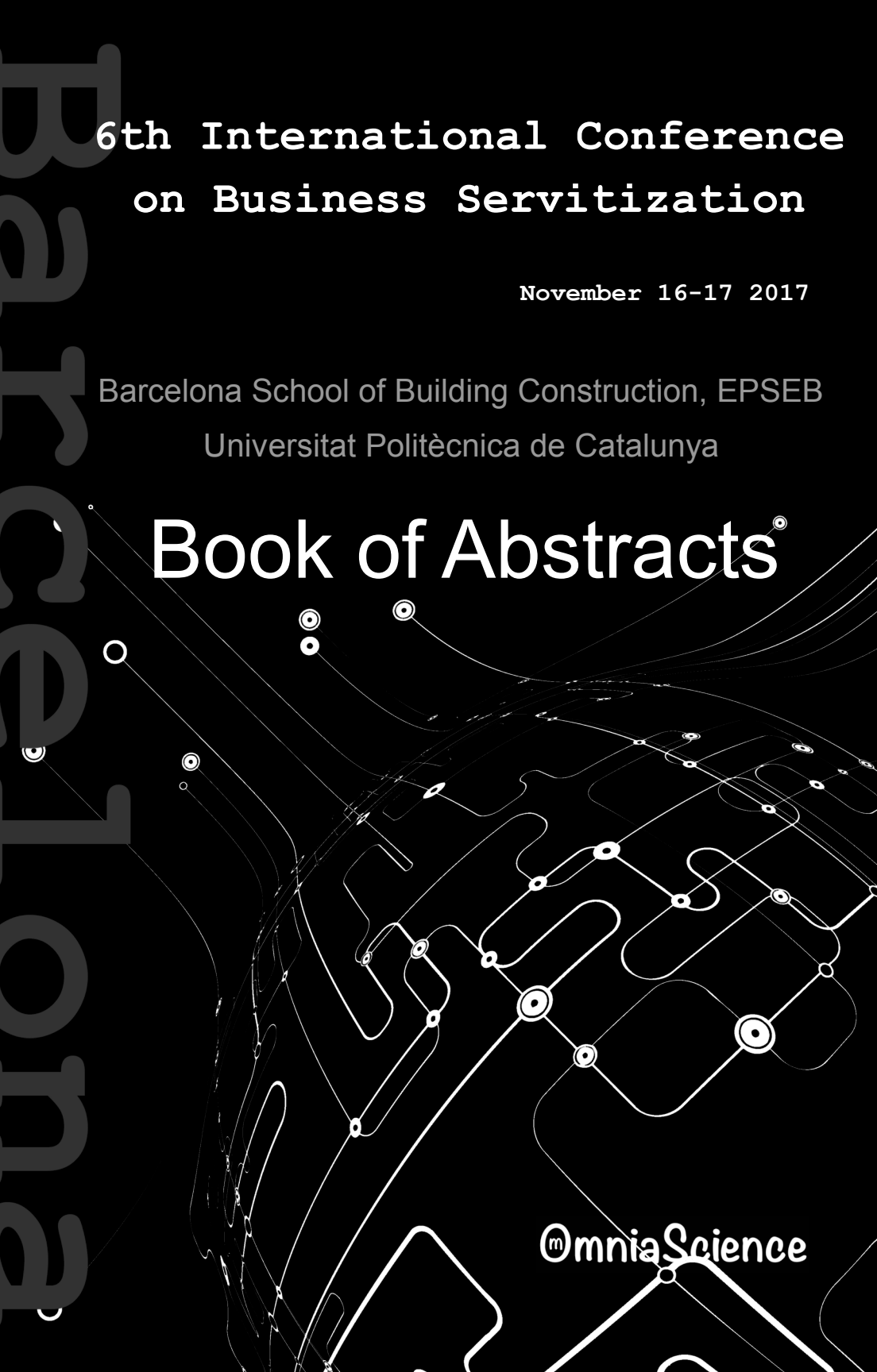
6th International Conference on Business Servitization

November 16-17 2017

Barcelona School of Building Construction, EPSEB

Universitat Politècnica de Catalunya

Book of Abstracts



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Barcelona

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Barcelona, November 16-17, 2017

www.omniascience.com

DOI: https://doi.org/10.3926/serv2017

ISBN: 978-84-946352-7-4

Cover design: OmniaScience

Cover photo: © DouDou - Fotolia.com

Foreword

Welcome to 6th International Conference on Business Servitization

This book abstracts summarizes the proceedings of the **6th International Conference on Business Servitization (ICBS 2017)**, held at the Barcelona School of Building Construction (EPSEB), Barcelona, Spain.

This edition of the **International Conference on Business Servitization (ICBS)** deals with the Servitization of Regions. The analysis of what drivers, processes and actors play a crucial role in enabling and promoting manufacturing renaissance, technological upgrading and product-service innovation in regions is of crutial importance for understanding how regions can efficiently transit to a more knowledge-based development models. The servitization of regions offers an opportunity for local manufacturing economies to resume growth and sustain long-term competitiveness. As such, the renaissance of manufacturing through territorial servitization not only facilitates the upgrading of existing manufacturing competences, but it also offers an opportunity to develop and anchor new technological capabilities across regions.

As such, the research collection in the pages below provide a better understanding of the factors that enable manufacturing sectors to transit to more innovation-intensive and difficult-to-imitate business models based on services.

The competitiveness of manufacturing businesses increasingly relies on their ability to introduce value-adding services into their operations, and to offer integrated packages of goods and services;

a process described in the literature as the servitization of manufacturing or product-service systems. There is a growing number of manufacturing firms adding services to their offer, with recent evidence indicating that the proportion reaches up to two thirds of manufacturers in developed economies. However, the integration of services in-house has considerable risks and therefore manufacturers, especially SMEs, have an increased demand for externalizing knowledge-based services.

Knowledge intensive business service (KIBS) firms inject advanced services—i.e., servitization—across new and incumbent manufacturing businesses. Local KIBS are both sources and carriers of knowledge that might impact the competitiveness of local manufacturing firms. The colocation of product and service firms in the same space enhance territorial and urban performance by providing high value-adding services to other organizations, and fuelling job creation.

At the territorial level, the renaissance of local manufacturing sectors, including traditional manufacturing sectors and new approaches to production such as the Makers movement and 3D manufacturing, seems to be related to growth in KIBS sector. Knowledge-intensive service ventures tend to agglomerate together with new and incumbent manufactures, developing linkages and strategic alliances, and therefore opening a virtuous entrepreneurial circle, which in turn positively influence the renaissance of manufacturing. As such servitization and the benefits of knowledge-intensive service provision do not necessarily have to be fully integrated within the manufacturer's internal value chain. There are benefits to 'Territorial Servitization'.

In this 6th edition of the ICBS we have brought together more than 45 researchers from 36 Universities and Research Institutes located in 13 countries across Europe and America. In summary, the conference is organized in ten different parallel sessions that seek to

fuel the academic debate around the different aspects of Territorial Servitization.

Additionally, this conference welcomes relevant keynote speakers as Prof. Yancy Vaillant (Toulouse Business School, TBS) analyzing "The Servitization of Regions" and Dr. Ivanka Visnjic (ESADE) speaking about "Product innovation, service business model innovation and their impact on performance".

Esteban Lafuente, PhD
Ferran Vendrell-Herrero, PhD
Ivanka Visnjic, PhD

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PRESENTED AT

6TH INTERNATIONAL BUSINESS SERVITIZATION CONFERENCE

Parallel session 1

Sustainability in servitization

Chair: Vinit Parida and David R. Sjödin

The Role of of KIBS in the transition towards Circular Economy

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Extended Abstract

Introduction

Circular Economy is defined as "an industrial economy that is restorative by intention; aims to rely on renewable energy; minimises, tracks, and eliminates the use of toxic chemicals; and eradicates waste through careful design" (Ellen MacArthur Foundation 2013 p. 22). In Circular Economy (CE), goods are recovered at their service end-of-life as resources for other goods, closing loops in industrial ecosystems and minimising waste.

Transition towards CE is considered a promising strategy to enable regional prosperity, through reindustrialisation based on the efficient use of resources. This recent research field is mainly focused on innovation, technical systems, tax incentives and new business models. In particular, business models for CE can be divided into two groups (Walter & Stahel, 2016): those that promote reusing and extend service life through repairing, remanufacturing, updating and recovery, refurbishing and retrofitting; and those

others that transform old goods into as new resources through material recycling.

Servitization, which refers to the strategy of the manufacturing firm consisting of adding services to their product or to satisfying the customer need with services rather than with the transference of product ownership, has been pointed out as one of the most promising business models in the transition towards Circular Economy (Stahel, 2013). Retaining ownership of goods by manufacturers enables the implementation of strategies aimed at extending service life, such as those indicated in the above paragraph.

Moreover, the literature on servitization has identified several obstacles that prevent the broad diffusion of service-based business models among manufacturing firms, such as organizational requirements, reluctance to internalise use-related costs, long time to access market, uncertainty regarding the products' return flow from customers to manufacturers, uncertainty about the cash flow, and difficulties for functional renting of some products (e.g. low residual value at end of life) (White et al., 1999; Mont 2002; Bartolomeo et al., 2003; Rothenberg, 2007; Laperche & Picard, 2013). The concepts of servitization and product-service-systems have been developed in the scientific literature but have not been properly transferred to practitioners (Cook et al., 2006). And this is fairly true for servitization that allows for achieving environmental benefits. Adopting an evolutionist perspective, Cook et al (2006) have defined a conceptual framework that identifies the attributes of receptivity to PSS in UK manufacturing firms (Table 1).

