

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)**ScienceDirect**

Procedia CIRP 16 (2014) 176 – 180

[www.elsevier.com/locate/procedia](http://www.elsevier.com/locate/procedia)

Product Services Systems and Value Creation. Proceedings of the 6th CIRP Conference on Industrial Product-Service Systems

## A Survey Study of the Transitioning towards High-Value Industrial Product-Services

Vinit Parida<sup>\*ab</sup>, David Rönnerberg Sjödin<sup>a</sup>, Joakim Wincent<sup>ab</sup>, Marko Kohtamäki<sup>ab</sup><sup>a</sup>FASTE Excellenc Center/Entrepreneurship and Innovation, Luleå University of Technology, Luleå, 97187, Sweden<sup>b</sup>Department of Management, University of Vaasa, 65101, Vaasa, Finland<sup>\*</sup>Corresponding author. Tel.: +46 920 49 2469; E-mail address: [vinit.parida@ltu.se](mailto:vinit.parida@ltu.se)

### Abstract

Servitization literature suggests that traditional manufacturing companies are increasingly offering industrial services in order to increase their position in the global competition. However, little is known about extent and profit potential of different types of such offers in current industry. This paper offers an overview of such offers and concludes that maintenance based business models are most closely linked to increased revenue generation while add-on services have a negative effect. Future trends, suggest that business models such as R&D services and functional services will be increasingly important in the future.

© 2014 Published by Elsevier B.V. This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/3.0/>).

Selection and peer-review under responsibility of the International Scientific Committee of “The 6th CIRP Conference on Industrial Product-Service Systems” in the person of the Conference Chair Professor Hoda ElMaraghy”

Keywords: Servitization; Business Model; Manufacturing companies; Industrial Product Services, Financial Performance

### 1. Introduction

Manufacturing companies are gradually transitioning towards offering industrial product-services as a response to increasing global competition. This trend is referred to as servitization where services are not only viewed as the fundamental value-adding component but also the predominant focus of industrial growth strategy [1, 2]. A central assumption of this revised outlook is the increased focus on creating value for customers by offering customized solutions. This implies moving beyond the offering of add-on services and rather considering services as the main part of value creation and competitiveness strategy [3].

The drive for pursuing an industrial service-oriented strategy can generally be motivated through a couple of reasons. First, firms are striving to secure financial benefits through creation of higher profit margins and stable income. For example, companies like GE, IBM and Siemens are able to charge premium prices for complex product-services and, by doing so, secure a steady flow of revenue even during an economic downturn [4]. Second, adding service components

to physical products leads to strategic benefits due to the increased imitability. This is because value adding industrial services can enable manufacturing companies to achieve product differentiation by customizing product-service offers to their customer's specific needs [5]. For example, Volvo Construction Equipment provides customized maintenance and repair contacts for key customers depending upon their operational requirements. Taken together, the strategy to engage in offering industrial product-services is currently viewed as a strategic opportunity for many manufacturing firms to secure long-term competitive advantage.

Although, the potential benefits of offering industrial product-services are well documented, little is known about the variety and extent of offered industrial product-services. In particular, current research lacks illuminating detail on how different product-service combinations are packaged and sold through different business models as well as the role of external actors in value creation. Moreover, present research on servitization has not convincingly showed the financial effect of such offers on firm profitability. For example, a survey study by Bain and company, found that only 21% of

their sample companies achieved financial success from implementation of an industrial service strategy [6]. Thus, these results question the extent to which that manufacturing companies are able to effectively master the transition and call for a deeper understanding of issues related with engaging in offering industrial product-services.

In this study, we attempt to provide a holistic overview on industrial product services by specifically exploring the types of product-services offered, the development approaches of product-services, how different service combinations are linked to business models and most importantly, the effect of these business models on financial performance. Finally, we use case studies with firms regarded as frontrunners in offering high value industrial product services to explain our results and provide implications for future management practice. By offering such insights based on large scale quantitative data as well as multiple case studies our study fills a gap in present knowledge, as a majority of the servitization literature is pre-dominantly conceptual or based upon individual case studies.

## 2. Industrial Product-Services Study

The study includes empirical data from multiple case studies and a large survey study over the course of three years (2010-2013). The goal of multiple case studies has been to advance understanding regarding opportunities, challenges and mitigation strategy for manufacturing companies with engaging in offering industrial product services. In total 30 interviews were undertaken with diverse respondents from Volvo Construction Equipment, GKN Aerospace Engine System, Ericsson, Sandvik Coromant, Volvo Cars, LKAB, Gestamp HardTech, Bosch Rexroth AG.

The survey aim of the study was to develop a holistic understanding of industrial product-services. More specifically, we focused on mapping current offers, their development approach and its effect of performance. During 2009, we sent out 404 questionnaires to product-oriented manufacturing companies (standard industrial classification code 28) employing 20 or more employees in Finland by application of a web-based questionnaire. The survey was filled by companies' managing directors or directors responsible of service business development. Before sending the questionnaires, the companies were contacted by telephone. In total, the survey was answered by a respectable 122 companies. Seven forms were rejected due to being inadequately completed, after which the final response rate was of 28%. Moreover, we used archival sources to relate our survey with secondary financial data. Size of the respondent companies was on average of 115 people (median of 100 persons), the net sales of approximately 30 million Euros (median of 14 million. €) and the ROI% of about 19 (median 19%). We also took into account the revenue for 2009 and 2010, which enables us to examine relationship between self-administered survey data to revenue growth and partially mitigate the challenges related to lag effect. For data analyses includes descriptive analysis, factor analysis and regression analysis.

### 2.1. Types and Extent of Industrial Product-Services

Our survey study shows that manufacturing companies are increasingly diversifying into a range of different industrial product-services. Figure 1 illustrates 17 product-services to be prominent among our sample companies.

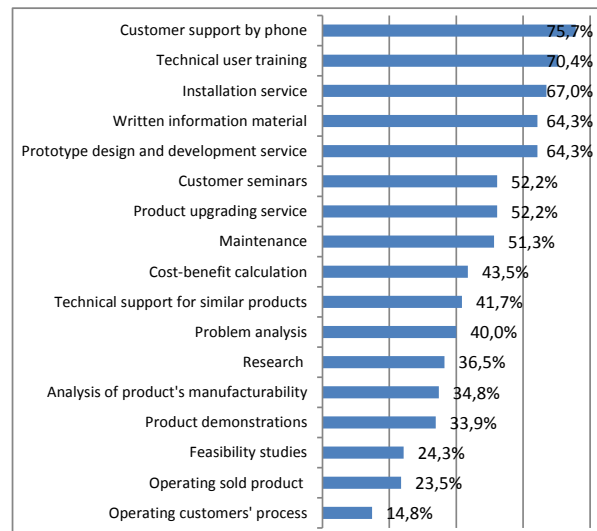


Figure 1: Percentage of industrial product-services offered by manufacturing companies

More specifically, the figure illustrates how actively companies offer a particular service to their customers. Thus, the percentage is a reflection of the role of a particular service as a part of company's service strategy. We find that customer consulting and support over phone (75,7%), technical user training (70,4%), installations services (67%), and prototype design and development services (64,3%) were the most important services offered. Whereas, product-services related to operating the customers process (14,8%), operating sold products (23,5%) and feasibility studies (33,9%) were the least prioritized offers. This descriptive analysis enables us to conclude that manufacturing companies are prioritizing involvement in a range of industrial product-services.

### 2.2. Development Approach for Industrial Product-Services

Prior research suggests that although a single company can drive the production of industrial product-services, involvement of external actors is equally important [7,8]. More specifically, during production of industrial product-services suppliers, business partners and allies need to jointly co-produce value for the customers. This may imply revised roles and responsibilities in light of the specific industrial product-service requirements. For example, Rolls Royce "Power by the hour" offers in which airlines pay for the functionality of the engine operation and receive services as an integrated part of the offer required the firm to engage in significant multi-actor collaboration between OEM, suppliers, third party partners and customers [9]. Two underlying reasons drive external actor involvement for the production of

industrial product-services, greater need to share risk and responsibility and lack of internal competences. Generally, it can be argued that the extent of involving external actors increases as companies move toward high-value adding industrial product-services [8].

To assess the production approach adopted by manufacturing companies, we examined the extent to which industrial product-services were produced internally as opposed to production through the involvement of external partners. According to the survey data, only 16% of industrial product-service production involves external actors, while 84% of product-services were being produced by internally by companies. This implies that industrial manufacturing companies are conservative towards involving external actors to support production of industrial product-service offerings.

### 2.3. Industrial Product Service Business Models

As manufacturing companies actively offer diverse combinations of industrial product-services, the possibilities to critically evaluate the business value of each product-service offer becomes challenging. One way to mitigate this challenge is by categorizing different products-services into groups based on the business model logic. A Business model describes the rational as to how a company creates, delivers and captures value [10]. Product-oriented, use-oriented, and result-oriented are three well-known business models, which provide possibility to distribute industrial product-services into a spectrum where pure product are at one end and pure services at the other [11].

We identified four different industrial product-service business models in our sample based on factor analysis of the 17 identified product-services (See figure 2). Factor analysis enables us to identify complex interrelationships among items and group items that are part of unified concepts, which is this case is represented by categories of industrial product service business models. The four business models are 1) basic services, 2) maintenance and product support services, 3) R&D services and 4) functional services. The first two business models can be regarded as being product-oriented business model due to higher emphasis on product as compared to services, whereas the next two can be related to user or result-oriented business models due to the higher degree of focus on services and greater responsibility taken by the provider.

