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Organizing for solutions: how project-based firms integrate project and service businesses

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Page 2 - Bio page:

Dr. Karlos Artto is a professor of project business at the Aalto University School of Science. He is leading the Project Business research group (PB). Karlos Artto's long experience in working in industry, and his several research projects with global firms and domestic organizations provide a strong empirical basis for his academic achievements. His publications include more than 100 academic papers, book chapters and books on project business and on the management of project-based firms. He belongs to several editorial boards (including International Journal of Project Management, Project Management Journal, and International Journal of Managing Projects in Business). He has supervised more than 150 master's theses and several doctoral dissertations. His current research interests include: project business as a research area and as an area of practical application in firms; business models of global project-based firms; governance of large and networked projects; project strategy as the strategy of a single project and its relation to business strategies of firms participating to the project, and; risk management, especially new paradigms in project risk management.

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Page 3 – Research highlights:

Research highlights:

- Provision of solutions in project-based firms (PBFs) is organized through delivering projects and services to customers.
- In our empirical study, we report eight micro-level integration mechanisms for integrating project and service businesses in a PBF.
- These mechanisms for integrating the two businesses take place at the level of project and service activities in the life cycle of a delivered system.
- Joint participation of project and service business units to activities over whole system life cycle enhances the continuity of customer relationships.
- The integration mechanisms help PBFs to overcome the problems with the discontinuous nature of project business.

Abstract

Project-based firms (PBFs) increasingly provide comprehensive solutions that consist of products, product systems and services. In solution business, long-term collaborative relationships between solution providers and customers are essential. However, little is still known about how relationship marketing activities should be integrated across organizational units, particularly at the practical level of delivering individual projects and services belonging to complete solutions. In this study, based on a case study of a project-based firm and four of its system delivery projects, we identify eight micro-level integration mechanisms for integrating the activities of the project and service business units at the level of delivering a single solution. The joint participation of both project and service business units in project and service activities over the life cycle of a single delivered system enhances the management of customer relationships between the units, and ensures the continuity of the customer relationship over the system life cycle. The identified integration mechanisms also help PBFs to integrate services into their core business and overcome the problems arising from the discontinuous nature of project business.

Keywords: Solution business; Project-based firm; Project marketing; Projects; Services; Integration

1. Introduction

The provision of services has become crucial to virtually all previously product-centric firms (Bitner & Brown, 2008; Neely, 2008), and many manufacturers now provide comprehensive solutions that include products and services that cover the entire life cycle of the delivered system (Davies, 2004). Solution provision over the system life cycle requires system supplier firms to move towards a service-dominant logic (Vargo & Lusch, 2004) that emphasizes the importance of value co-creation through continuous, long-term customer relationships, and requires firms to adopt a relational approach when interacting with their customers (Helander & Möller, 2007; Penttinen & Palmer, 2007; Spekman & Carraway, 2006; Tuli et al., 2007).

This is particularly true for project-based firms (PBFs) that deliver complex product systems – or capital goods systems – to industrial customers, and use projects as specific organizational forms to deliver these systems (Davies & Hobday, 2005; Hobday, 2000; Tikkanen et al., 2007). As indicated by research on project marketing, customer relationship discontinuity is one of the key characteristics of project business (Cova et al., 2002; Hadjikhani et al., 2012; Mandják & Veres, 1998; Skaates & Tikkanen, 2003), and makes the management of customer relationships over sleeping phases (Hadjikhani, 1996) between delivery projects a key priority for PBFs (Cova et al., 2002; Mandják & Veres, 1998). Recent research has argued that PBFs should use services to bridge these sleeping phases in customer relationships, as continuous service provision enables uninterrupted, close and active relationships with customers (Cova & Salle, 2007; Davies, 2004; Vargo & Lusch, 2008). Empirical evidence shows that PBFs have indeed expanded their service offering beyond system delivery projects (Arto et al., 2008; Kujala et al., 2012, 2010) by providing services

such as system maintenance or operations outsourcing (Cova & Salle, 2007; Davies, 2004; Jalkala et al., 2010; Oliva & Kallenberg, 2003).

However, despite the importance of managing customer relationships in an integrated manner in complex solution markets (Day, 2000; Piercy, 2009), relatively limited research exists on how to organize and integrate relationship marketing across organizational units (Maltz & Kohli, 2000; Möller & Rajala, 1999; Workman et al., 1998). As extant research (Brax & Jonsson, 2009; Galbraith, 2002; Gebauer et al., 2009; Miller et al., 2002; Oliva & Kallenberg, 2003) suggests, PBFs, and solution providers in general, should organize their operations in separate project and service business units. Therefore, the integration of the two businesses – i.e. project and service businesses, for coordinating relationship marketing becomes a key issue for these firms. While this issue has been studied at the organizational unit level (Maltz & Kohli, 2000), little research exists on how this integration is organized in practice at the level of individual projects and services.

Our paper explores the integration across project and service businesses by addressing the research question “How do project-based firms integrate project and service businesses over the system life cycle of a delivered system?” More specifically, we seek to understand the practical micro-level integration mechanisms used by PBFs to enhance the collaboration between the two business units and hence the continuity of the customer relationship over the system life cycle of a single delivered system.

We address the research question through an embedded case study of a PBF called “ManuCo”. We explore the organizational mechanisms used by ManuCo to foster the collaboration between its project and service business units by studying in detail four

successful system delivery projects over both project phase (covering system marketing, sales and delivery) and service phase (covering the operational use of the system and the provision of services). As a result, we identify eight distinctive micro-level integration mechanisms that enhance the management of customer relationships through the integration of the project and service businesses at the level of project and service activities in the system life cycle.

Our study contributes to research on project marketing and the organization of services and service business in PBFs. Most importantly, the empirically derived eight integration mechanisms demonstrate how project and service business units can be integrated at the level of the life cycle of a single delivered system. Furthermore, we argue that the mechanisms provide an organizational solution for creating continuity in the customer relationship over project and service phases of a solution delivery, thus mitigating the well-known problems caused by the discontinuity of customer relationships in project business. From a theoretical perspective, our study elaborates how PBFs manage customer relationships through the use of micro-level integration mechanisms for integrating project and service businesses. Our study thus extends the theories on management of relationships in project marketing research to the case where a PBF concentrates on offerings over a whole system life cycle of a delivered system by setting up a distinctive service business to accompany the PBF's project business.

2. Prior literature

2.1. Project-based firms

In many industries firms offer solutions that are unique, are based on complex systems with multiple technologies, and include components integrated from multiple subcontractors' offerings (Davies et al., 2007; Hobday, 1998, 2000). The delivery of large and complex systems has prompted solution providers to adopt project as a specific form of organizing

their business activities (Cova & Holstius, 1993; Cova & Salle, 2005; Davies & Hobday, 2005; Tikkanen et al., 2007; Whitley, 2006). These firms have become project-based firms (PBFs) that customize and deliver complex capital goods as solutions to their customers. These firms are also often referred to as complex products and systems providers (Davies et al., 2007; Hobday, 1998), system suppliers (Helander & Möller, 2007), systems integrators (Davies, 2004; Hobday et al., 2005), system companies (Bonaccorsi et al., 1996), and service-enhanced firms (Gann & Salter, 2000).

The solutions delivered by PBFs are typically used by customers in their own core business to produce further goods and services; in this way, PBFs engage in value co-production with their customers (Vargo & Lusch, 2008). Therefore, both customers and solution providing PBFs have expanded their view to cover the whole system life cycle, including both the development and delivery of the system, and the subsequent operations or service phase in the life cycle (Davies, 2004). This implies that a PBF needs to engage the customer during both project and service phases to ensure that the value-in-use of the system is realized (Storbacka, 2011; Tuli et al., 2007; Vargo & Lusch, 2008). The realization of value-in-use for the customer typically requires the PBF to provide services during the service phase (Stremersch et al., 2001) and to integrate more closely to customer's operations (Windahl et al., 2004).

The emphasis on value co-creation and system life cycle perspective increases the importance of managing long-term customer relationships in PBFs. Research on project marketing has established that customer and other business relationships are crucial for PBFs, as they provide opportunities for future business (Cova & Holstius, 1993; Cova & Salle, 2008; Cova et al., 1996; Skaates et al., 2002; Tikkanen et al., 2007). The strategic objective of a PBF is thus to create, maintain and manage business relationships that enable or support the

development of future demand for projects (Cova & Hoskins, 1997; Cova et al., 1994; Tikkanen et al., 2007).

However, the management of a PBF's customer relationships is significantly affected by three key characteristics of project marketing: discontinuity, uniqueness and complexity (Hadjikhani, 1996; Mandják & Veres, 1998; Skaates et al., 2002). In particular, discontinuity affects customer relationships (Hadjikhani et al., 2012), as project deliveries are typically followed by a potentially long sleeping phase in the relationship that lasts until the next project delivery (Cova et al., 2002; Hadjikhani, 1996; Mandják & Veres, 1998). Therefore, project marketing stresses the importance of active customer relationship management during this sleeping phase. Prior research has indicated, for example, the importance of marketing activities not directly related to any specific project (Cova et al., 1996; Skaates & Tikkanen, 2003), the different functions of customer relationships (Walter et al., 2001), the overall customer strategy (Helander & Möller, 2007), and the capabilities of the PBF (Möller & Törrönen, 2003). In particular, instead of entering into a sleeping mode after a project delivery, the provision of services after the project phase of the system life cycle enables PBFs to maintain and further develop customer relationships during the service phase (Artto et al., 2008). Long-term service contracts can thus help PBFs to overcome the adverse effects of discontinuity in project business (cf. Hadjikhani et al., 2012).

2.2. Integration of project and service businesses within a PBF

Given the increasing importance of services provided over longer periods of time, PBFs face the challenge of organizing the service business that is inherently very different from the traditional project business of delivering customer-tailored capital goods in unique projects (Bowen & Ford, 2002). Most authors suggest that, on the organizational unit level, PBFs

should establish an independent business unit responsible for delivering services after the project delivery (Galbraith, 2002; Mathieu, 2001; Miller et al., 2002; Oliva & Kallenberg, 2003). For example, Gebauer et al. (2010) argue that a separate service business unit can manage service-related customer relationships and operations more effectively than if the product and service business units were governed as a single entity. This organizational arrangement is also supported by our observations about the industry practice: most contemporary PBFs operating in global markets tend to have distinctive business units for project and service businesses.

However, having separate project and service organizations has a potential negative impact on the management of customer relationships from the perspective of the entire firm's long-term business. If the project and service phases of the system life cycle are served by separate organizational units with independent profit and loss responsibilities, organizational boundaries can create conflicts of interest and hinder the knowledge flows as well as the emergence of collaboration and trust, leading to difficulties in managing customer relationships. Although organizational distinctiveness is important for the establishment of the independent service business unit, it thus also potentially creates a chasm between the project and service businesses, and thus it is necessary to have organizational mechanisms in place to ensure the integration of the two businesses (Gebauer et al., 2009).

As suggested by prior research, the maintenance of customer relationships in complex contexts such as in project business requires the integration of marketing activities across functions (Day, 2000; Möller & Rajala, 1999; Piercy, 2009). The integration of marketing activities across different channels is also emphasized in research on customer relationship management (Payne & Frow, 2004). Furthermore, Skaates et al. (2002) argue that customer

relationships can be weakened even within the project phase of the system life cycle if there is insufficient overlap in the management of customer relationship between organizational functions. If the management of a customer relationship over the entire system life cycle is not sufficiently arranged by integrating the activities of the project and service units in different phases of the system life cycle, the development of the relationship can be significantly hampered (Möller & Rajala, 1999; Tuli et al., 2007). In conclusion, prior research suggests that the management of the customer relationship over the system life cycle, along with its potential benefits, is contingent on how the project and service businesses are organizationally integrated within the PBF.

However, prior research on solution providers suggests only a limited number of approaches for this kind of integration between separate business units. Some authors suggest the creation of a customer-facing organizational unit responsible for the customer relationship and the delivery of the solution (Davies et al., 2006; Galbraith, 2002). However, such customer-facing unit within a PBF would need to master competences related to both the delivery and maintenance of the system, which would be a daunting task given the scope and complexity of the delivered systems. Foote et al. (2001) propose the establishment of a separate, strong strategic center with an overall responsibility for the customer relationship and sufficient power to coordinate the collaboration of project and service business units. However, the applicability of this suggestion is undermined by the increased complexity induced by the added organizational unit, as well as its unclear implications on the financial independence and responsibilities of the project and service units.

The integration of marketing activities across organizational units has been studied in research on relationship marketing by establishing the importance of both interaction and collaboration

in integration efforts (Kahn & McDonough, 1997; Kahn & Mentzer, 1998) and suggesting mechanisms for achieving integration at the organizational level (Hitt et al., 1993; Maltz & Kohli, 2000). However, this research is limited in three ways: first, it tends to be focused exclusively on the integration of marketing with other functional departments; second, it has been conducted at the organizational level and not at the micro-level; and third, it has been mostly conceptual or quantitative in nature, leaving its implications for practical mechanisms open.

In summary, extant research provides only scant advice on how the project and service businesses are integrated within a PBF on the level of practical micro-level activities. Instead, the previous research tends to observe integration across organizational units by treating these units as black boxes which are argued to interact, but this previous research does not describe what kind of activities this kind of interaction contains in practice. Furthermore, only limited research exists on how the integration of the two businesses of a PBF should be organized in practice – in terms of micro-level mechanisms related to actual delivered services and projects at the level of the life cycle of a single system.

2.3. Research framework: integration mechanisms for customer relationship continuity

Our research framework, shown in Figure 1, summarizes the literature review and describes the focus of the empirical study. The central concepts of the framework are system life cycle, project phase, service phase, project business unit, service business unit, customer relationship and its continuity, and organizational mechanisms for cross-unit integration.

System life cycle consists of two distinctive phases: project phase and service phase. In the project phase, the PBF markets, sells, designs and delivers the unique system to the customer.

At the end of the project phase, the system is handed over to the customer and it becomes operational, and the system enters the service phase of its life cycle. During the service phase, which can last tens of years, the system is being operated, maintained and upgraded by the customer or its outsourcing partner (e.g. a service-providing PBF). Activities of the PBF during the service phase are related to the provision of maintenance services, continuous customer support, or even running the outsourced operations of the system for the customer. Organizational mechanisms for cross-unit integration are shown in Figure 1 with arrows indicating the integration between the two units and also pointing to the system life cycle where the integration occurs in practice.

Figure 1. Research framework: organizational cross-unit integration between project and service business units in different phases of the system life cycle.

3. Research methods

As the purpose of this study was to identify micro-level mechanisms for integrating project and services businesses in individual projects, and thus to provide evidence of practical implementation of project marketing, we chose to use an inductive research approach and, more specifically, case study methodology. This methodology, based on the study of real life phenomena in their naturally occurring environment (Yin, 2003), is well-suited for our purposes of elaborating existing theory (Eisenhardt, 1989).

Because prior research does not address the question of how service and project businesses are integrated in PBFs, we chose to engage in in-depth analysis of one case firm. The rationale for selecting only one case firm was based on two factors. First, concentrating on one firm allowed us to collect more rich data, which was necessary to understand and analyze a phenomenon that is not yet fully understood (cf. Parkhe, 1993). Second, focusing on only one case firm served the purposes of theoretical sampling: by limiting ourselves to only one case firm, we were able to control the variation in organizational and environmental factors not observed in our study that might have affected our findings (Eisenhardt, 1989). Variation in the empirical context was further controlled by purposefully selecting four case projects within the case firm that were sufficiently similar but varied with respect to their type, value, duration, and technological content. This research strategy allowed us to closely observe and understand the micro-level mechanisms and processes related to the integration of project and service businesses in delivery projects, where an individual project is seen as the part of the system life cycle which in a natural manner connects the services (occurring in a latter phase of the life cycle) to the same customer and to the same relational continuum with the project.

3.1. Case firm

Our case firm, “ManuCo”, is a global supplier of process industry systems as well as related know-how and aftermarket services. Its mission is to help customers to use renewable raw materials in manufacturing. We had two reasons for selecting ManuCo as our case firm (cf. Eisenhardt & Graebner, 2007). First, the business model and organizational structure of the firm were relevant to our research question, i.e. the firm was exemplary of how project and service businesses can be integrated in practice. Second, ManuCo agreed to give us thorough access to its internal data, including detailed data of individual projects, which was necessary to analyze the phenomenon in detail. For confidentiality reasons, we use pseudonyms for ManuCo and its projects.

The outcomes of ManuCo’s projects are complex manufacturing systems that are to a large extent unique, cost millions of euros, and take years to deliver. These systems are always tailored to satisfy customer’s requirements and local constraints, for example, the quality of the local raw material. These systems are delivered by using project as an organizing form for the delivery. The systems consist of several main modules, which are based on distinctive technologies and constitute complex, unique systems of their own right. The modules have standardized interfaces, and hence they are relatively independent and deliverable as sub-systems.

ManuCo has historically been very product-oriented, and system delivery projects have been the core of the firm’s business. Yet, the strategic importance of services has increased steadily, and the current strategic intent of the firm is to further emphasize services in its business. Services have indeed become financially significant for ManuCo: in 2012, 40 % of its turnover came from service business.

The emphasis on services is reflected in the organizational structure of ManuCo: the organization has consisted of separate project and service business units since 2006. Both units have their own resources and operate independently with profit-and-loss responsibilities. The project unit designs, engineers, manufactures and installs all physical components of delivered systems, and uses temporary project organizations to deliver them. The service unit provides various operations and maintenance services when the system is operational after the completion of the project, and has a stable organization with global presence.

3.2. Embedded case selection

To study the micro-level integration mechanisms between project and service businesses taking place at the system life cycle of delivered systems, we needed to study these mechanisms on the level of projects. Therefore, we chose to analyze four advanced system delivery projects of ManuCo. Our study is thus an embedded case study (cf. Yin, 2003), where four embedded cases (i.e., projects) are analyzed to understand how the case firm has organized the integration of project and service businesses.

The characteristics of the selected embedded case projects, NewTech, Standard, Module, and Processor, are shown in Table 1. The case projects consisted of two large new installation projects where ManuCo delivered the entire production system as a greenfield project to the customer, and two smaller rebuild projects, where an existing system was modified or extended to a significant extent.

Table 1

Embedded case project characteristics.

Characteristic	Project			
	NewTech	Standard	Module	Processor
Project type	New installation	New installation	Rebuild	Rebuild
Project value	\$260 million	\$65 million	\$3 million	\$7 million
Project duration	4 years	4 years	2 years	1 year
Included modules	5	5	1	2
Technology	State of the art	Standard	Reused technology	Standard
Customer location	Europe	China	North America	North America

The selection of case projects was based on theoretical sampling. Choosing the projects from a single firm helped us to control the variation for both internal factors, such as organizational structure, culture and practices, and external factors, such as competitive environment and industry structure. ManuCo considered all chosen projects to be progressive in the sense that, unlike in the past, the project and service business units collaborated significantly during these selected projects and, hence, the projects were suitable for our study on micro-level integration mechanisms between these two units. We also purposefully chose projects that were varied in terms of factors that were likely to affect the interaction between the project and service business units. These factors were project type, value, duration, and technological content.

Project type – either a new installation (NewTech and Standard) or a rebuild of existing system (Module and Processor) – affects the level of discontinuity as rebuilds, by definition, are delivered to existing customers. The selected projects also varied in terms of the project value, duration and the number of included modules. These factors are related to the complexity and uncertainty dimensions of the project and its marketing aspects. The

NewTech and Standard projects were considerably larger in terms of scope, value and duration than the Module and Processor rebuild projects. The technological content also affects both the complexity of the project, as well as the uniqueness of the project: the technologies of the case projects varied from state-of-the-art to standard and even reused technology. Since ManuCo operates globally, the chosen projects were delivered to different customers located on three different continents. This meant that characteristics of customers also varied to some extent, for example, in terms of cultural expectations and competences.

3.3. Data collection

We worked in cooperation with ManuCo to collect data on the chosen projects and on the overall organizational structure and processes of the firm. The two main sources of data were informant interviews and archival data. Having two sources of data allowed us to improve the reliability of the findings through triangulation (Eisenhardt, 1989) and to avoid informant recall bias (Golden, 1992), and, these two sources of data provided rich and detailed data required for theory development.

We interviewed 32 individuals to get detailed, first-hand information on the embedded projects, and to understand the forms of project and service business integration mechanisms used in these projects. Interviewees had either been involved in the chosen delivery projects, or were managers or executives who had been involved in decisions and activities concerning their respective business unit's participation in one or several of these case projects, or collaboration and integration between the two business units across several case projects. The informants, listed in Appendix, were chosen in cooperation with ManuCo.

A total of 32 interviews were conducted between June and November 2012. For practical reasons, three interviews were conducted over a telephone conference due to large geographical distances and appropriate timing and traveling arrangements; the rest were done in face-to-face meetings. With the exception of three interviews, all interviews were recorded for reliable recall during data analysis. We also made notes during all interviews on the emerging issues mentioned by the informants, as well as our own observations and insights formed during each interview. The interviews were based on open-ended questions developed using prior literature on project marketing and available information about the case firm. These questions covered topics such as specific process and activities of delivery projects, the division of responsibilities between the project and service units, how the collaboration between the two units had progressed, how customer relationships were managed, and what outcomes the collaboration had produced. The length of the interviews varied between 33 and 114 minutes, with an average of 71 minutes.

We complemented the analysis of interview data by an analysis of extensive archival data. We had access to documentation about ManuCo's organization and offering, and detailed project data, including project plans, project meeting agendas and minutes, and financial information about the projects. These data were used to validate the informants' accounts about the projects, particularly with respect to the dates and activities of each project.

3.4. Data analysis

Data analysis was done in two phases. Following Eisenhardt (1989), we first conducted within-case analysis to establish a coherent narrative and characteristics for each embedded case project. This was followed by cross-case analysis, where we compared the embedded cases to identify patterns in the data and to develop theoretical explanations for these patterns.

During within-case analysis, we first combined all available data on each embedded case project. Next, based mostly on available project documentation, we established the key facts of each project, including project customer, size, purpose, and important dates and activities during the project. We then analyzed the interviews related to the project and corroborated the accounts of the interviewees with these facts. We also noted if the informants had mentioned any issues, challenges or insights arising during the project. Interview data was also used to establish characteristics of each project that could not be directly inferred from project documentation, including the actual chain of activities, the possible external parties involved in the project, and the reactions of all involved actors.

Based on this analysis we wrote extensive case reports of each embedded case. These reports described the characteristics of the project, and a narrative of how the project had proceeded, and which activities had taken place during the project. In these embedded case reports, we explicitly noted how the project and service business units were involved in the project, and what actions they had taken during the project. To facilitate within-case analysis, we drew process diagrams of each project that showed the key activities in the project on a timeline and how the two business units were involved in these activities (cf. Langley, 1999). Figure 2 shows the timeline of project NewTech.

Figure 2. Project timeline of project NewTech on the system life cycle, with an illustration of project and service unit activities, and shared activities between the two units.

In the cross-case analysis part of our study, we compared the embedded case projects to infer patterns in the data. To facilitate this, we tabulated project characteristics, activities and compared the project timelines (Miles & Huberman, 1994). We noted whenever data showed a similar patterns across all projects, as well as discrepancies between the projects. Based on this analysis, we identified specific activities related to customer relationships that involved both units and were thus likely to integrate the project and service businesses. This process was iterative: whenever we noted a new type of activity, we went back to other case projects and compared this new type to prior observations. Finally, by comparing these activities and combining similar activities, we identified mechanisms used by ManuCo to facilitate the integration between the two businesses.

4. Findings

Based on the comparative analysis of the four embedded case projects of ManuCo we identified eight micro-level integration mechanisms that facilitated the integration between the project and service business units at the level of life cycles of individual systems. These mechanisms, described in more detail in this chapter, are summarized in Table 2 with observations from each case project. The eight mechanisms are: audits, creation of formal external relationship, provision of value-added services, creation of formal internal relationship, use of cross-unit resources, participation in system design, promotion of life cycle perspective, and selection of project manager.

Table 2

Identified integration mechanisms, and observations on mechanisms in the four case projects.

Integration mechanism		Description	Case evidence			
			NewTech	Standard	Module	Processor
Customer relationship overlap mechanisms						
	Audits	On-site inspections and explorations of the customer environment and existing systems performed by the service unit personnel.	Service unit personnel audited older production facility during the EPC phase; service unit employees designing the new service concept familiarized themselves with the customer environment, prior machinery, maintenance routines and challenges.	Service unit employees visited the customer site during the installation phase and inspected several items to ensure the customer of the benefits of a service agreement. During these visits, service unit employees explained the benefits of service contracts and introduced process optimization possibilities.	Individuals from service unit conducted audits of both the pre-existing and planned production facilities during pre-project maintenance and collected ideas for improvement in facility operations.	Service unit personnel conducted audits of the production facility prior to the project, for generating ideas for improvement in system operations. Business proposals, timelines and early phase budgets were discussed with the customer.
	Creation of formal external relationship	The creation, development and maintenance of formal relationship between the service unit and customer organization.	Service unit employees were introduced to the customer during sales phase. The service unit extensively presented its organization, operations and expertise to the customer. Building up the interface went well since customer agreed to a contract early in the project.	Service unit personnel participated in few project meetings during the EPC phase, but service unit did not establish a direct relationship with the customer until in later phases of the project.	Service unit personnel had previously collaborated with the customer and this pre-existing relationship was strengthened during the early phase of the project. Most important activities of the service unit employees included the assessment of the pre-existing equipment that was to be used in the project.	Individuals from the service unit were introduced to the customer early during the sales phase, and the unit's service offering was discussed in detail during the project, resulting to a good information-sharing relationship with the customer.
	Provision of value-added services	The marketing, sales and provision of value-added services by the service unit during the delivery project.	A service contract for improving output and quality was signed during the EPC phase of the project. Job shops for certain system components were built on-site to serve the customer's needs.	The service unit sold and delivered training services for the customer within the production facility. Additional services to improve output and quality were also offered but were not bought by the customer.	Value-adding services were offered during the project, but the customer did not place an order for these kinds of services during the project phase. Prospects for future sales for certain components in the service phase were generated in the project phase.	Value-adding services were offered to the customer during the project, but customer did not award for service contracts referring to a challenging economical situation.
Enhanced internal relationship mechanisms						
	Creation of formal internal relationship	The creation, development and maintenance of formal relationship between the project and service units.	Service unit participated actively in discussions with the project team in early project meetings and provided information on its operations and resources to the project unit. The project manager actively facilitated cross-unit collaboration.	Services were discussed internally during the project, but no formal relationship between project and service units existed before post-project service agreement was negotiated late in the project.	Project and service units had a long history of collaboration in daily activities before the project. Close physical proximity allowed easy team work and brainstorming among individuals from both units.	Formal and informal meetings were arranged between the project team and service unit employees at an early phases of the project. Project and service units shared geographical location and had collaborated in previous projects.
	Use of cross-unit resources	The participation of service unit employees in the implementation of the delivery project under the direction of the project unit.	Service unit employees took a major responsibility for the installation work of the project. A group of service technicians worked full time in building up the system.	Service unit employees provided expertise on specific components during installation.	The service unit was mostly responsible for project's installation, testing and start-up work. The unit was also called in to troubleshoot some initial problems in production start.	The service unit had the main responsibility for the installation of the system. Expertise for the project was used from both service and project units, as well as from the customer organization.
	Participation in system design	The participation and contribution of the service unit to the design and engineering of the project unit's delivered system .	The service unit ensured that machinery maintenance was taken into account during EPC phase. However, the service unit did not extensively participate in R&D activities of future system deliveries.	The expertise of the service unit was used in project's engineering activities for planning for system modifications. Service engineers with expertise on key technologies were consulted to improve system performance.	Cooperation with the service unit was intensive during the EPC phase to ensure the usability of customer's pre-existing equipment. The cooperation was devised through joint workshops and significant amount of joint engineering work.	The service unit collaborated closely with the project unit to ensure high maintainability of the new system. Certain components were re-engineered for improved operations and maintenance of the system in the operations phase.
Life cycle perspective mechanisms						
	Promotion of life-cycle perspective	The introduction and promotion of a life-cycle, total cost of ownership perspective to the project as the customer's investment.	A new kind of maintenance agreement was introduced to the customer during the sales phase. This agreement included agreed levels of quality and output as well as resource management.	The service unit introduced its maintenance service offering to the customer during sales phase. The emphasis was on contributing to the customer's understanding on benefits of making strategic decisions by measuring the impacts of decisions on the total cost of ownership.	The service unit proposed maintenance service contracts to the customer during sales phase.	The service unit proposed maintenance service contracts to the customer during sales phase. Advanced concepts and high-level service agreements were presented as the customer was open to strong cooperation.
	Selection of project manager	The selection of a project manager with overall project responsibility from either the project or service unit.	The project manager was from the project unit.	The project manager was from the project unit.	Project manager was from the service unit.	Project manager was from the service unit.

The identified integration mechanisms could further be categorized according to how they affect customer relationships. We inferred three such categories (Table 2): customer relationship overlap, enhanced internal relationship, and life cycle perspective. Our empirical observations suggested that the mechanisms in the customer relationship overlap category promoted direct interaction with the customer, where both project and service business units had joint interaction with the customer. The mechanisms in the enhanced internal relationship category included activities where representatives of the two business units had internal meetings and shared knowledge and resources to conduct marketing, planning and delivery activities. However, in this category the shared integration activities between the units took place within the PBF's organization and hence the participation of both business units was not necessarily visible to the customer. The mechanisms of the life cycle perspective category were based on the promotion of a life cycle perspective to the delivered system, and preparing the customer and the PBF's organization to make strategic choices on planning and staffing the project with individuals from project and service provider organizations by aiming at the ideal value creation over the whole system life cycle, i.e. over all phases from the project to the operational phase of the system.

4.1. Customer relationships overlap mechanisms

The three micro-level integration mechanisms belonging to the customer relationship overlap category are audits, creation of formal external relationship, and provision of value-added services. These mechanisms contribute to the integration of project and service businesses, and further to customer relationship continuity by creating an overlap in the customer relationships between the project and service business units, and ensuring that the units simultaneously have a sufficiently strong relationship with the customer. These mechanisms thus aim to create a direct relationship between the service unit and the customer during the

project phase of the system life cycle, and vice versa by engaging the project business unit with the customer during the service phase. Overlaps in customer relationship suppress the creation of discontinuities in the customer relationship during potential breaking points, such as transfer of responsibility from one business unit to the other.

4.1.1. Audits

In all of the case projects the service unit conducted some type of audit to existing customer production facility prior or during the delivery project. These audits consisted of obtaining documentation on existing machinery, interviewing customer employees, as well as observing production and maintenance procedures on site. For ManuCo, the purpose of audits was to assess the existing machinery and to learn about the customer's needs and opportunities to sell additional services during the project. Audits provided valuable information about the customer, particularly in the case of new customers whose procedures were poorly known or when older machinery was reused, as well as information for developing future project proposals. Customers benefited from the audits by receiving feedback on how the system was functioning and ideas for improvement.

In most cases, the local service unit took care of audits, as they had experience on the activity and already spent considerable time on site. These audits require detailed technical expertise on production systems and their use. However, particularly when evaluating the overall procedures and performance of a production system, further expertise from the global service unit was sometimes necessary. For example, in the NewTech project, the global service unit participated in the audits, because a new maintenance service concept was being developed for the customer. A service manager described the audits as follows:

“We performed a couple of audits to the production line [...] to evaluate the production line’s condition and necessary actions, which included technical audits and cost calculations. [...] A plan for was developed for [system] integration, synergy advantages were evaluated, and an organizational model [for services] was also developed.” (Service Manager, Project NewTech)

Performing audits to the customer site prior and during the delivery project serves to introduce the service business unit to the customer. They also enable the service unit to demonstrate its capabilities, as some kind of system report of these audits is always provided to the customer. In effect, audits create a direct relationship between the service business unit and the customer prior to the service phase of the system life cycle. Consequently, they thus contribute to an overlap in the customer relationships between the project and service business, which enhances customer relationship continuity, particularly during the transition from the project to the service phase of the delivered system.

4.1.2. Creation of formal external relationship

An important mechanism for integrating project and service business units is the creation of a direct formal relationship between the service business unit and the customer. Formal relationship refers to the planned and frequent interactions between service unit and customer managers representing their respective organizations. A formal introduction of the service unit initiates relationship development by creating both formal and informal connections between the service unit and the customer organization. Without formal interaction, the customer relationship may remain too informal and weak to serve the purposes of marketing further services during the project and service phases of the system life cycle.

“You have to be actively involved in the customer’s business. Fail to do this, and the consequences are fatal: the worst examples include cases where we have not

been able to [create a quote for] a project before a competitor has already [...] executed the project.” (Service Manager, Project NewTech)

For the PBF, the most important objective is to explore the customer’s interest in buying services and to demonstrate the service business unit’s capabilities. Relationship creation is related to the communication of the life cycle perspective, but seeks to build a working relationship immediately instead of providing a vision of services delivered in the future. For example, in the NewTech project, the service unit was introduced to the customer at early stages of the project. The service business unit used this opportunity to present its offering, operations and expertise related to the system and its maintenance. As the project manager explained:

”We sought to introduce the service unit to the customer to create a relationship between the service unit and the customer. [...] Crucial to this was that the customer’s project manager was very talented and capable of making clever decisions.” (Project Manager, Project NewTech)

Customer relationship development in the NewTech project was also driven by the customer’s interest in a maintenance service contract. However, this required extensive negotiations, during which the service unit was able to strengthen its relationship with the customer. Similar approach was attempted in the Standard project, with poorer results. However, the initial creation of relationship between the customer and the service business unit did improve the customer’s confidence in the service unit’s competences to improve output quality and train personnel. The Module project demonstrates how the service business unit can build its relationship with the customer through direct collaboration: the service unit and the customer together assessed the pre-used equipment that was going to be used at the customer’s mill. Working on this project-related task improved their mutual trust.

While not a sufficient antecedent for the development of customer relationships, the creation of formal external relationship between the service business unit and the customer is an important step towards this goal. The formal nature of interaction serves to capture the attention of the customer's management, and raise interest in the service unit. Formal early introduction of the service business unit thus improves the chances for developing an overlapping customer relationship already during the project phase of the system life cycle, which obviously positively influences customer relationship continuity.

4.1.3. Provision of value-added services

Traditionally, the division of labor between project and service business units follows the line between the project and service phases of the system life cycle. Yet, as we have seen above, the service unit can begin to build a relationship with the customer already during the project phase. In a more concrete way of further developing this relationship, the service unit may also market and deliver its services to the customer during the project phase. These services are usually limited in scope and do not require changes to the original project budget, but complement the project in a way that adds value to the customer.

Value-added services are typically consultative and analyze the production system to identify and solve potential problems in the system. For instance, in both NewTech and Standard projects, the service unit sold consultative services that aimed at increasing the volume and quality of production output. In the NewTech project, the service contract was included to the scope of the project already during the sales phase of the project. The project manager commented on this:

”By using the resources reserved in this service contract, we were able not only to increase the output slightly but also to enhance production quality to meet the requirements of the main project contract. (Project manager, NewTech)

In project Standard, the customer bought similar services during the installation phase, shortly before the production line had been started. A service manager working for the project evaluated the reasons for the customer to invest in the contract:

“This was new technology for the customer. They had no experience on running the production line and thus wanted ManuCo’s support.” (Service manager, Project Standard)

Another class of services sold during the delivery project are training services provided for customer employees. In the Standard project, ManuCo sold extensive training services to the customer to train its employees to use the new production line. In all case projects, the service unit made an offer on value-added services to the customer.

Provision of value-added services to the customer provides the service business unit an opportunity to familiarize itself with the customer and the customer’s operations, and increases the customer’s trust in the service unit’s competences. An effective implementation also helps to ensure customer satisfaction with ManuCo’s offering and provides an opportunity to sell further services and projects, including maintenance outsourcing contracts. Provision of these additional services thus further strengthens the relationship between the service business unit and the customer, and further contributes to the overlap in the customer relationship between the project and service business units.

4.2. Enhanced internal relationship mechanisms

Three micro-level integration mechanisms that enhance the internal relationship between the project and service business units were identified in the case data: the creation of formal internal relationship between the project and service units, the cross-unit use of service resources during the delivery project, and participation of the service business unit in system design. As the successful management of customer relationships depends on the existing relationship and trust between the two organizational units within a PBF's organization, these mechanisms affect customer relationships indirectly by creating a stronger and more active relationship between the project and service business units (Möller & Rajala, 1999). This relationship then allows the efficient transfer of information regarding the customer, as well as the smooth transfer of customer relationship responsibility. In other words, instead of directly affecting the relationship with the customer, these integration mechanisms focus on the internal integration of customer relationship management activities. In this sense, these integration mechanisms are similar to those recently proposed in the project marketing literature between the sales and project functions (Cooper & Budd, 2007; Turkulainen et al., 2013).

4.2.1. Creation of formal internal relationship

One important mechanism for improving the integration between the project and service units is creation of a formal relationship between them. Like in the creation of the formal external relationship between the service business unit and the customer, this mechanism includes initiating the frequent and formalized interaction between managers of the two units for the purpose of sharing knowledge, building trust, and coordinating activities. In practice, this interaction may use channels ranging from the information sharing (e-mails, documents) to face-to-face meetings.

The creation of formal internal relationship has most impact when created at the beginning of the project. In the NewTech project, the project manager invited service representatives to the initial internal project meetings to tell about service unit's competences and processes:

“We made a special effort to bring in the service people to introduce their operations to our project unit people. At a later stage, when the project contract had been agreed upon, [...] I invited each unit's directors to discuss [project] goals and requirements” (Project manager, Project NewTech)

As a result, the two units had close collaboration, and the service business unit received detailed information from the project business unit about the customer's needs concerning the maintenance service agreement.

Obviously, when the same employees and workgroups from service and project business units collaborate over multiple projects, the relationship between the two units is further strengthened. This is what has happened in the North American local units, and consequently the collaboration has worked well, as demonstrated by the Module and Processor projects. However, this is not always the case, particularly in new markets, such as in project Standard, or when new local service units are created. In these cases, a working relationship needs to be developed between the service and project units.

A formal relationship between the project and service business units is an important antecedent for the collaboration between these units. As discussed above, a strong relationship between the two units eases the transfer of knowledge and builds trust between the two units. These factors indicate that such formal relationship also improves the transfer of customer relationship responsibility between the units, and thus contributes to the continuity of the customer relationship.

4.2.2. Use of cross-unit resources

Similar to the provision of value-added services, the service business unit can also contribute to the delivery project by allowing its resources to be used during the project. The service unit employees can participate in various tasks during installation, including automation and electricity installation, and supervision of the installation work. In the case of ManuCo, the service unit's groups had significant technical expertise on many components of delivered systems, and consequently it was quite common for these experts to take some role in delivery projects. A service manager commented that:

“The installation personnel have significant knowledge on how the production line actually works. Training them even more on service business aspects would provide us competitive advantage.” (Service manager, Project NewTech)

In particular, service unit experts were often called in to troubleshoot or fine-tune the installed system after the start of production. For example, in the Module project, ManuCo's experts were called in to examine the problems encountered by the customer in the new production line. Experts from ManuCo's service unit were able to quickly identify the cause of the problems and fix them to the satisfaction of the customer.

In addition to troubleshooting, service unit employees can also have a major role in the installation of the system. In the NewTech project, the service business unit took a major responsibility of the installation work. This was mostly dictated by the recently signed maintenance outsourcing contract, whereby the service unit was to provide maintenance services to the production line for the following six years. ManuCo decided to use employees from the service unit to ease production ramp-up and improve the quality of services during

the service phase of the system. The service unit benefited from this by learning about the installed system already during the project phase.

In some projects, the local service unit may not have sufficient expertise to contribute to project delivery. For example, in the Standard project, ManuCo had difficulties in finding available sufficiently skilled service resources. As a consequence, the installation team consisted mostly of experts from the project business unit.

In the smaller Module and Processor projects the service unit took the main responsibility for the installation, testing and start-up work. In both projects, ManuCo created a team that consisted of experts from both project and service business units to take care of system commissioning, with the explicit goal of combining the technical expertise of the project unit with the service expertise and customer intelligence of the service unit.

While the use of cross-unit resources also contributes to the creation of direct relationship between the customer and respective business units, its most important effect is the strengthening of internal relationships between the two business units. However, these relationships are mostly informal in nature, as the participating employees are likely to be experts rather than managers. These informal ties further improve the transfer of knowledge between the units, as well as trust between the units. Both these factors contribute to more effective collaboration of the units, including the transfer of customer relationship responsibility. In effect, the use of cross-unit resources thus positively influences customer relationship continuity.

4.2.3 Participation in system design

The third integration mechanism related to the enhancement of internal relationships is the participation of the service business unit in system design activities. While the systems can be designed from different design perspectives, such as design for recyclability, the needs of the service unit with regard the system are easily ignored if the project unit takes sole responsibility for the design and engineering of the delivered system. Hence, one way the service unit can be integrated into the delivery project by contributing to the design and, in particular, to the maintainability of the system. As the service business unit has detailed knowledge about the maintenance of the system, it can significantly contribute to design for maintainability.

"You have to start [service involvement] already during research and development phase [...] The foundations of life cycle costs and services are laid down in R&D. During the project, there's almost nothing that can be done [to improve maintainability]. (Service Manager, Project NewTech)

In practice, participation in design means that engineers from the project business unit consult service personnel as they make design decisions about the system. Experts from the service unit may also be temporarily transferred to the R&D function of the project unit. In the Standard project, the service business unit was asked to consult on equipment modifications since it had the best knowledge on maintainability. Project Module consisted of fitting pre-owned equipment in an existing production line. Since the service unit had first-hand experience on this older system, they contributed significantly to the design of the required modifications to the newer components delivered by the project unit.

The participation of the service unit in the design of the delivered system has similar effects to the use of cross-unit resources: the informal collaboration enhances the relationship between

the project and services business units by enabling effective knowledge transfer and building of trust between the units. Again, these contribute to the enhanced relationship between the project and service units, and consequently to the continuity of the customer relationship. However, given that system design decisions have a more far-reaching impact than value-added services, the impact of this integration mechanism is likely to be larger.

4.3. Life cycle perspective mechanisms

The two micro-level integration mechanisms belonging to the life cycle perspective category are the promotion of life cycle perspective, and the selection of project manager. These mechanisms affect customer relationships more indirectly than the mechanisms in the two previous categories by influencing the customer's and the PBF's strategic choices on planning and staffing the project and the service deliveries by concentrating on the value creation over the whole system life cycle, and by avoiding sub-optimizing specific business outcomes in distinctive project or service phases of the life cycle. For example, it may be advantageous for the customer to acquire the operations services for the system from the same PBF that has delivered the system, and is therefore able to operate it effectively. The effects of life cycle perspective integration mechanisms are mediated through the organizational culture, or service orientation (cf. Gebauer et al., 2009) of the PBF. Both of the two identified mechanisms in this category, the promotion of a life cycle perspective in the customer relationship, and the selection of a service unit based project manager enhance the life cycle perspective of both the PBF and the customer. This has a positive effect on customer relationships, as the longer-term customer relationships related to a system life cycle perspective are likely to increase the commitment of both the customer and the PBF to mutual collaboration and relational processes (Tuli et al., 2007).

4.3.1. Promotion of life cycle perspective

While the importance of considering the entire life cycle of complex systems is becoming increasingly accepted in developed countries, some customers still see project delivery as disconnected from the use of the system, and PBFs simply as manufacturers of machinery. However, the PBF can use this integration mechanism to affect the mindset of customers by actively presenting its own vision that encompasses the entire life cycle of the system. This life cycle perspective includes promoting the PBF as a solution provider that has a keen interest in the service phase of the system after the project, and as potential outsourcing partner for the customer. For instance, a service manager for project Newtech said:

“We calculated life cycle costs for the production line and prepared criticality analysis [early in the project]. Based on these, we calculated the expected revenue each piece of equipment would generate, as well as revenues generated by the production facility as a whole. Together with the customer, we prepared a plan for the facility’s maintenance.” (Service Manager, Project Newtech)

This use of this integration mechanism is likely to have the biggest impact when applied as early as possible in the system life cycle, as there is most time to affect the customer’s mindset and when change in this mindset can still affect the design and delivery of the system. Moreover, as adopting a life cycle perspective also requires significant changes to planning of production, as well as to the investments plan, and they need to be taken into account early during the customer’s investment planning before the project budget is finalized. As explained by an executive from the service unit:

“Our most extensive service offerings, such as maintenance outsourcing contracts, should be introduced to the customer very early on. [...] The customer

needs to be prepared for such big arrangements during their own investment preparation [that] takes place several months before the actual [EPC] project even starts. Once the investment plan is locked down, the customer is unlikely to make major changes.” (Executive, service business unit)

In project NewTech, the prospect of a maintenance outsourcing contract was introduced to the customer at the very early stages the project when the customer still had sufficient time to consider the contract and make all necessary financial arrangements. Subsequently, the customer agreed to the proposed contract. Similarly, in the Standard project, the service business unit promoted the idea of extensive maintenance service contract to the customer. These efforts did not immediately lead to a contract, but the introduction of ManuCo as a life cycle solution provider eventually convinced the customer to agree on a limited performance improvement contract.

The promotion of life cycle perspective affects customer relationship continuity in an indirect fashion. Rather than directly enhancing the relationship between the customer and the service business unit, this integration mechanism improves relationship continuity by changing the customer’s perspective on the entire system. The more the customer sees the system from a life cycle perspective, the more it is likely to understand the benefits of a continuous relationship with the PBF delivering the system. In other words, this mechanism increases the customer’s demand for relationship continuity.

4.3.2. Selection of project manager

The final integration mechanism involves the selection of the project manager to support the life cycle perspective. The project manager is the single most important employee in every project, and can have a significant impact on the success or failure of the project. In

particular, the culture and perspective of the project manager can affect how the project is both organized and how it succeeds. Therefore, the selection of project manager from the service business unit can greatly affect the collaboration between the project and service units.

The Module and Processor projects had a project manager from the service unit. The service unit manager thus took the responsibility of the overall system delivery project. The selection from a service unit was prompted by the important role of the service unit in selling and initiating the project, as well as the required level of knowledge about the existing system. The long collaboration history between the North American service unit and project unit, and the limited scope of the projects indicated that service unit based manager could successfully manage the project, as the technical aspects of the project were relatively simple.

By contrast, in the new production line projects the project manager was selected from the project business unit. This decision was based on the fact that the project unit had better knowledge of the technologies embedded in the delivered complex system. This knowledge was needed to ensure that the systems were successfully integrated to meet customer requirements. Despite this, the project managers of these projects themselves had a life cycle perspective and strived to include the service business unit in the delivery project.

This integration mechanism affects customer relationship continuity by enhancing the life cycle perspective within the PBF. The selection of a project manager who possesses a life cycle perspective on system delivery is likely to balance treatment between the project and service phases of the system life cycle, and hence to emphasize a long-term, continuous relationship with the customer. As service unit managers are more likely to have such

perspective, project managers selected from the service business unit better support the adoption of life cycle perspective across the two business units.

5. Discussion

5.1. Contributions

Through a case study of a PBF and four of its system delivery projects, we have identified eight micro-level integration mechanisms that enhance the continuity of customer relationships through shared activities of the project and services business units over the life cycle of a single system. The identified mechanisms help firms to achieve organizational integration in between project and service businesses for delivering solutions, and to overcome the problems created by discontinuity of project business (Hadjikhani, 1996; Mandjak & Veres, 1998; Skaates et al., 2002). The eight mechanisms were further grouped into three categories based on how they affect customer relationships: by strengthening the direct relationship between the service unit and the customer and hence creating a customer relationship overlap between project and service business units, by enhancing the internal relationship between the project and service units and, by promoting a life cycle perspective.

Our study makes three specific contributions to literature on project marketing and solution business. First, the identified eight integration mechanisms describe how PBFs integrate project and service businesses at the level of a single system life cycle. In contrast to prior research on integrated solutions (Davies et al., 2006; Galbraith, 2002; Miller et al., 2002) and relationship marketing (Kahn & Mentzer, 1998; Maltz & Kohli, 2000), which have focused on the organizational level, our study thus provides a more detailed, system life cycle level description of concrete activities for the integration between the project and service businesses. In particular, the identification of micro-level mechanisms increases our

understanding on how PBFs and solution providers manage and implement the necessary organizational integration between project and service business units in practice.

Second, our findings suggest that each project serves as a platform for further integration between project and service business units, and that this platform can play a significant role in marketing long-term service agreements and achieving deeper customer relationships during the service phase. We argue that these factors enhance the overall business performance of a PBF. Prior literature on project marketing has focused on the marketing and delivering of projects, by arguing that PBFs mostly only use services to support the project business (Artto et al., 2008; Kujala S., et al. 2010; Kujala J., et al. 2012). Our study complements this view by indicating that project and service businesses are mutually supportive: while services do support the project business, each project also presents significant marketing opportunities for the service business, suggesting a two-way relationship between the two businesses.

Third, our paper expands the project marketing discourse conceptually by elaborating the organization of a PBF in relation to entire system life cycle of a delivered system, and how this can enhance the continuity of customer relationships. Our findings contribute to new knowledge on how the organization of solution business affects relationship marketing by suggesting that the management of the customer relationship is shared between the two business units, i.e. project and service units. This implies that the units should integrate their marketing and delivery activities by jointly participating in these activities over the system life cycle, irrespective of whether a project or a service is delivered. The project and service businesses thus work together to drive the overall solution business and customer relationships at the level of the whole firm, rather than at the level of two separate businesses with exclusive customer relationships.

5.2. Managerial implications

This study has four significant implications for managers. First, we reiterate the importance of services to PBFs. Service provision can effectively help PBFs to overcome the problems caused by the discontinuous nature of project business and sleeping phases in customer relationships. In addition, service business is a source of stable revenue, and a source of opportunity for marketing further projects. On the other hand, the project business and individual projects can be used as platforms for initiating a long-term service relationship for servicing the delivered system. Our findings suggest the importance of understanding project-based firms as organizational hybrids that need to balance and integrate project and service businesses in order to succeed in their overall solution business.

Second, integrating project and service businesses skilfully can help PBFs to further ensure continuity in customer relationships, which is likely to improve the performance of the PBF. To achieve optimal results in solution business, these firms need effective organizational arrangements that promote the interplay between delivering complex customer-specific systems through projects and delivering services continuously throughout the life cycle of the delivered system. In other words, a simple combination of project and service businesses is not always sufficient – the two businesses need to be organizationally integrated. The identified integration mechanisms provide practical methods for achieving this integration.

The third managerial lesson from our study is that customer relationship continuity depends on micro-level activities for creating and operating a single system for the customer. As the delivered systems are mission-critical for the customers' business operations, the customers are interested to participate to decisions at a detailed level on how project and service

activities are arranged. Therefore, the project and service business units of a PBF should manage their customer relationships through involving the customers' decision makers to decisions on concrete micro-level activities in project and service deliveries. Moreover, the two units should have a shared customer relationship, irrespective of which unit has the financial responsibility for sub-delivery of the project or service.

Fourth, the eight identified integration mechanisms provide a concrete list of practical actions that can be implemented by PBFs or other solution providers to foster the integration between project and service businesses. In the following three paragraphs, we discuss the specific managerial implications of the integration mechanisms belonging to the three identified categories: (1) customer relationship overlap mechanisms, (2) enhanced internal relationship mechanisms, and (3) life cycle perspective mechanisms.

Mechanisms in the customer relationship overlap category affect customer relationship continuity directly by creating an overlap in the customer relationship of the project and service units. In effect, these mechanisms eliminate obvious breaking points in the customer relationship through fostering a shared responsibility for the relationship, and smooth transfer of responsibility from one unit to the other. All mechanisms that involve front-line employees working together across organizational boundaries and collaborating in the delivery of customer value have potential to produce innovative and customer-oriented solutions. Thus, the mechanisms of auditing, creating the relationship between the service business unit and the customer, the participation of service employees in project implementation, and the provision of services during the delivery project are likely to enhance the innovative activities of the PBF. Internal innovation activities are also likely to be enhanced by mechanisms that require close collaboration between the project and service business units, such as the

development of the internal formal relationship between the units and service unit participation in the delivery project. In particular, on the level of a single system and its life cycle, if the service unit is able to contribute to the design activities of the system design early on in the project, there are significant opportunities for innovations concerning the characteristics of the system that benefit both business units and the customer in the operations/service phase of the system.

Enhanced internal relationship mechanisms influence customer relationships by improving the relationship between the project and service business units. Although these mechanisms do not involve direct interaction between the customer and the business units, they contribute to customer relationship continuity by strengthening the relationship between the project and service units. Participation of service unit employees in the delivery project occurred in our empirical study mainly in project's audits, but service unit employees also participated in providing other value-added services within the sphere of the project unit's governed project. These audits and provision of value-added services serve as mechanisms for transferring the project/system knowledge to the service business unit, and facilitate the service unit's learning from the customer environment. Learning from the customer's business by participating in the project phase improves the service unit's ability to meet customer requirements during the post-project service phase. Of course, knowledge transfer works also to an opposite direction (from projects to services): the mechanism for promotion of a system life cycle perspective to the customer serves to educate the customer but also the project business unit's personnel about the service-related parameters of the system, for example on terms of the system's operability or maintainability. As internal organizational boundaries tend to hinder knowledge transfer (Carlile, 2004), mechanisms such as creation of formal relationship between the project and service business units, and the use of services unit

employees to implement the project, help a PBF to overcome the formal organizational boundary. The enhanced internal relationship mechanisms improve knowledge transfer between the units, and contribute to the smooth internal transfer of customer relationship responsibility between the units through effective internal processes.

Life cycle perspective mechanisms influence customer relationships even more indirectly through promoting a life cycle perspective to the customer and also within the organization of the PBF. These mechanisms are based on preparing the customer to make strategic choices on staffing the project and the service deliveries with knowledgeable individuals from such organizations that are capable of ensuring a seamless transfer from the project to the operations of the system. For example, it may be advantageous for the customer to acquire the operations services for the system from the same PBF that has delivered the system, for the reason of this PBF being capable of operating its self-built system effectively. Our findings suggested that the choice of project manager as an integration mechanism makes a difference: selecting a project manager from the service unit or at least a service-oriented manager from the project unit, can improve the extent to which the service unit is integrated in the system delivery project, and subsequently how well the two businesses are integrated over the life cycle of the system. The choice of a project manager is an organizational design decision related to the creation of formal relationships between the two units, which enhances the integration between the units. Life cycle perspective mechanisms ultimately seek to influence the customer's view to see the PBF's offering as a complete integrated solution over the long system life cycle. Life cycle perspective mechanisms increase the likelihood of both the PBF and the customer to have a long-term perspective on their mutual relationship.

Finally, our findings highlight the importance of part-time marketers (Gummesson, 1991) and internal marketing (George, 1990): many of the identified integration mechanisms rely on the behavior of frontline employees to improve relationship with the customer, which contributes to the marketing of both further projects and services. Therefore, it is important for PBFs and solution providers to ensure the competences and motivation of these employees to perform as part-time marketers, in order to enhance the implications of their actions on the overall performance of the solution business. Another suggestion based on our findings on the integration mechanisms is that adopting a service-dominant mindset is relevant for a firm to fully embrace service business needs and to understand both the life cycle perspective on the delivered systems and the firm's potential role as a co-producer of value with the customer (Vargo & Lusch, 2004, 2008). Without such perspective on the system life cycle, either the project business or the service business is likely to remain secondary, and their integration will be less than optimal.

5.3. Future research

In our empirical study, we reported eight micro-level integration mechanisms for integrating project and service businesses in a PBF. These mechanisms take place at the level of project and service activities in the life cycle of a single delivered system, and they enhance customer relationship continuity over the system life cycle. The findings open up four different avenues for further research.

First, we welcome further studies that focus on the organizational design aspects of integration between two or more organizational units of solution providers in different markets and industries. We suggest that the literature on organizational design is used for a

theoretical perspective that provides deeper insights on specific organizational arrangements, and a specific focus on horizontal and vertical, and on formal and informal integration mechanisms. Especially, we suggest further research on analyzing in detail the impact of informal (Edström & Galbraith, 1977) vs. formal integration (Galbraith, 1973) in solution businesses in various contexts. Also, we suggest future research on horizontal formal mechanisms (Galbraith, 1973; Lawrence & Lorsch, 1967) like the role of a project manager as a liaison between the two business units (Tushman, 1977), and the continuous collaboration between the units that occurs through meetings and continuous face-to-face negotiations between managers on a daily basis during the project and service deliveries.

Second, we suggest further research on organizing for solution business from a knowledge management perspective. Nearly all of the identified integration mechanisms facilitate learning and knowledge transfer between the customer and the PBF, or the transfer of knowledge from one PBF's business unit to the other. Successful knowledge transfer is crucial for management of multiple different project and service offerings (Tikkanen et al., 2007). Based on our findings, we welcome further research on knowledge specialization (Brusoni et al., 2001) and knowledge integration (Brusoni, 2005) and their impact on the successful integration of the capabilities of two specialized business in delivering complete solutions.

Third, we suggest further research on organizational arrangements that enhance the joint innovation of the solution provider firm and its customer. Our findings indicate that fostering collaboration of front-line employees from the project and service units is a fruitful grounding for innovation and for the creation of new knowledge (cf. Nonaka & Takeuchi, 1995). In particular, this creates opportunities for joint innovation in interaction with the customer

(Davies, 2004) over the whole system life cycle. Such innovations are likely to enable increase of the customer value in the system at hand and in future systems and solutions offerings.

Fourth, project is an organizational form for effective integration of multiple actors and technologies (Davies & Hobday, 2005) for the sponsor's – or the system's user-operator's – added value (Morris, 2013). As integrating and value adding are in the core of delivering solutions, we welcome further research on organizing in projects and project-based firms, with a strong focus on a solution provider's perspective. Especially, we suggest empirical studies in the future that bridge project research (cf. Morris, 2013) and integrated solutions research (cf. Davies et al., 2007) by building on core concepts of this study: the system life cycle, the project provision for systems integration and adding value, and the service provision for the long-term value-in-use of the solution.

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Appendix. List of informants.

Informant position	Location	Interview length (minutes)	Projects with informant's involvement	Informant's role in project(s)
Project unit				
Project manager	Finland	59	Standard	Project manager for subsystems
Project manager	Finland	94	Standard	Project manager for subsystems
Vice president	Finland	114	Standard	Steering group member
Manager	China	54	Standard	Adviser for project manager
Manager	China	33	Standard	Subsystem specialist
Project manager	Finland	91	NewTech	Project manager for first half of the project
Project manager	Finland	63	NewTech	Project manager for latter half of the project
Manager	Finland	73	NewTech	Subsystem specialist
General manager	Finland	99	NewTech	Installation operations lead
Vice president	Finland	63	NewTech, Standard	Steering group member
General manager	Finland	68	NewTech, Module	Steering group member (technical issues)
Senior vice president	China	55	NewTech, Standard, Module	Steering group member
Service unit				
Director	China	54	Standard	Steering group member
Manager	China	73	Standard	Service product specialist
Manager	China	56	Standard	Steering group (service sales)
Region head, service sales	China	38	Standard	Service product specialist
Manager	Finland	48	NewTech	Process specialist, service product specialist
Vice president	Finland	47	NewTech	Steering group member
Manager	Finland	63	NewTech	Subsystem specialist
Vice president, sales	Finland	78	NewTech	Steering group member (sales perspective)
Project specialist *	USA	86	Module	Project manager
Project specialist *	USA	77	Processor	Project manager
Director *	USA	83	Module, Processor	Steering group member (service contract sales)
Director	Finland	77	NewTech, Module, Processor	Service contract expert
Manager	Finland	74	NewTech, Standard	Process specialist, service product specialist
Manager	China	107	NewTech, Standard	Service concept/contract expert
Vice president	China	59	NewTech, Standard	Steering group member
Manager	China	85	N/A	N/A
General management				
Vice president (Region)	China	110	NewTech, Standard	Steering group member
VP, Business segment	China	39	N/A	N/A
Third parties				
Partner, Consulting firm	Italy	52	N/A	N/A
Consultant, Consulting firm	Finland	102	N/A	N/A

* Telephone interview (all other interviews are face-to-face interviews)