This framework is used in this paper as a starting point to analyse the role of KIBS in supporting the transition towards Circular Economy. Circular Economy defines a new economic paradigm that requires new knowledge, learning and innovation. However, as shown in the literature, business capacities are hardly

developed in relation to servitization. In the knowledge economy, it is argued that knowledge mediation is crucial for system growth (Lundvall, 2003). One of the most common ways of mediating knowledge consists of hiring business services. In particular, knowledge intensive business services (KIBS) have an increasing importance and have defined a new economic paradigm where knowledge is the main asset (Vence, 1998). KIBS fulfil a number of functions and give place to new intra- and interindustry structures that determine new ways of learning to learning. KIBS play a crucial role in training, triggering and catalysing technological change (Bessant & Bush, 2000).

External selection environment

Knowledge residing in the external environment

The PSS concept and its requisite knowledge set must be available in the external selection environment of firms; these must be in an accessible form; and a mobility channel must be available to enable the transfer of these from academic circles to industry.

Market conditions facing the firm

The PSS concept must provide a response to perceived changes in the market conditions facing a firm. These include: the need to add value and to attain greater economies of scope.

Legislation

The PSS concept must provide a response to environmental legislation, and in particular, legislation which has been developed to engender extended producer responsibility such as the WEEE Directive.

Internal Environment

Corporate competence

Competencies for technology/knowledge transfer must exist; particularly those that are required to acquire the PSS concept and its knowledge set from a firm's external selection environment and to assimilate these into organisational structure;

Competencies to apply the PSS concept: those required to use the service type of transaction.

Strategic orientation

The PSS concept must be consistent with the firm's strategic orientation.

Firms must be seeking greater differentiation;

Firms must be seeking greater economies of scope;

Firms must be seeking to attain competitive advantage from compliance with environmental legislation;

There must be a corporate commitment to improving environmental performance.

Organisational structure

A structure that can facilitate the acquisition, assimilation and application of the PSS concept.

Product portfolio

High value products from which sufficient revenue can be secured to finance the acquisition of any additional competencies needed for service delivery;

Service orientated products in product portfolio;

Tangible products could be easily disassembled and upgraded to account for changes in technology and fashion.

Table 1. The attributes of receptivity to Product Service Systems in UK manufacturing firms (Cook et al., 2006, p. 1464)

Since SMEs usually face important limitations in terms of financial and knowledge resources, receiving advice and support from KIBS and setting strategic partnerships might help them to jump at the chance of circular business models, which require specific knowledge and skills to design new value propositions oriented towards value preservation and optimisation.

Methodology

This paper builds on the case study methodology, which is adequate to study complex and contemporary phenomena in their natural context (Yin, 1994). The novelty of the field being explored and the research objective support the utilisation of this methodology. Therefore, the paper starts with a literature review and gets deeper insights through desk research and qualitative interviews with the managers of three KIBS. The structure and contents of the interviews are summarised in Table 2.

Preliminary results and contribution

The analysis conducted in this paper shows the important role played by KIBS in Circular Economy. In particular, the conceptual framework developed by Cook et al (2006) has been useful to highlight the functions of KIBS in three aspects: 1) KIBS are crucial to make available the concept of Circular Economy and supporting business models in the selection environment; they are also key to support the implementation of new legislative requirements; 2) KIBS gather competences for assimilating the Circular Economy principles supporting the internalisation in the organisation of SMEs and help to develop internal competences or to set strategic partnerships for service provision by SMEs; 3) Due to limitations of SMEs, KIBS represent the necessary external structure to adopt

servitization and go further in Circular Economy without investing own resources.

This paper has contributed to shed light of the role of KIBS in Circular Economy and to refine the contextual framework of attributes of receptivity to servitization with environmental objectives in manufacturing firms.

Keywords: Servitization, KIBS, circular economy business models, tools

References

Bartolomeo, M., dal Maso, D., de Jong, P., Eder, P., Groenewegen, P., Hopkinson, P., et al (2003). Eco-efficient producer services—what are they, how do they benefit customers and the environment and how likely are they to develop and be extensively utilised? J*ournal of Cleaner Production*, 11, 829–837. doi: 10.1016/S0959-6526(02)00157-9.

Bessant, J., & Bush, H (2000). *Innovation agents and technology transfer. 'Serv. knowledge-based Econ.'* (Eds M Boden, I Miles) pp. 155–169. (Continuum: London)

Cook, MB., Bhamra, T.A., & Lemon, M. (2006). The transfer and application of Product Service Systems: from academia to UK manufacturing firms. *Journal of Cleaner Production*, 14, 1455–1465. doi:10.1016/j.jclepro.2006.01.018.

Ellen MacArthur Foundation (2013). *Towards the circular economy. Economic and business rationale for an accelerated transition.*

Laperche. B., & Picard, F. (2013). Environmental constraints, Product-Service Systems development and impacts on innovation management: learning from manufacturing firms in the French context. *Journal of Cleaner Production*, 53, 118–128. doi:10.1016/ j.jclepro.2013.03.047.

Lundvall, B-A. (2003). *The economics of knowledge and learning. 'Prod. Inov. Interact. Learn. Econ. Perform.'* (Eds JL Christensen, B-A Lundvall) pp. 21–42. (Emerald Group Publishing Limited)

Mont, O. (2002). Drivers and barriers for shifting towards more service-oriented businesses: Analysis of the PSS field and contributions from Sweden. *Journal of Sustainable Product Design*, 2, 89–103.

Rothenberg, S. (2007). Sustainability through servicizing. *MIT Sloan Management Review,* 48, 82–91.

Stahel, W. (2013). Policy for material efficiency--sustainable taxation as a departure from the throwaway society. *Philosophical transactions Series A, Mathematical, physical, and engineering sciences*, 371, 20110567. doi:10.1098/rsta.2011.0567.

Vence, X. (1998). *Industria e innovación*. Xerais: Vigo.

Walter, R. & Stahel (2016). Circular Economy. *Nature*, 531, 435–438. doi:10.1038/531435a.

White, A.L., Stoughton, M., & Feng, L. (1999). *Servicizing: The quiet transition to Extended Product Responsibility*. http://infohouse.p2ric.org/ref/17/16433.pdf.

Yin, R.K. (1994). *Case study research. Design and methods*. (Sage Publications: California)

Enhancing sustainability performance through Digital servitization: Implications from the automotive industry

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Extended abstract:

Introduction

Sustainability has gained considerable attention from companies attempting to interweave environmental and social issues in their business strategy. Its implementation has induced companies to be more involved in complex global social-ecological challenges, such as climate change, biodiversity loss or poverty alleviation (Schäpke et al., 2017). Hence, over the years, companies are gradually transitioning towards a responsible environmental behavior and a sustainable management of their operations (Lindström et al., 2015) by conceiving sustainability as an opportunity upon which they can

build difficult-to-replicate core competencies and optimize organizational performance (Le & Wang, 2017).

Likewise, servitization has proven to be a crucial strategy for capitalizing on opportunities to differentiate traditional product offerings and enhance customer engagement (Vandermerwe & Rada, 1988), increase performance (Kohtamäki et al., 2013), and achieve sustainable competitive advantage (Oliva & Kallenberg, 2003; Bustinza et al., 2017). Moreover, the emergence of digital technologies has lately enabled companies to dematerialize physical offerings and provide smart and connected products and services (Parida et al., 2014; Lenka et al., 2017). A recent research trend centered on exploring the utilization of digital technologies in servitized product firms defined as digital servitization (Vendrell-Herrero & Wilson, 2017).

Sustainability is particularly critical in the automotive industry where most vehicle and auto parts manufacturers strive constantly to reduce the environmental impact of both their products and their manufacturing processes (Vaz et al., 2017). As a matter of fact, the automotive industry is under constant pressure concerning environmental risks, emissions and safety, and is forced by regulatory agencies to make continuous technological improvements oriented to reduce waste, improve environmental performance, and consequently enhance sustainable operations (Koplin et al., 2007).

Within this context, digital servitization erects itself as an enhancer of sustainability performance through the dematerialization of products, thus reducing material flow and energy consumption (Dobers & Wolff, 1999). Likewise, digital servitization allows better resource allocation and more accurate information sharing (Kindström & Kowalkowski, 2014) which facilitates availability of information so that products can be easily refurbished, remanufactured and recycled (Li & Found, 2017).

Furthermore, digital servitization enables the deployment of remote services to supplement or replace traditional technical services performed on-site without location or time constraints (Lerch & Gotsch, 2015), while potentiating the development, design, and redesign of custom-adapted services (Opazo-Basaez et al., 2017) mainly aimed at reducing environmental impacts.

Therefore, this paper aims at analyzing the effect of digital servitization on sustainability performance in the automotive industry, underlining the importance of setting a successional order of performance objectives in achieving overall sustainability performance.

Methods

The study focuses on sustainability performance through the effect of digital servitization, particularly set in the automotive industry. The study follows a mixed methodology combining quantitative and qualitative techniques. For such purpose, Orbis database was used to gather data from 256 companies followed by semi-structured interviews for data collection respectively.

Findings and Implications

Preliminary results obtained in this research suggest the relevance of digital servitization to support operations and reduce environmental impact. In addition, they highlight the importance of establishing a successional order of performance priorities, where digital servitization must be considered a prerequisite for overall sustainability performance.

The main empirical contribution emerging from the study indicates the existence of two levels of sustainability performance. The first one is referred in the present study as the micro level and relates to the use of digital servitization for supporting sustainable

operations. The second is referred as the meso level and is considered as an overall and subsequent sustainability performance level.

Keywords: Sustainability, Servitization, Digital servitization

References

Bustinza, O.F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2017). *Product–service innovation and performance: the role of collaborative partnerships and R&D intensity. R&D Management,* in press.

Dobers, P., & Wolff, R. (1999). Eco-efficiency and dematerialization: scenarios for new industrial logics in recycling industries, automobile and household appliances. *Business Strategy and the Environment,* 8(1), 31.

Kindström, D., & Kowalkowski, C. (2014). Service innovation in product-centric firms: A multidimensional business model perspective. J*ournal of Business & Industrial Marketing*, 29(2), 96-111.

Kohtamäki, M., Partanen, J., Parida, V., & Wincent, J. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*, 42(8), 1374-1385.

Koplin, J., Seuring, S., & Mesterharm, M. (2007). Incorporating sustainability into supply management in the automotive industry–the case of the Volkswagen AG. *Journal of Cleaner Production,* 15(11), 1053-1062.

Le, T. N., & Wang, C. N. (2017). The Integrated Approach for Sustainable Performance Evaluation in Value Chain of Vietnam *Textile and Apparel Industry. Sustainability,* 9(3), 477.

Lenka, S., Parida, V., & Wincent, J. (2017). Digitalization Capabilities as Enablers of Value Co-Creation in Servitizing Firms. *Psychology & Marketing,* 34(1), 92-100.

Lerch, C., & Gotsch, M. (2015). Digitalized product-service systems in manufacturing firms: A case study analysis. Research-Technology Management, 58(5), 45-52.

Li, A. Q., & Found, P. (2017). Towards Sustainability: PSS, Digital Technology and Value Co-creation. *Procedia CIRP,* 64, 79-84.

Lindström, J., Nilsson, K., Parida, V., Sjödin, D. R., & Ylinenpää, H. (2015). Sustainable management of operation for Functional Products: Which customer values are of interest for marketing and sales? *Procedia CIRP*, 30, 299-304.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. *International Journal of Service Industry Management*, 14(2), 160-172.

Opazo-Basaez, M., Ghulam-Muhammad, S., Arias-Aranda, D., Molina-Moreno, V. (2017). A Roadmap towards Smart Services in Healthcare. *DYNA*, 92(1), 22-27.

Parida, V., Sjödin, D.R., Wincent, J., & Kohtamäki, M. (2014). Mastering the transition to product-service provision: Insights into business models, learning activities, and capabilities. *Research-Technology Management*, 57(3), 44-52.

Schäpke, N., Omann, I., Wittmayer, J.M., van Steenbergen, F., & Mock, M. (2017). Linking Transitions to Sustainability: A Study of the Societal Effects of Transition Management. *Sustainability,* 9(5), 737.

Vandermerwe, S., & Rada, J. (1988). Servitization of business: adding value by adding services. *European Management Journal,* 6(4), 314-324.

Vaz, C.R., Rauen, T.R.S., & Lezana, Á.G.R. (2017). Sustainability and Innovation in the Automotive Sector: A Structured Content Analysis. *Sustainability,* 9(6), 880.

Vendrell-Herrero, F., & Wilson, J. R. (2017). Servitization for territorial competitiveness: Taxonomy and research agenda. Competitiveness Review: *An International Business Journal*, 27(1), 2-11.

Sustainable product innovation without scale and experience, but only for KIBS!

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Extended abstract:

Motivation

Sustainability has become the main driver of business innovation in the current period of economic recuperation that follows close to a decade of slowdown. Defined as the creation of new market space, products and services or processes driven by social, environmental or sustainability issues (ADL Group, 2005), most firms have abandoned the long-held belief that sustainable innovations will disadvantage their competitiveness (Nidumolu, Prahalad & Rangaswami, 2009). Sustainability oriented innovation, from either organizational or technological origins, has been found to be increasingly responsible for both bottom and top-line returns. From input efficiency to greater value-added products, sustainable product innovation is allowing many firms to create new and

stronger sources of competitive advantage (Nidumolu, Prahalad and Rangaswami, 2009).

But whereas the traditional product innovation that characterized the greater part of the twentieth century was found to be enthused by firm size and market experience (Schumpeter, 1939), the performance of product innovation in the knowledge-based economy of the last thirty years has largely been associated with the entrepreneurial and learning orientation adopted by the firms that promote these innovations (Cohen & Klepper, 1996; Wiklund & Shephard, 2003). In the case of sustainable product innovation, it is not yet clear how the size of the firm or its market experience, nor how a firm's entrepreneurial or learning orientation may influence the ultimate performance of such innovation. Nor is it clear how firm types that are characteristic of knowledge-based economies, such as knowledge intensive business service firms (KIBS), are influenced by these factors in their quest for sustainable product innovation performance.

Therefore, this study lays the initial path to help answer these questions by helping to identify the ideal trajectory for sustainable product innovation performance. In line with their increased relevance for the development of efficient servitization strategies at business and territorial level (Bustinza, Gomes, Vendrell-Herrero & Baines, 2017; Cusumano, Kahl & Suarez, 2015; Lafuente, Vaillant, & Vendrell-Ferrero, 2016), KIBS are specifically singled out in the study to scrutinize what sustainable product innovation performance trajectory is best for this particular type of knowledge-intensive business that is playing an increasingly important role in the economy. A common challenge faced by manufacturing businesses is the access to both qualified service delivery partners and the resources and skills needed to successfully co-create value (Lenka, Parida & Wincent, 2017), increase product functionality (Lindström, Nilsson, Parida, Sjödin & Ylinenpää, 2015) and market

and deliver product-service offerings (Parida, Sjödin, Wincent & Kohtamäki, 2014). KIBS businesses constitute the ideal partner for manufacturers for implementing servitization strategies, and this study seeks to shed some light in the sustainable product innovation patterns of KIBS firms which is especially relevant for the sustainability-led resilience and servitization of manufacturing firms.

Research design and preliminary results

To reach the objective of this study we perform a fuzzy set analysis (qualitative comparative analysis) on a sample specifically designed for the purpose of this research that includes information for 74 Costa Rican businesses for 2016.

The findings of the research indicate two ideal configurations in order for firms to reach sustainable product innovation performance. These configurations both include the adoption of entrepreneurial and learning orientations but differ as to the importance of firm size and market experience. Whereas one of the configurations to reach maximum sustainable product innovation performance requires the presence of KIBS businesses that have both an entrepreneurial and learning orientation, the second configuration is specific to non-KIBS firms with strong firm size and age along with entrepreneurial and learning orientation. Of the two optimal configurations for sustainable product innovation, the one including KIBS does not depend on firm size, with age only having a very minor (peripheral) influence.

We find very similar results if we remove the sustainability restriction and analyze the configuration that optimizes the performance of all product innovations. But in this case, KIBS are essential in both optimal configurations reached through the fuzzy set analysis. The difference comes from the importance of the KIBS within the configurations. When KIBS are less important, greater

weight must be given to firm size and market experience to compensate if maximum product innovation performance is to be achieved.

Keywords: sustainable product innovation, knowledge-intensive business services (KIBS), fuzzy set analysis

References

Arthur, D. Little (ADL) Group (2005). *Innovation High Ground Report: How Leading Companies are Using Sustainability-Driven Innovation to Win Tomorrow's Customers?* Retrieved from http://www.adlittle.com/sustainability-viewpoints0.html?&view=13

Bustinza, O.F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2017). Product–service innovation and performance: the role of collaborative partnerships and R&D intensity. *R&D Management,* in press.

Cohen, W., & Klepper, S. (1996). Firm Size and the Nature of Innovation within Industries: The Case of Process and Product R&D. *Review of Economics and Statistics,* 78(2), 232-243.

Cusumano, M.A., Kahl, S.J., & Suarez, F.F. (2015). Services, industry evolution, and the competitive strategies of product firms. *Strategic Management Journal*, 36(4), 559-575.

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2016). Territorial Servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. International J*ournal of Production Economics*, in press.

Lenka, S., Parida, V., & Wincent, J. (2017). Digitalization Capabilities as Enablers of Value Co-Creation in Servitizing Firms. *Psychology & Marketing*, 34(1), 92-100.

Lindström, J., Nilsson, K., Parida, V., Sjödin, D.R., & Ylinenpää, H. (2015). Sustainable management of operation for Functional Products: Which customer values are of interest for marketing and sales? *Procedia CIRP,* 30, 299-304.

Nidumolu, R., Prahalad, C.K., & Rangaswami, M.R. (2009). Why Sustainability Is Now the Key Driver of Innovation. *Harvard Business Review*, 87(9), 56-64.

Parida, V., Sjödin, D.R., Wincent, J., & Kohtamäki, M. (2014). Mastering the transition to product-service provision: Insights into business models, learning activities, and capabilities. *Research-Technology Management*, 57(3), 44-52.

Schumpeter, J.A. (1939). *Business cycles* (Vol. 1, pp. 161-74). New York: McGraw-Hill.

Wiklund, J., & Shepherd, D. (2003). Knowledge-based resources, entrepreneurial orientation, and the performance of small and medium-sized businesses. *Strategic Management Journal,* 24(13), 1307-1314.

Parallel session 2

Management Tools

Chair: Ivanka Visnjic

Taking the IoT turn: Best practices from 5 success cases

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Extended abstract:

Introduction

The Internet of Things (IoT) refers to the interconnection of physical objects to the Internet. Through this servitization strategy, firms are able to differentiate their offering and enhance customer engagement (Vandermerwe & Rada, 1988).

The IoT is currently going through a phase of rapid growth. McKinsey (2016) estimates the total IoT market size should grow to $3.7 billion in 2020 and to $6.2 trillion until 2025. Gartner (2015) predicts 20.8 billion connected things will be in use worldwide by 2020. Most industries are impacted. In particular, the competitiveness of manufacturing businesses increasingly depends on their capacity to add services to their products.

The IoT turn participates to the servitization strategy of these businesses. The servitization process remains a big challenge to these businesses for many reasons; e.g. by requiring new managerial capabilities by entrepreneurs (Gauthier et al., 2017), by creating disruption in the supply chain (Vendrell-Herrero et al., 2017) or increasing complexity of value capture mechanisms (Benedettini, et al., 2015 ; Kohtamäki, et al., 2013; Suarez et al., 2013).

This research addresses the big challenge in manufacturing businesses by exploring business cases that successfully have addressed the turn to IoT.

Methodology

This research adopts a small-N case study approach (Yin, 2003) to understand how manufacturing businesses have successfully managed their turn to IoT. Such approach is appropriate to analyse ongoing phenomena, and facilitate theory building (Eisenhardt, 1989). We analyse 6 cases of recently turned to IoT businesses BAYARD BY TALIS, COVAL, CREATIQUE Technologie, CROUZET AUTOMATION, HAGER Group and SNOWsat KÄSSBOHRER. We collected primary (interviews) and secondary data (IRT Nanoelec, 2016).

Findings and Discussion

A main issue concerns thresholds, in some cases technological thresholds; e.g. COVAL had some weaknesses in the electronic and embedded software domains, in some others design or market thresholds. Businesses have implemented different actions to get the required skills: train the employees and recruit new talents. They have mostly identified experts and partners to go further ⇒Best practice: Build collaborative strategies.

This first best practice confirms that collaborative strategies meet an increasing popularity (Chung et al., 2008; Gomes et al. 2011; Pogrebnyakov et al., 2011, Gomes et al., 2016). Literature also shows that despite this popularity, their rate of failure for collaborative strategies remains high (Gomes et al., 2011; Weber et al., 2011; Checkley et al., 2014; Vendrell-Herrero et al., 2014) and that some issues should be further explored like the cultural issue (Günter et al., 2013). The results of this study address these issues.

The turn to IoT has been lived as a Big project, even a strategic breakthrough by the businesses. The cases reveal that it has induced main changes in the business' corporate strategy and require flexibility; CROUZET AUTOMATION managers talk about a "cultural threshold" to exceed. They have intensively practiced trial and error methods, adapting step to step their solutions for the market. Moreover managers have expressed the increase of technical uncertainty due to the turn to IoT ⇒Best practice: Adopt an internal culture of agility.

Data reveal that the turn to IoT has to be fed by lots of market studies. The challenge is to sell connected objects on a market that still does not exist. New entrants are revealed, sometimes some not expected coming from another manufacturing sector but having expertise in connect objects. Endly, digitization of the solutions may induce a change of the positioning of a product on its former market ⇒ Best practice: Opt for Market orientation culture.

Becoming a supplier of a service necessitated these businesses to rethink their target; which has impacted their value proposition and customer identification. As explained by BAYARD, to deliver this new value proposition, changes were made to their value chain. This had an impact of their mechanisms of value delivery. They have changed the dominant logic of their business, shifting from a product dominant logic to a service dominant logic ⇒ Best practice: Transform the business model.

Keywords: IoT, Servitization, Business model, Collaborative strategies

References

Benedettini, O., Neely, A., & Swink, M. (2015). Why do servitized firms fail? A risk-based explanation. *International. Journal of Operations and Production Management*, 35(6), pp. 946-979.

Gartner (2015). Internet access, July 10, 2017.

Gauthier, Bastianutti, Haggège (2017). *Forthcoming in Strategic Change.*

Günter, K. et al. (2013). Sociocultural Integration in Mergers and Acquisitions: Unresolved Paradoxes and Directions for Future Research. *Thunderbird International Business Review,* 55(4).

IRT Nanoelec (2016). Ils ont pris le virage des objets connectés: 10 retours d'expérience en B to B, pp. 1-40.

Kohtamäki, M., Partanen, J., Parida, V., & Wincent, J. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*, 42(8), 1374–1385.

McKinsey (2016), Internet access July 10, 2017.

Suarez, M.A., Cusumano, S.J. Kahl (2013). Services and the business models of product firms: An empirical analysis of the software industry. *Management Science*, 59(2), 420-435.

Vendrell-Herrero, F., Bustinza, O.F., Parry, G., & Georgantis, N. (2017). Servitization, digitization and Supply-chain interdependency. *Industrial Marketing Management*, 60, 69-81.

Does Infrastructure Servitization Deliver Value?

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Extended abstract:

Introduction

In line with the trend of manufacturing servitization, the infrastructure industry is experiencing a rapid integration that follows a service-oriented approach to streamlining entire supply chain for a fast track delivery of critical infrastructure projects. This development of infrastructure servitization stems from the challenges of aging infrastructure assets, growing public demand and public funds shortfall. Three features define the servitization of infrastructure development. First, infrastructure development follows a life-cycle asset management framework and integrates both upstream and downstream services covering infrastructure planning, public/private financing, design, construction, and operation and maintenance. Second, infrastructure servitization emphasizes on outcome based requirements or specifications in order to ensure quality service to the public. Third, this new paradigm demands untraditional mechanisms for risk sharing and incentive to attract private companies as well as protecting public interest – after all, infrastructure is a public good with characteristics of natural monopolies. Therefore, infrastructure servitization is normally known as Public Private Partnership (PPP or P3). Various terms are also used for other types of infrastructure development,

e.g. Energy Performance Contract (EPC) on building renovation, Power Purchase Agreement (PPA) for renewable energy development, and Performance Based Logistics (PBL) for defense acquisition. According to the Work Bank (2017), annual investment in infrastructure servitization projects reached $100 billion. The market will continue to grow dramatically considering the fact that both the United States and China are committed to leverage private capital for $1 trillion infrastructure investment in each country. Along with the fast growth, there are serious concerns and criticism provoked by the provision of public goods by the private sector (Garvin and Bosso 2008). Efficiency of private delivery, transparency of private participation, and adequate protection of public interest are all questioned in those complex infrastructure servitization projects (Istrate and Puentes, 2011). This paper focuses on the efficiency issue of infrastructure servitization and applies an empirical method to answer the question: does infrastructure servitization deliver value?

Method

As most infrastructure servitization projects last a long period of time, there are little project completing the concession yet. The efficiency evaluation then would cover the planning, design, construction stages but excluding the operation and maintenance phase. Typical indicators used for project efficiency are cost and time. This paper compares the cost and time performance of infrastructure servitization projects to traditional infrastructure projects which were delivered via traditional public delivery model. Three hypotheses are defined as follows:

H1: Infrastructure servitization lower infrastructure delivery cost.

H2: Infrastructure servitization lead to faster project delivery than the conventional method.

H3: Infrastructure servitization reduce the uncertainty of infrastructure delivery cost

Time efficiency evaluated with population-average estimator:

$$\ln(duration_{it}) = \alpha + \beta_1 \ln\text{contract}_{it} + \beta_2 \ln\text{cost}_{it} + \alpha_i - \alpha + e_{it}$$

Cost efficiency will be evaluated with fixed effect estimator:

$$overrun_{it} - \overline{overrun_i} = \beta_1(contract_{it} - \overline{contract_i}) + \beta_2(cost_{it} - cost_i) + (e_{it} - \bar{e})$$

Megaproject database from the US Department of Transportation is used to collect panel data of 72 mega-projects from 1999 to 2014. Cost and time data is also examined from initial financial plan and annual financial update on those projects. Total 15 projects were delivered using the public private partnership (servitization) method. The rest projects were delivered with traditional delivery methods (design-bid-build (DBB) or design-build (DB)). While some scholars classified DB as a type of P3, we focuses on the servitization issue and define P3 as an integrated approach covering operation and maintenance.

Findings

Dummy Coded Variable		
	Dummy 1	Dummy 2
P3	-1	-1
DB	1	-1
DBB	-1	1

The analysis shows a significant time efficiency for P3 or servitization method in comparison with traditional methods (both DBB and DB). In general, time efficiency for infrastructure servitization is higher for large infrastructure projects. It should be noted that time savings herein include a reduction in design/build time as well as project development and preliminary engineering duration. The cost efficiency of P3 servitization is also significant while comparing to traditional DBB method. However, the cost difference between P3 servitization and DB is statistically insignificant. The most critical advantage of P3 servitization appears the certainty of infrastructure delivery cost and time which can benefit public budget.

	Model 1			Model 2		
Dependent Variable	Total Cost (log)			Duration (log)		
Unit	$ in Millions			Days		
Independent Varable	Coefficeint	t statistics	P-value	Coefficeint	t statistics	P-value
Constant	6.231	90.039	0.000			
Dummy1*Group	-0.232	-1.876	0.062	0.173	5.395	0.000
Dummy2*Group	-0.236	-10.229	0.000	0.226	7.227	0.000
Dummy1*Dummy2*Group	-0.264	-12.665	0.000	0.155	5.340	0.000
Log(Total Cost)				1.164	5.340	0.000
F statistics	57.783			7297.446		
Significance	0.000			0.000		
R square	0.429			0.992		

Keywords: Servitization, Infrastructure, Public Private Partnership, Efficiency

References

Istrate, E., & Puentes, R. (2011). Moving Forward on Public Private Partnerships: U.S. and International Experience with PPP Units. *Brookings-Rockefeller Project on State and Metropolitan Innovation,* December, 2011

Garvin, M.J., & Bosso, D. (2008). Assessing the effectiveness of infrastructure public-private partnership programs and projects. *Public Works Management & Policy,* 13, 162-178.

Istrate, E., & Puentes, R. (2011). *Moving forward on public private partnerships: U.S. and international experience with ppp units*. Washington, DC: The Brookings Institution.

World Bank (2017). *2016 private participation in infrastructure (PPI) annual update*. The Work Bank, Washington D.C.

Open service innovation: co-production in design and delivery of outcome-based contracts

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Extended abstract:

Introduction

Product firms are increasingly shifting from sales of products and services towards provision of advanced services that guarantee fulfilment of a certain outcome over a period of time (Cusumano et al., 2015; Howard et al., 2016; Batista et al., 2016; Ng et al., 2013). However, the process that underpins the development of advanced services (e.g. outcome-based services, performance-based services) differs significantly to the traditionally product (manufacturing) or service innovation logic (Ettlie & Rosenthal, 2011). First, a typical product provider first engages in research, design and development of a new product, which is subsequently launched and sold to customers (Cooper, 2008). In contrast, outcome-based contract

provider guarantees to deliver specific outcomes required by the customer and then combines diverse products and services to deliver this outcome (Visnjic et al., 2016). For instance, under these contracts manufacturers of airplane engines (e.g. Rolls Royce or GE) guarantee the availability and reliability of the engines (Batista et al., 2016).

Second, all products and services necessary to deliver the outcome (e.g. engine availability) is coordinated by the OBC provider, who not only chooses how these outcomes are achieved, but also who is responsible for delivering them (Visnjic et al., 2016; Ng et al., 2013; Batista et al., 2016). Thus, OBC providers often leverage on competences of other actors (e.g. external partners) in the ecosystem (Chesbrough, 2003; Chesbrough et al., 2006; West & Bogers, 2014) since providers are rewarded on the basis of outcome rather than how they met the requirement (Sumo et al., 2016; Kim et al., 2007). It is argued that outcome-based contracts have positive effects on innovation as they usually engage parties in long term relationship that allows experimentation as part of daily activities (Sumo et al., 2016). Consequently, primary innovation potential lies in the collaborative activities between OBC provider, customers and other actors helping to design and deliver the service (Greer & Lei, 2012).

While literature identifies different practices of co-production of value proposition and value co-creation in the context of service solutions (Kohtamäki et al., 2013; Kohtamäki & Partanen, 2016), understanding the innovation process of outcome-based contracts that follows the inverted sequence of design, development and launch of the offering is still puzzling.

Over the last four years, we have studied how outcome providers innovate as they design and develop product-service systems through which they deliver the outcomes they are obliged to. Building on four exemplar cases of advanced outcome providers the

study finds that the success of their innovation hinges on understanding specific co-creation activities that appear at the contracting stage (henceforward called the Outcome Service Design), as well as during the development and deployment of the product-service system that enables the outcomes to be delivered after the contract is signed (henceforward called the Outcome Service Delivery).

At the outcome service design phase, the provider is involved in (i) co-production of the outcome value proposition. It includes identifying the customer's needs and specifying the outcomes that will satisfy these needs. Outcome specificity includes co-designing of the contract (Frow et al., 2015; Kohtamäki & Rajala, 2016) that includes specification of the price, duration of the contract, level of performance, stakeholder remuneration and stipulating the contract (Harrison et al., 2010). In parallel, outcome provider is involved in (ii) co-production of the outcome delivery process. Herein, providers conceptually design the product service system that is expected to deliver the outcome. Provider is structuring the delivery process (Aarikka-Stenroos & Jaakkola, 2012) as well as involving suppliers in delivery process (Hakanen & Jaakkola, 2012). However, complexity of the service delivery system hinders contractual completeness due to sources of uncertainty on both customer's and provider's side (Durugbo & Erkoyuncu, 2016; Erkoyuncu et al., 2013).

At the outcome service delivery phase, the innovation process unfolds via explicating first instance of the outcome delivery process and improving the efficiency and effectiveness of the successive instances of the outcome delivery process through relationship co-learning (Kohtamäki & Partanen, 2016; Cheung et al., 2010; Beckman & Barry, 2007; Stevens & Dimitriadis, 2004). The mediating role of relationship learning is achieved using trial-and-

error (Thomke et al., 1998) and feedback loops (Beckman & Barry, 2007) in subsequent instances of the outcome delivery system.

Methods

We decided to study the open service innovation in a context of industrial goods manufacturing, given that this context has been identified in literature as a setting where shift to outcomes occurs frequently and takes most advanced forms. We selected two outcome providers from the train sector, Hitachi Rail and Bombardier, and two outcome providers from the engineering goods sector, Caterpillar and Rolls Royce.

The research evolved through several phases, starting from data collection to analysis and validation (Pentland, 1999). In the data collection phase, we triangulated data from semi-structured interviews with archival data, such as company reports, financial data and historical records (Kvale, 1996). We also used company visits and observations, including participation at the management meetings where the management would discuss progress on the outcome design and delivery. Overall, we conducted 25 interviews, mainly targeting top management, who were aware of the overall innovation process of outcome-based contracts. We focused in particular on the actions that were taken to design the outcome, including the process of the negotiation with the customer, and then we proceeded with the questions regarding the development of the product-service system intended to deliver the outcome, inquiring about the changes that were made throughout the outcome contract delivery. We then asked our interviewees to comment on the opportunities and challenges that occurred throughout the innovation process. We used probes – asking additional clarifying questions – to gain further insight where appropriate.

We started the analysis by having two individual researchers perform detailed within-case analysis following a write-up of detailed descriptions for each case (Yin, 1994). Within-case analysis performed by two individual researchers was chosen in order to take into account the richness of the contextual data and gain greater confidence in the research findings (Barratt et al., 2011). The constructs of outcome design, development and launch were already present from the extant literature. We were also consciously collecting data on the activities associated with these process stages.

Findings and Implications

First, there is a stage of the design of the new outcome where firm designs the contract, deciding together with the customer what level of performance is required. The customer describes the needs that should be met and the provider and customer jointly agree on the outcomes that best match these needs. However, the process of outcome specification is far from simple. For instance, Rolls Royce executive manager provides an interesting illustration depicting difficulties in crafting the outcome-based contracts, "The first thing they'll say is availability. Availability is everything. And then when you start saying: OK, well, how are we going to measure that? Thus, the outcome specification, availability or performance level, need to be entrenched in the context of product operation as well as customer's business model. Outcome specifications have different contextual importance and entail different factors. Finally, the outcome provider proposes conditions in terms of the price and length of the contract that they expect in order to deliver the expected outcome and the customer and the provider fine-tune the level of the customer's requirements relative to the price and the contract length.

Besides the scope and duration of the contract, the partners (provider and customer) also decide on the price and liability/ penalty regime at the outset of the contract. Therefore, providers strive to identify all the activities and investments that are needed for the outcome to be delivered and then estimate the costs, both direct and indirect. Furthermore, firms have to be able to identify dependencies with other parties – client, partners or complementors - that may prevent them from delivering the outcome and therefore being exposed to penalties. The successful delivery of contractual outcomes is dependent upon a system of products and services that deliver the outcome. In turn, these product-service systems are underpinned by resources, capabilities and processes. However, new outcomes may require new sets of resources, capabilities and processes that the provider does not possess or have not used prior to the contract being agreed. The provider needs to be able to estimate or at least approximate the changes that need to be made to the product-service system and cost out the associated resources. As firms enter products and services that are related from the consumption perspective, but less related from the resource/ capability perspective, they need to be particularly careful with estimating their ability to access those resources, as well as the intangible resources/capabilities that are needed to interface with the product-service system (e.g. managers with coordination and integration capability).

Once the contract is agreed upon and signed, the outcome delivery stage begins. At the delivery stage, innovation becomes an ongoing process – the provider, often jointly with the customer, engages in innovation throughout the life of the contract to increase efficiency and quality of service delivery. Innovation takes the form of closing the gap between the desired outcome, as specified at the outcome design stage, and the achieved level of performance as delivered during the delivery stage. The outcome provider and their

customers frequently find that the specifications can't be met easily and so they engage in a trial-and-error process, adjusting the product-service system, to match the real conditions. And once they have met the required outcomes they continue to innovate collaboratively to drive even further efficiency and effectiveness gains.

At the stage of the design of a new outcome-based contract, the provider may have limited or no experience with execution of the entire product-service system needed for the outcome to be delivered. Providers often realize that they have to commit more resources, require unforeseen capabilities or have to make additional actions, only once the contract has been signed. Furthermore, some dependencies between the provider and the customer and/or other stakeholders only become apparent in the delivery phase. Similarly, unanticipated dependencies may appear during the design stage that prevent the provider from delivering the required outcome. The customer or stakeholder organization may exhibit complexity and lack of incentives to cooperate with the provider and perform the actions needed for the provider to be able to 'do their job' properly. Alternatively, some actions or routines performed by the customer and stakeholders may hamper the provider's ability to deliver the outcome. The provider may face difficulties in identifying and monitoring these issues, and even once they have been identified, they may face difficulties in reinforcing the required actions or preventing undesired actions. Similar issues can appear with respect to the knowledge generated in the process of the delivery. The customer may not be willing (or may require time) to change the behaviour needed to allow the provider to make use of this knowledge.

Keywords: Servitization, open service innovation

References

Aarikka-Stenroos, L., & Jaakkola, E. (2012). Value co-creation in knowledge intensive business services: A dyadic perspective on the joint problem solving process. *Industrial Marketing Management*, 41(1), 15–26.

Barratt, M., Choi, T.Y., & Li, M. (2011). Qualitative case studies in operations management: Trends, research outcomes, and future research implications. *Journal of Operations Management,* 29(4), 329–342.

Batista, L. et al. (2016). Servitization through outcome-based contract ? A systems perspective from the defence industry. International J*ournal of Production Economics*. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0925527316303826.

Beckman, S.L.S., & Barry, M. (2007). Innovation as a Learning Process: embedding design thinking. *California Management Review*, 50(1), 25–56.

Chesbrough, H.W. (2003). *Open innovation: The new imperative for creating and profiting from innovation*. Boston, MA: Harvard Business School Press.

Chesbrough, H.W., Vanhaverbeke, W., & West, J. (2006). *Open innovation: Researching a new paradigm*. Oxford, UK: Oxford University Press.

Cheung, M.S., Myers, M.B., & Mentzer, J.T. (2010). Does relationship learning lead to relationship value? A cross-national supply chain investigation. *Journal of Operations Management*, 28(6), 472–487.

Cooper, R.G. (2008). Perspective: The Stage-Gate ® Idea-to-Launch Process—Update, What's New, and NexGen Systems. *Journal of Product Innovation Management*, 25(3), pp.213-232. http://doi.wiley.com/10.1111/j.1540-5885.2008.00296.x.

Cusumano, M.A., Kahl, S.J., & Suarez, F.F. (2015). Services, industry evolution, and the competitive strategies of product firms. *Strategic Management Journal,* 36(4), 559-575. http://doi.wiley.com/10.1002/smj.2235.

Durugbo, C,. & Erkoyuncu, J.A. (2016). Mitigating uncertainty for industrial service operations: a multi case study. International *Journal of Operations & Production Management*, 36(5), 532–571.

Erkoyuncu, J.A. et al. (2013). Uncertainty driven service cost estimation for decision support at the bidding stage. *International Journal of Production Research*, 51(19), 5771–5788.
Available at: http://www.scopus.com/inward/record.url?eid=2-s2.0-84885836075&partnerID=tZOtx3y1.

Ettlie, J.E., & Rosenthal, S.R. (2011). Service versus manufacturing innovation. J*ournal of Product Innovation Management*, 28(2), 285–299.

Frow, P. et al. (2015). Managing Co-creation Design: A Strategic Approach to Innovation. *British Journal of Management,* 26(3), 463–483.

Greer, C.R., & Lei, D. (2012). Collaborative Innovation with Customers: A Review of the Literature and Suggestions for Future Research. *International Journal of Management Reviews*, 14(1), 63–84.

Hakanen, T., & Jaakkola, E. (2012). Co-creating customer-focused solutions within business networks: a service perspective. *Journal of Service Management,* 23(4), 593–611.
Available at: http://www.scopus.com/inward/record.url?eid=2-s2.0-84864454056&partnerID=tZOtx3y1.

Harrison, J.S., Bosse, D.A., & Phillips, R.A. (2010). Managing for stakeholders, stakeholder utility functions, and competitive advantage. *Strategic Management Journal*, 31(1), 58–74.

Howard, M. et al. (2016). Performance-based contracting in the defence industry: Exploring triadic dynamics between government, OEMs and suppliers. *Industrial Marketing Management*, 59, 63–75. Available at: http://linkinghub.elsevier.com/retrieve/pii/S0019850116301079.

Kim, S.-H., Cohen, M. a., & Netessine, S. (2007). Performance Contracting in After-Sales Service Supply Chains. *Management Science,* 53(12), 1843–1858.

Kohtamäki, M. et al. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*, 42(8), 1374-1385.

Kohtamäki, M., & Partanen, J. (2016). Co-creating value from knowledge-intensive business services in manufacturing firms: The moderating role of relationship learning in supplier–customer interactions. *Journal of Business Research*, 69(7), 2498–2506.
Available at: http://linkinghub.elsevier.com/retrieve/pii/S0148296316000904.

Kohtamäki, M., & Rajala, R. (2016). Theory and practice of value co-creation in B2B systems. I*ndustrial Marketing Management*.

Kvale, S. (1996). *InterViews: An introduction to Qualitative Research Interviewing*. London: Sage Publications Ltd.

Ng, I.C.L., Ding, D.X., & Yip, N. (2013). Outcome-based contracts as new business model: The role of partnership and value-driven relational assets. *Industrial Marketing Management,* 42(5), 730–743. https://doi.org/10.1016/j.indmarman.2013.05.009.

Pentland, B.T. (1999). Building process theory with narrative: From description to explanation. *Academy of Management Review,* 24(4), 711–724.

Stevens, E., & Dimitriadis, S. (2004). New service development through the lens of organisational learning: Evidence from longitudinal case studies. *Journal of Business Research,* 57(10), 1074–1084.

Sumo, R. et al. (2016). Using performance-based contracts to foster innovation in outsourced service delivery. *Industrial Marketing Management*, 59, 12–24.

Thomke, S., von Hippel, E., & Franke, R. (1998). Modes of experimentation: an innovation process—and competitive—variable. *Research Policy,* 27(3), 315–332.
Available at: http://linkinghub.elsevier.com/retrieve/pii/S0048733398000419.

Visnjic, I. et al. (2016). What brings the value to outcome-based contract providers? Value drivers in outcome business models. International *Journal of Production Economics*.
Available at: http://linkinghub.elsevier.com/retrieve/pii/S0925527316303851.

West, J., & Bogers, M. (2014). Leveraging external sources of innovation: A review of research on open innovation. *Journal of Product Innovation Management,* 31(4), 814–831.

Yin, R.K. (1994). *Case Study Research: Design and Methods* (Applied Social Research Methods),
Available at: http://www.amazon.co.uk/Case-Study-Research-Methods-Applied/dp/1412960991.

Servitization and Service design: Model-based tool support for Product-Service Systems Business Modeling

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Extended abstract:

Servitization can be understood as the process of increasing value by adding services to products (Vandermerwe and Rada, 1988). The process of servitization can be seen as the development of an organization's innovation capabilities in the sense that, rather than merely offering products, it can provide customers with complete product-service systems (Visnjic & Van Looy, 2013).

In their approach towards a successful servitization process, companies need to redesign their business model (Baines et al., 2009). In fact, one of the main challenges for companies wishing to

adopt a Servitization process is to identify the changes required in their businesses. Since the business is a central point in this issue, the business model concept seems appropriate to be employed.

Business models are representations of companies' strategies, operations and relationships that define their business logic. It can be considered a conceptual tool that helps companies to identify, understand, design, analyze, and change their business. The business model describes the bases upon which the firm creates, provides and captures value (Osterwalder & Pigneur, 2010). As stated by Teece (2010), the definition of a business model implies identifying the way in which the company provides value to customers, attracts them so that they will pay for this value and converts that payment into profit.

Despite the interest raised by business model, the concept has been historically suffered from a very heterogeneous comprehension from the three main different perspectives of business models, namely technology oriented, strategy-oriented and organization-oriented. For instance, in the context of information technology business models have been classically identified with process models, while the organization theory oriented conceived the business model more as an abstract representation of a company's structure or architecture (Wirtz et al., 2015). It is necessary to integrate both approaches. The current paucity of information about how to use the business model concept to support the adoption of Servitization process is challenging for companies and offers opportunities for investigation (Bezerra-Barquet et al., 2013).

The business model should be constantly revisited, and to that end it is essential that all the departments of the organization share a clear and common understanding vision of the model, even when they speak different languages, which in the case of business models, implies using different notations (Wirtz et al., 2015). Of these, it is possible to mention models more oriented towards

providing a quick an strategic overview of the organization, such as the Business Canvas model (Osterwalder & Pigneur, 2010) or the e3Value model (Gordijn, 2004), and those models that are more oriented to show the details of a given process, such as the Service Blueprint model (Bitner et al., 2008), or the Process Chain Networks (Sampson and Passey, 2011).

Based on systems engineering principles, modeling is seen as a central activity for the development and life cycle of a product, system, and more recently product-service systems. Hence, supporting the servitization of manufacturing, modeling and interoperability are becoming of utmost importance to ensure coherence among conceptual design phases at organizational levels down to technology development. It applies Model Driven Arquitecture/Model Driven Interoperability principles to model the product-service, and to guide the transformation from business requirements into detailed specifications of components that must be implemented to support the servitization process.

The objective of this research is to analyze the servitization process with the purpose of developing a proposal for the implementation of this process into companies, examining the techniques and methodologies for business modeling that can enable this process, introducing a modeling environment for service design. The aim in the medium being to support the integrated management of business models elaborated with different notations.

This work presents INNoVaServ, a modelling environment, which is a first step towards attempting to fill the lack of proper support for bridging existing business modelling notations by constructing a technological environment that will integrate tools to support them and to register and manage the relationships among different business models. This research offers guidelines to companies who decide to servitize and transform their value chains,

innovating in their value propositions through product-service combinations. From a theoretical point of view, it is proposed a framework where business and IT approaches are closed. Taking as a starting point an innovative business model, we propose methodological support and tools that facilitate the incorporation of services in the manufacture, giving support to product-service systems. This presents an ecosystem for servitization.

Keywords: Servitization, Product-service systems, Business Model, Business Modeling

References

Baines, T., Lightfoot, H.W., Benedettini, O., & Kay, J.M. (2009). The servitization of manufacturing. A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, 20(5), 547–567.

Bezerra Barquet, A.P., de Oliveira, M.G., Amigo, C.R., Cunha, V.P., & Rozenfeld, H. (2013). Employing the business model concept to support the adoption of product-service systems (PSS). *Industrial Marketing Management*, 42(5), 693–704

Bitner, M.J., Ostrom, A.L., & Morgan, F.N. (2008). Service blueprinting: A practical technique for service innovation. *California Management Review*, 50(3), 66-94.

Gordijn, J. (2004). E-business value modelling using the e3-value ontology. In W.L. Curry (editor), *Value creation form e-business models.* 98-127, Oxford, UK.

Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. Hoboken, NJ: John Wiley and Sons.

Sampson, S.E., & Passey, M. (2011). *Introduction to Process-Chain-Network Analysis*. Brigham Young University, Provo, Utah.

Teece, D.J. (2010). Business models, business strategy and innovation. *Long Range Planning*, 43(2), 172-194.

Vandermerwe, S., & Rada, J. (1988). Servitization of Business: Adding Value by Adding Services. *European Management Journal*, 6(4), 314–324.

Visnjic, I., & Van Looy, B. (2013). Servitization: disentangling the impact of service business model innovation on manufacturing firm performance. *Journal of Operations Management*, 31(4), 169-180.

Wirtz, B. W., Pistoia, A., Ullrich, S., & Göttel, V. (2015). Business models: origin, development and future research perspectives. *Long Range Planning,* 49(1), 36-54.

Parallel session 3

Value creating networks

Chair: Emanuel Gomes

The impact of digitalization on interfirm network relationships: challenges and opportunities for value creation

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Extended abstract:

Introduction

Engaging in networks implies that organizations can get access to resources and activities that are traditionally considered to be outside the control of the organization but also that other network actors gain some control over the resources and activities of the organization (Gomes et al., 2013; Håkansson & Snehota, 1989; Junni et al., 2013). Therefore, a business network can be defined as the establishment of long-term relationships to achieve results which would be not possible operating individually (Dean et al., 1997).

In the emergence of an interfirm collaboration, a key factor of success is that different actors involved perceive the value and

importance of the business network for his own strategic objectives (Möller & Svahn, 2009, Gomes et al., 2011). Hence, certainty and transparency for value perception becomes critical for interfirm collaborations success (Jaakkola & Hakanen, 2013; Möller & Halinen, 1999).

The dawn of digitalization is transforming deeply strategies and business operations (Bharadwaj et al., 2013; Bustinza et al., 2017, Iansiti & Lakhani, 2014; Teece, 2012). These transformations are often reflected in business model reconfigurations and in the search of different patterns of value creation (Kagermann, 2015; Parry et al., 2012). Technological innovation emphasizes the increasingly importance of accessing to resources out of firm's boundaries (Cassiman & Veugelers, 2006, Gebauer et al., 2013; Perks & Moxey, 2011) since the impressive expansion of digital technologies in business put many companies at risk and increases uncertainty (Gimpel & Röglinger, 2015).

Lack of digital capabilities, especially in mature firms, is a key driver for companies to take the decision to set up collaborative methods of development (Bigdeli et al, 2017, Goes & Park, 1997; Tarba et al., 2017, Tether, 2002). Also for IT firms, relationships with well-established companies provide them interesting market and customer information. (Rickne, 2006). Hence, we can expect a growing number of multiorganisational collaborations based on digital services that transform traditional business operations and make cooperation a key success factor (Pagani, 2013).

In this paper, throughout the study of the different relationships within an interfirm network, we attempt to provide a better understanding of how digitalization impact interfirm relations inside the network scope, how it may enable the network emergence and how it influences value creation and value recognition.

Methodology

We follow a qualitative approach through a case study of an individual firm engaged in an interorganisational business network. Our selected firm has become part of this network to gain access to new digital capabilities which are transforming its business model. We aim to study causes influencing firm's decision to build collaborations. Our objective is to gain insights on the relationships within the network, particularly focusing on the role of the IT provider is and how the quality of this relationship influences value creation.

Findings

Our preliminary findings shows how the increasingly influence of digitalisation in business competition is enabling the development of business networks. This influence is particularly due to the current importance of technological capabilities in value creation, which prompts firms to build strategic alliances and to transform their business models. On the other hand, critical aspect of relationships between network's actors such as trust and data sharing become transcendental aspects in order to extract value and achieve competitive advantages.

Keywords: Interorganizational networks, Digitalization, Business model innovation (BMI)

References

Bharadwaj, A., El Sawy, O. A., Pavlou, P. A., & Venkatraman, N. V. (2013). *Digital business strategy: toward a next generation of insights.*

Bigdeli, A., Bustinza, O.F., Vendrell-Herrero, F., & Baines, T. (2017). Network positioning and risk perception in servitization: evidence from the UK road transport industry. *International Journal of Production Research,* 1-15.

Bustinza, O.F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2017). Product–service innovation and performance: the role of collaborative partnerships and R&D intensity. *R&D Management.*

Cassiman, B., & Veugelers, R. (2006). In search of complementarity in innovation strategy: Internal R&D and external knowledge acquisition. *Management science*, 52(1), 68-82.

Dean, J., Holmes, S., & Smith, S. (1997). Understanding business networks: evidence from the manufacturing and service sectors in Australia. *Journal of Small Business Management,* 35(1), 78.

Gebauer, H., Paiola, M., & Saccani, N. (2013). Characterizing service networks for moving from products to solutions. *Industrial Marketing Managemen*t, 42(1), 31-46.

Gimpel, H., & Röglinger, M. (2015). Digital *Transformation: Changes and Chances–Insights based on an Empirical Study.*

Goes, J.B., & Park, S.H. (1997). Interorganizational links and innovation: The case of hospital services. *Academy of Management Journal*, 40(3), 673-696.

Gomes, E., Weber, Y., Brown, C., & Tarba, S.Y. (2011). *Mergers, acquisitions and strategic alliances: Understanding the process.* Palgrave Macmillan.

Gomes, E., Angwin, D. N., Weber, Y., & Yedidia Tarba, S. (2013). Critical success factors through the mergers and acquisitions process: revealing pre-and post-M&A connections for improved performance. *Thunderbird international business review,* 55(1), 13-35.

Håkansson, H., & Snehota, I. (1989). No business is an island: the network concept of business strategy. *Scandinavian Journal of Management*, 5(3), 187-200.

Iansiti, M., & Lakhani, K.R. (2014). *Digital ubiquity: How connections, sensors, and data are revolutionizing business.*

Jaakkola, E., & Hakanen, T. (2013). Value co-creation in solution networks. *Industrial Marketing Management*, 42(1), 47-58.

Junni, P., Sarala, R.M., Taras, V., & Tarba, S.Y. (2013). Organizational ambidexterity and performance: A meta-analysis. *Academy of Management Perspectives*, 27(4), 299-312.

Kagermann, H. (2015). *Change through digitization—Value creation in the age of Industry 4.0. In Management of permanent change* (pp. 23-45). Springer Fachmedien Wiesbaden.

Möller, K.K., & Halinen, A. (1999). Business relationships and networks: Managerial challenge of network era. *Industrial Marketing Management,* 28(5), 413-427.

Möller, K., & Svahn, S. (2009). How to influence the birth of new business fields—Network perspective. *Industrial Marketing Management*, 38(4), 450-458.

Pagani, M. (2013). Digital business strategy and value creation: Framing the dynamic cycle of control points. *Mis Quarterly*, 37(2).

Parry, G., Bustinza, O.F., & Vendrell-Herrero, F. (2012). Servitisation and value co-production in the UK music industry: an empirical study of consumer attitudes. *International Journal of Production Economics*, 135(1), 320-332.

Perks, H., & Moxey, S. (2011). Market-facing innovation networks: How lead firms partition tasks, share resources and develop capabilities. *Industrial Marketing Management*, 40(8), 1224-1237.

Rickne, A. (2006). Connectivity and performance of science-based firms. *Small Business Economics*, 26(4), 393-407.

Tarba, S. Y., Ahammad, M. F., Junni, P., Stokes, P., & Morag, O. (2017). The Impact of Organizational Culture Differences, Synergy Potential, and Autonomy Granted to the Acquired High-Tech Firms on the M&A Performance. *Group & Organization Management*, 1059601117703267.

Teece, D. . (2012). Dynamic capabilities: Routines versus entrepreneurial action. J*ournal of Management Studies,* 49(8), 1395-1401.

Tether, B.S. (2002). Who co-operates for innovation, and why: an empirical analysis. *Research Policy*, 31(6), 947-967.

Corporate Entrepreneurship and Servitization: An integrative model of types of services and activities

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Extended abstract:

Introduction

Corporate entrepreneurship (CE) includes the creation of new business, the entry into new markets or the development of new products or services by established companies. CE transforms the organization and exploits opportunities that create new value (Antoncic & Hisrich, 2001; Covin & Slevin, 1991; Guth & Ginsberg, 1990; Lumpkin & Dess, 1996; Zahra, 1991, 1993). Innovation, corporate venture and renewal represent the activities developed by firms with entrepreneurial orientation (Zahra, 1991, 1993).

Servitization has been recognized as a mean for manufacturers, facing significant challenges in their core product markets, to achieve competitive advantage and create improved customer value (Baines, Lightfoot, Benedettini & Kay, 2009; Vandermerwe & Rada, 1988). The services incorporation at industrial companies requires the adaptation of the service type to the business context so that the company can create value (Tukker, 2004). From this point of view, servitization is considered a continuous process that goes from the supply of basic services to high-value service providers (Vandermerwe & Rada, 1988; Oliva & Kallenberg, 2003; Baines et al., 2007). Kinnunen and Turunen (2012) question the need of servitization in the organization as a whole and present a framework that allows examining different divisions in relation to the servitization. Changes can happen in units or divisions and these are in charge of the way they deal with customers, the supply and are in charge of the way the added value and the organizational structure are offered (Turunen & Toivonen, 2011).

Each of the stages of this continuous process involves the incorporation of different types of services and therefore we consider that the type of services will affect the forms of CE that will be carried out by the company in the different phases of service. The objective of this work is to identify which of the forms of CE is the most appropriate for each type of service.

Relationship between CE y Servitization

Innovation refers to the new products development, processes or markets originated from new resource combinations. Innovation is characterized by companies introducing new products and services to exploit innovative entrepreneurial opportunities and competencies (Covin & Miles, 1999). For Gebauer, Fleisch, & Friedli (2005) the transition from product to service allows

companies to develop new opportunities for the sale of more products or services. The incorporation of basic services requires the application of new knowledge and skills that imply innovation in services in order to increase sales or to improve the product operation (Oliva & Kallenberg, 2003). This type of services adds value to the product, improves its efficiency and extends its lifespan. In addition, these services do not imply large investments or organizational changes, so the company tries to standardize and predefine the services (Gebauer, 2008; Tukker, 2004).

Corporate venturing includes the creation of new businesses, divisions or businesses that the company did not perform previously. In this sense the entry into a new business implies the expansion of its activity field (Antonic & Hisrich, 2001; Zahra, 1991).

The incorporation of support services and its consolidation increase the orientation towards the customer and costs and activities are transferred from the client to the supplier of the service offering customized service packages (Gebauer, 2008). This involves the development of a new business in terms of company strategies and in terms of customer support process (Parasuraman, 1999). The success of the implementation of the servitization strategy involves a deliberate, systematic and well-structured transformation effort in which the industrial company must carry out significant changes in the activity field (Oliva & Kallenberg, 2003).

Renewal refers to the process by which the company reorganizes its businesses (Covin & Miles, 1999), change its activity field or focus, or both (Guth & Ginsberg, 1990, 1994). It involves the transformation in the value chain as well as a change in the business concept and the mission of the company (Zahra, 1993, 1996).

With the introduction of advanced services, the strategic orientation of the company is directed towards customer and market orientation so that the relationship goes from being transactional to being relational, that is, the service provider takes over the client's activities through long-term contracts (Gebauer, 2008; Oliva & Kallenberg, 2003; Tukker, 2004). Changes that must be introduced have a high impact on the company and should focus on the business culture that includes learning the value of services in the company and how to sell, deliver and collect the service within the company where the product perspective comes first (Oliva & Kallenberg, 2003). So, the company will tend to add a new vision and to transform its value chain in order to incorporate the customer into the service development.

Based on the previous arguments this paper will try to present a theoretical framework that will give answer to the following proposition: Basic services are more associated with innovation, support services with corporate venturing and advanced services or only services with business renewal.

Keywords: Servitization, Corporate entrepreneurship, innovation, renewal, venturing

References

Antoncic, B., & Hisrich, R.D. (2001). Intrapreneurship: Construct Refinement and Cross-Cultural Validation. *Journal of Business Venturing*, 16(5), 495-527.

Baines, T.S., Lightfoot, H.W., Evans, S., Neely, A., Greenough, R., Peppard, J.,et al. (2007). State-of-the-art in product-service systems. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 221(10), 1543–1552.

Baines, T., Lightfoot, H., Benedettini, O, & Kay J.M. (2009). The Servitization of Manufacturing. A Review of Literature and Reflection on Future Challenges, *Journal of Manufacturing Technology Management*, 20(5), 547–567.

Covin, J., & Miles, M. (1999). Corporate entrepreneurship and the pursuit of competitive advantage. *Entrepreneurship: Theory & Practice*, 23(3), 47-63.

Covin, J.G., & Slevin, D.P. (1991). A Conceptual Model of Entrepreneurship as Firm Behavior. *Entrepreneurship: Theory & Practice,* 16(1), 7-25.

Gebauer, J., Fleisch, E., & Freidli, T. (2005) Overcoming the service paradox in manufacturing companies. *European Management Journal*, 23(1), 14-26

Gebauer, H. (2008). Identifying Service Strategies in Product Manufacturing Companies by Exploring Environment-Strategy Configurations. *Industrial Marketing Management*, 37(3), 278–291.

Guth, W.D., & Ginsberg, A. (1990). Corporate entrepreneurship. *Strategic Management Journal*, 11, 5–15.

Kinnunen, R.E., & Turunen, T. (2012). Identifying servitization capabilities of manufacturers: a conceptual model. *Journal of Applied Management and Entrepreneurship*, 17(3), 55.

Lumpkin, G.T., & Dess, G.G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review*, 21(1), 135–172.

Mathieu, V. (2001) Product services: from a service supporting the product to a service supporting the client. *Journal of Business and Industrial Marketing*, 16(1), 39-58.

Oliva, R, & Kallenberg, R. (2003). Managing the Transition from Products to Services. *International Journal of Service Industry Management,* 14(2), 160–172.

Tukker, A. (2004). Eight Types of Product-Service System: Eight Ways to Sustainability? Experiences from SusProNet. *Business Strategy and the Environment*, 13(4), 246–260.

Turunen, T.T., & Toivonen, M. (2011). Organizing customer-oriented service business in manufacturing. *Operations Management Research*, 4(1-2), 74-84.

Vandermerwe, S., & Rada J. (1988). Servitization of Business: Adding Value by Adding Services. *European Management Journal,* 6(4), 314–324.

Zahra, S.A. (1991). Predictors and Financial Outcomes of Corporate Entrepreneurship: An Exploratory Study. *Journal of Business Venturing*, 6(4), 259.

Zahra, S.A. (1993). A Conceptual Model of Entrepreneurship as Firm Behavior: A Critique and Extension. *Entrepreneurship: Theory & Practice*, 17 (4), 5-21.

Parallel session 4

Literature reviews

Chair: María-Luz Martín-Peña

The evolution of the servitization concept: a co-word analysis

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Extended abstract:

Introduction

To understand the essence of any concept, it first must have a clear definition (Ronda-Pupo & Guerras-Martín, 2012). To understand the essence of the servitization field, we must have a historical perspective on its central concept: servitization. Scholars in this discipline recognize that its emergence as an academic field of research began in 1988 with the publication of Vandermerwe & Rada (1988).

Baines and Lightfoot (2013: 232) state that "Servitization is a concept" although "the concept is not new; examples exist from the 1800s. What is new is our consolidation and formalization of knowledge about servitization".

Servitization has grown rapidly since its emergence as an academic field and today is quite diverse. The scope and abundance of the literature, together with the variability of the perspectives and vocabulary employed, make what seems to be a central problem in the case of servitization a secondary matter.

We believe that all of the above arguments provide evidence of the need for scholars of servitization to work toward a common shared language that will allow us to know its essence as a science. This will facilitate the development of the field and its research methods and lead to its progress as a scholarly discipline. To frame one approach would be beneficial, but fully achieving a single completely agreed-upon definition of the field might not be a realistic expectation at present. Our aim in this paper is to make progress in that direction. Recently, different studies have analysed the evolution and state of art of servitization as a scientific discipline using qualitative techniques and to less extend quantitative techniques. However, we believe that a quantitative analysis of one of the essential elements that comprise a discipline is still missing, that is, its object of study: the servitization concept.

Following upon this argument, we believe in the importance of heeding a fundamental question: what is servitization concept? Although different studies have attempted to make an analysis of servitization (Martín-Peña et al., 2017; Reim et al., 2015; Berkovich et al., 2011; Beuren et al., 2013; Baines, Lightfoot, Peppard, et al., 2009; Tim Baines et al., 2007; Park & Yoon, 2015; Baines, Lightfoot, Benedettini, et al., 2009; Baines et al., 2007; Cavalieri & Pezzotta, 2012), a common trait of these studies is that they essentially carry out descriptive and qualitative analysis of reduced sets of definitions of servitization ranging over diverse time spans. In this paper, we thus make an attempt to extend reflection regarding the field of servitization. The objective of this paper is to study the evolution of the term 'servitization' and the changes that have taken place in its

structure throughout the different stages of its historical development. To reach this objective, we have made a quantitative analysis of a broad set of definitions of servitization for an extended period of time (2006–2016). This will allow us to analyze the evolution of the concept over time, in a way similar to what Nag et al. (2007) did for strategic management and Ronda-Pupo and Guerras-Martín (2012) did for strategic concept. To do this, we have deconstructed selected definitions in order to identify the nouns, verbs, and adjectives used. Using co-word analysis, we have tried to identify the key conceptual elements both for the whole period analyzed and for each of the two stages into which the full time period was divided. This has enabled us to extract the essential terms of the concept of servitization and to know how the concept of servitization has evolved.

Methodology

In order to attain the objectives posed, we established the definition of the servitization concept as the unit of analysis and selected a set of definitions formulated between 2006 and 2016, segmented into two stages of approximately 5 years each: 2006-2011 and 2012-2016.

The methodological process is described based on four essential stages: 1) identification of the unit of analysis; 2) deconstruction of the definitions; 3) creation of families of words or conceptual elements; and 4) performance of a co-word and centrality analysis.

Results and conclusions

We identified a high number of terms based upon 103 definitions analyzed and observed that the majority of the terms (more than 60%) only appear in one definition.

In the present study, we use co-word analysis to analyze the structure of the definition of a concept. To do so, we analyzed nouns, verbs, and adjectives separately and create word families for each lexical classification.

Networks analysis has allowed us to determine the degree of centrality of the terms. The centrality degree shows the evolution of the influence that the key term has in its location in each of the two stages studied. The dynamics of the evolution of the key terms in the structure of the definition of the servitization concept throughout the two stages analyzed shows three trends:

1) Terms whose degree of centrality grew: business model, service innovation.

2) Terms whose degree of centrality remained stable: change, shift, Product-Service System.

3) Terms that started out with a certain degree of centrality in the first stage and decreased in the second: "value in use"

Networks analysis has been possible to calculate network density in each stage. Density refers to the number of lines in a network and reflects the internal coherence or strength of the relations among its members. The general description of the evolution of the network by stages shows that the level of density increased from first stage to the next. This shows that the gained internal coherence over time.

The increase in the values of the centrality degree of the term 'business model' throughout the two stages studied is significant; it shows how this term came to define a new area of study in the field.

Keywords: servitization concept, servitizing, co-word analysis, servitization evolution.

References

Baines, T. et al. (2007). State-of-the-art in product-service systems. *Proceedings of the Institution of Mechanical Engineers, Part B: Journal of Engineering Manufacture*, 221(10), 1543–1552.

Baines, T., Lightfoot, H., Benedettini, O., et al. (2009). The servitization of manufacturing. A review of literature and reflection on future challenges R. Roy, (editor). *Journal of Manufacturing Technology Management*, 20(5), 547–567.

Baines, T., Lightfoot, H., Peppard, J., et al. (2009). Towards an operations strategy for product-centric servitization. International *Journal of Operations & Production Management*, 29(5), 494–519.

Baines, T., & Lightfoot, H. (2013). *Made to Serve: How manufacturers can compete through servitization and product service systems.* Chichester, UK: John Wiley & Sons.

Berkovich, M., Krcmar, H., & Leimeister, J.M. (2011). Requirements Engineering for Product Service Systems A State of the Art Analysis. *Business & