. From a technological point of view, CPC should have the best ability to design and optimize the life-cycle performance of a solution due to its superior knowledge of its proprietary technology. Therefore, with the suitable contractual framework including the right incentives, a life-cycle solution that is designed, constructed and operated by CPC should create the most value for the customer and for CPC. This view naturally does not take into account the perspective of the client; the client often considers life-cycle solutions to be risky and undesirable lowering the potential for the project supplier to implement life-cycle solution business models.

5. DISCUSSION

Prior research presents a number of incentives for including services in traditional products or project offerings (e.g., Artto et al., 2008; Brax, 2005; Wikström et al., 2009). The results reported by Artto et al. (2008) provide evidence of how services can positively impact a project-based firm's business performance in multiple ways. In addition to increasing the scope of traditional transactional project deliveries by including services or complete O&M responsibilities as an additional component, some scholars

suggest that project-based firms should design and optimize the solutions that they offer for the best possible life-cycle performance (Ivory et al., 2003; Markeset and Kumar, 2004). Designing a solution that takes into account the entire life-cycle from the beginning to the end of the use phase can help to prevent sub-optimization between different organizational units, creating a win-win situation for both the customer and the solution provider (Cohen et al., 2006; Davies et al., 2006; Ivory et al., 2003; Markeset and Kumar, 2004; Windahl et al., 2004). Despite the clear advantages, life-cycle solutions pose risks for both parties (Stremersch et al., 2001; Davies, 2004). However, our results suggest (cases C and D) that the separation of the design of the project from the service component in combination with separate customer communication regarding those components hinders the use-phase performance of the solution. Additionally, our results support the idea that a holistic perspective of the total life-cycle of the project product and its operations provides a successful long-term outcome for both the customer and the project supplier (case E). Our aim, however, was not to compare the performance of the solutions and therefore this is only a preliminary conclusion and does not imply that a project led solution would not be successful. Despite the project supplier's capabilities and experience in creating successful life-cycle solutions, not all of its solution deliveries are life-cycle oriented in nature. Although this is partly related to the fact that the supplier was not accustomed to delivering life-cycle solutions, most of the underlying reasons are related to the focal customer (e.g., the existence and capabilities of customer's maintenance the organization, the customer's core business and financing capabilities). This finding is in line with the customer orientation of a business model (Magretta, 2002). Thus, we recognize that the supplier's choice of a business model for a project solution that it delivers is closely related to and often determined by the

customer's choice of a certain project scope for the project solution that it purchases. Keeping this in mind, we discuss the factors that influence the project supplier's choice of a business model in the following section. In this second step of our analysis we move away from a descriptive theory towards a normative theory. We present propositions concerning the factors that inform the choice of the business model for the solution delivery. The empirical data is used to motivate these propositions. However, we consider the propositions to be context-dependent and hence, the task of refining them into testable hypotheses in various contextual conditions and the subsequent testing of the propositions is left for future research.

5.1 The supplier's and the customer's institutionalized and accustomed business practices

Our findings suggest that institutionalized and accustomed business practices and organizational structure can prevent a move towards a new business model. This factor is related to two separate issues: a project supplier organizational structure that supports product-centric business practices (Galbraith, 2002; Vargo and Lusch, 2004; Wikström et al., 2009) and the customer's existing purchasing practices that do not focus on the life-cycle cost of the system (Stremersch et al., 2001). Both factors clearly inhibit the choice of a life-cycle solution business model. Our findings are supported by existing business model literature which recognizes that factors such as a institutionalized industry practices, the firm's past success and established methods of business affect the choice of business model (Chesbrough and Rosenbloom, 2003; Siggelkow, 2001; Tikkanen et al., 2005).

Proposition 1. The product orientation in the supplier's organization: *Project suppliers are more likely to deliver a solution with a transactional project delivery business model or with a project led solution business model than with a life-cycle solution business model, when they have strong product orientation in their organizations.*

Proposition 2. The product orientation in the customer's purchasing practices: *Project suppliers are more likely to deliver a solution with a transactional project delivery business model or with a project led solution business model than with a life-cycle solution business model, when their customers have product-oriented purchasing practices.*

5.2 The customer's maintenance organization and its skill-level

In three cases (A, B and D), the customer already had operational staff within the organization. This operational staff and the perceived in-house know-how was initially a driver towards a transactional project delivery as the customer did not regard project led or life-cycle solutions necessary or tempting. Also prior literature on strategy and business models build on the idea that customer characteristics should be carefully considered when choosing a firm's business model (Chesbrough and Rosenbloom 2003; Hedman and Kalling, 2003; Slywotsky et al., 1998).

Proposition 3. Customer's maintenance organization: *Project suppliers are more likely to deliver a solution with a transactional project delivery business model than with a project led solution business model when their customers have a maintenance organization in place to operate the project product.*

Despite the existence of the customer's maintenance organization, the skill level and capabilities of the organization had a strong effect on the choice of business model. Ultimately, the limited operational capabilities of the customer's organization enabled CPC's involvement in its use-phase as it was able to demonstrate the value of its presence. This was a strong driver in the choice of a project led solution business model instead of the transactional project delivery business model for the solution. The influence that the customer's capabilities and competence level has on choosing a scope for the solution has also been raised in prior research (Helander and Möller, 2007; Markeset and Kumar, 2003).

***Proposition 4. Skill-level in the customer's maintenance organization:** Project suppliers are more likely to deliver a solution with a project led solution business model than with a transactional project delivery business model, when their customers' maintenance organizations have low capability to operate the project product.*

5.3 The complexity of technology

Technology has an important role in the selection of the business model (Chesbrough and Rosenbloom, 2003). This is evident in our empirical analysis; in cases A, B and D the customers' knowledge of CPC's technology was limited and consequently they viewed CPC's technology as having high complexity. The perceived technological complexity of A, B and D was a strong driver for a project led solution business model. The relationships between the solution components, such as the project product and the long-

term service agreement, also increase the complexity of the entire solution (Hobday, 1998). The project supplier's superior knowledge concerning the service requirements of its systems is an advantage when offering services to a customer (Oliva and Kallenberg, 2003). The perceived technical complexity combined with the customer's low skill level increased the technology gap between the customer and the supplier (Helander and Möller, 2007), directing the supplier's choice of business model towards O&M services. Our findings also support the findings of Wikström et al. (2009), who report that complex technology is a driver that encourages the inclusion of services in business models in a project-based company. The effects of project complexity on the supplier's business are also discussed by Hobday (1998).

Proposition 5. The perceived complexity of the supplier's technology: Project suppliers are more likely to deliver a solution with a project led solution business model than with a transactional project delivery business model when their customers perceive the project product technology to be highly complex.

5.5 The customer's financial resources

The attractiveness of life-cycle solutions from a customer standpoint is often in avoiding major initial investments in big infrastructure projects (Brady et al., 2005). This is supported by our findings as a customer's limited financial resources influenced the choice of a life-cycle solution business model. This is also supported by Gebauer (2008), who reports that customers who have a keen interest in lowering their initial investment cost often demand the outsourcing of operations. Cova et al. (2002) also recognizes that the parties' ability to make

a financial commitment and to carry risk can be an important factor influencing the business model that is used.

Proposition 6. The customer's financial resources: *Project suppliers are more likely to deliver a solution with a life-cycle solution business model than with a project led solution business model or with transactional project delivery business model when their customers have limited financial resources available for capital investment in the project.*

5.4 The supplier's marketing approach

The supplier's proactive approach to solution marketing and requirement definition in co-operation with the customer is found to be a driver towards project led solution and life-cycle solution business models. Our findings suggest that the co-creation of the project value proposition allowed the supplier to deliver solutions using project led solution and life-cycle solution business models instead of a transactional project delivery business model. Proactive marketing and co-creation of the life-cycle offering is suggested to be especially useful when the solution is perceived to be complex and risky (Crespin-Mazet and Ghauri, 2007), which is supported by our findings as well. Vargo and Lusch (2004) also advocate a strategic role for marketing and insist that the service-dominant offerings require that the creation of customer relationships become intrinsic to the organization. The proactive approach used in the firm's marketing approach is a factor related to a firm's internal capabilities, which is one of the factors to be considered in the choice of a business model (Morris et al., 2005; Tikkanen et al., 2005).

Proposition 7. The supplier's marketing approach: *Project suppliers are more likely to deliver a solution with a life-cycle solution business model or with a project led solution business model than with a transactional project delivery business model when the project supplier has a proactive marketing approach*

5.5 The core business of the customer

Our findings suggest that industrial users of electricity and investor-type of customers (cases A, B, C and E) are more willing to outsource their electricity production operations. By contrast, the customer whose core business was power generation only engaged in a short-term O&M service contract with CPC (case D). This is in line with the empirical findings of Gebauer (2008) and even more importantly in line with the notion of core competence (Prahalad and Hamel, 1990); companies focus on their core activities and outsource other activities. Our findings indicate that customers that view electricity production as only one aspect of the production process or as a means of gaining return on investments are eager to outsource because of the flexibility that it provides. These customers were not interested in purchasing a physical power plant as such, but were more interested in purchasing guaranteed performance over the system's life-cycle.

Proposition 8. The focus of the customer's core business: *Project suppliers are more likely to deliver a solution with a life-cycle solution business model or with a project led solution business model than with transactional project delivery business model when their customer's core business is outside the supplier's offering.*

6. CONCLUSION

In this paper we have explored the factors that influence a project supplier firm's choice of business model for its various solution deliveries. We have focused on servitized business models. It has been suggested that such business models are very important for firms in today's business environment (Vandermerwe and Rada, 1988; Rothenberg, 2007). In the context of a project-based firm, we made a distinction between the three different deliveries depending on the role that services play; transactional project deliveries, project led solutions, and life-cycle solutions. Our aim was to identify the factors that influence the choice between the business models for these solutions. We built on the assumption that in the context of project-based firm, the assessment of business models needs to be done at the solution level (Kujala et al, 2010). This is supported by our empirical findings; the focal firm indeed had different business models for different solution deliveries. We further analyzed why a certain business model was implemented in each solution and identified the factors affecting the choice. Based on our findings, we formulated propositions addressing how those identified factors influence the choice of business model for solution deliveries in project-based firms. Our analysis also points out an important finding; most of the influencing factors are fully or partly related to the customer and, therefore somewhat beyond the managerial decision making capabilities of the project supplier firm. This finding supports the notion that customer-orientation is indeed the key feature in servitized business in general (Vandermerwe and Rada, 1988). Our results also challenge the traditional definition of what a project is by a clear differentiation between operation and maintenance related to the solution.

This research has been one of the first empirical attempts to assess business models of project-based firms at the solution level. Despite the clear contribution to the

understanding of why firms implement different business models at the solution level, the findings are still preliminary in nature. The research is not without limitations but it does provide interesting avenues for further research. First, we have taken a supplier perspective in the assessment of factors that affect the choice of business model. The dyadic level of analysis with both supplier and customer perspectives taken into account could be beneficial and provide interesting results, especially observations at the solution level. More empirical data is needed to assess the findings and to find other potential factors affecting the choice of the business model. Further research could also assess the identified factors and their relevance and importance in other empirical contexts (firms and industries). The relative importance of the factors and their interplay in different business situations provides an additional interesting avenue for further research. Furthermore, although ideal case life-cycle solutions and life-cycle business models optimize life-cycle performance and minimize the total cost of delivery and maintenance for both the project supplier and the customer, many firms still face barriers in implementing life-cycle solution business models. Our analysis points out the institutionalization of other business practices and the product-oriented organizational structure of the project supplier as one of the factors promoting the implementation of transactional project deliveries or project-led solutions. These findings should be subject to more research, because these factors could be a characteristic of the focal firm or of the industry. The underlying idea of the life-cycle model is that it provides long term benefits for both the customer and the supplier but more research is needed in this area. Questions such as; what factors affect the use-phase performance of life-cycle solutions? Are life-cycle solutions truly able to optimize the use-phase performance for both the customers and the suppliers and create win-win situations? And finally, in what ways does

implementing a servitized business model impact a project supplier's business? More research is needed on the relationship between the impact that services have on businesses and on the identified factors.

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