*Basic Services business model* include services designed to consult and educate customers about the products. Here, in relation to the product sold, the provider gives advice on the most efficient way to use product. This can include, for example, technical user training, or customer seminars and telephone support. These specific types of offers are intended to add marketing value of the product. For example, Sandvik Coromant is a leading industrial product-service provider of support material (e.g. manuals), cutting training program and customized productivity program.

*Maintenance and product support services business model* includes provisions of maintenance, technical support as well as installation services. These services are generally offered to

minimize the cost for the long-lasting, well-functioning products and to even take responsibility for end-of-life products through product upgrading. The focus in this business models continues to be at the product but their attractiveness is generally enhanced through bundling of maintenance services. For example, ABB robotics provides maintenance services package for the robot lifecycle. In collaboration with customer they develop a customized maintenance strategy which includes regular inspection and diagnostics, preventive maintenance, remote condition monitoring, and refurbishment/reconditioning services.



Figure 2. Identified Industrial Product Service Business Models

*Research and development services business model* includes advanced industrial product-services such as feasibility studies, prototype design and development and problem analyses. Because manufacturing companies interact with different customers, they need to build internal know-how about their customers' products and processes. Overtime this knowledge can be use develop set of advanced product-services which would reduce customers R&D challenges and enhance profitability. For example, LKAB (i.e. iron ore manufacture) provides service of "experimental blast furnace" which is a powerful tool for their customers to test testing various types at peripheral blast furnace equipment and blast furnace process. It allows the unique possibility for customer to gain rapid, relevant test results without the risk of lost production.

*Functional services business model* includes result-oriented services such as operating the customer process or the product that is sold to the customer. The aim of this business model is to sell certain results or capability rather than a physical product. This model tends to be service based

and could involve taking large level of risk and responsibility of customers for a premium price. For example, GKN aerospace on their military side of business provides availability of aircraft to customers. This involves ensuring that aircraft is operation to perform the task when needed.

#### 2.4. Extent and Financial Performance of Industrial Product-Service Business Models

Our results show that most of the industrial manufacturing companies are predominantly offering lower value-added product-services such as basic services and maintenance services (see figure 3). This finding goes along with prior research that firms tend to adopt a servitization strategy gradually starting with offering simple add-on services and then moving towards increasingly advanced and high value adding services as they gain experience and capabilities [3, 12]. In particular, it is interesting to note that only 19,2 percent of companies were actively offering functional services.

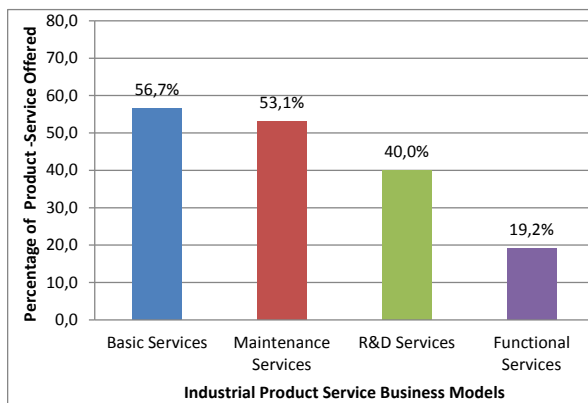


Figure 3. Percentage of different business models offered by manufacturing companies

Evaluating the financial consequences of engaging in offering industrial product-services has been a central research issue. However, the relationship between industrial services and firm performance is considered complex. While some studies have supported positive effects [3,13,14], other suggest for a negative or non-linear effect on performance [15,16,17]. Therefore, to further understand this critical issue, we examined the financial effect of the different IPS2 business models. This was done through investigating the relation between the differing business models and the company's share of revenues from services which is strongly related to revenue growth over the period 2009-2010. This examination required us to undertake regression analysis where the four industrial product services business models were considered as independent variable and revenue growth was considered as the dependent variable. The analysis met all the model fit requirement and revealed that the maintenance and product support services business model is most strongly related to financial performance, whereas; the

basic services business model had a negative effect on financial performance (see figure 4). The R&D services and operational services business models are also positively linked to financial performance. These results further support our assumption that focusing on lower value-adding (product centric) basic services are necessary but not sufficient for driving revenue growth in future. That is, such services no longer provide a differentiating effect among competing manufacturers but rather representing basic requirements for satisfying existing customers. However, maintenance services on the other hand are currently a strong predictor of revenue generation from services. It is likely that as industrial manufacturing companies become increasingly servitized, the differentiating effect of offering services will be limited to the high-value adding R&D and operations services business models. Still, the importance of possessing diversifying portfolio of industrial product-services business models will be required by manufacturing companies to not only brand them as provider of product-services in the market but also having the possibility to combine different business models (simple and complex) to generate the greatest value for customers. Thus, we support the efforts towards increasingly offer R&D and functional services, while maintaining the basic and maintenance business models.

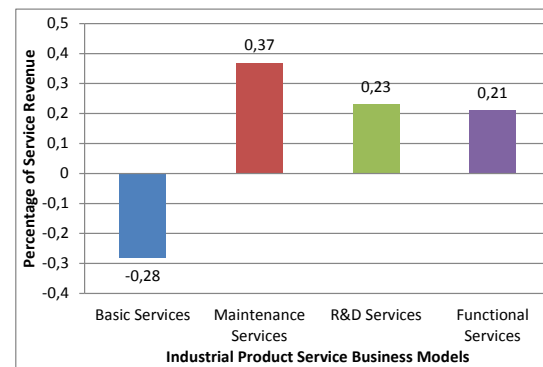


Figure 4. Relations between Industrial product-service business models and financial performance

### 3. Conclusions

Our empirical data suggests that manufacturing companies are actively engaging in offering industrial product services to secure financial, strategic and marketing benefits. We identified 17 prominent industrial services, which supports the presence of wide range of product-services portfolio for most companies. However, the majority of offerings are simple services or maintenance services. The financial effect of simple services was found to be negative, which questions the resource investment in only their production. It is rather the high-value adding services which were found to have the positive influence of performance. At present maintenance services provides the highest financial return for manufacturing companies, however, it is not far fetch to speculate that in near future returns from such services could diminish. Therefore, for securing future competitiveness, we

recommend developing a diverse-set of industrial product-services portfolio, including simple as well as complex services, enabling manufacturing companies to provide integrated or bundled product-services and generate higher-value for customers.

### Acknowledgements

This work was conducted at the VINNOVA Excellence Centre the Faste Laboratory at Luleå University of Technology, Sweden. We would also like to acknowledge support from the SYSTEMI and FUTIS (Future of Industrial Services) research projects. The authors would also like to extend our gratitude to the case companies and the respondents that have contributed with their precious time and inputs.

### References

- [1] Gebauer H, Friedli T, Fleisch E. Success factors for achieving high service revenues in manufacturing companies. *Benchmarking: An International Journal*. 2006;13(3):374-86..
- [2] Baines TS, Lightfoot HW, Benedettini O, Kay JM. The servitization of manufacturing: a review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*. 2009;20(5):547-67.
- [3] Oliva R, Kallenberg R. Managing the transition from products to services. *International Journal of Service Industry Management*. 2003;14(2):160-72.
- [4] Sawhney M, Balasubramanian S, Krishnan VV. Creating growth with services. *MIT Sloan Management Review*. 2003;45(2):34-44.
- [5] Gebauer H, Fleisch E. An investigation of the relationship between behavioral processes, motivation, investments in the service business and service revenue. *Industrial Marketing Management*. 2007;36(3):337-48.
- [6] Baveja SS, Gilbert J, Ledingham D. From products to services: why it's not so simple. *Harvard Management Update*. 2004;9(4):3-5.
- [7] Windahl C, Lakemond N. Developing integrated solutions: The importance of relationships within the network. *Industrial Marketing Management*. 2006;35(7):806-18.
- [8] Schweitzer E, Aurich J. Continuous improvement of industrial product-service systems. *CIRP Journal of Manufacturing Science and Technology*. 2010;3(2):158-64.
- [9] A. Harrison, Design for service: harmonising product design with a services strategy, in ASME Turbo Expo, Barcelona, Spain 2006.
- [10] Osterwalder A, Pigneur Y, Clark T. *Business model generation: a handbook for visionaries, game changers, and challengers*. Hoboken: John Wiley and Sons; 2010.
- [11] Tukker A. Eight types of product-service system: eight ways to sustainability? Experiences from SusProNet. *Business Strategy and the Environment*. 2004;13(4):246-60.
- [12] Meier H, Roy R, Seliger G. Industrial product-service systems—IPS2. *CIRP Annals-Manufacturing Technology*. 2010;59(2):607-27.
- [13] Davies A. Moving base into high-value integrated solutions: a value stream approach. *Industrial and Corporate Change*. 2004;13(5):727-56.
- [14] Gebauer H, Edvardsson B, Bjurko M. The impact of service orientation in corporate culture on business performance in manufacturing companies. *Journal of Service Management*. 2010;21(2):237-59.
- [15] Neely A. Exploring the financial consequences of the servitization of manufacturing. *Operations Management Research*. 2008;1(2):103-18.
- [16] Fang E, Palmatier RW, Steenkamp J-BE. Effect of service transition strategies on firm value. *Journal of Marketing*. 2008;72(5):1-14.
- [17] Kohtamäki M, Partanen J, Parida V, Wincent J. Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*. (In press).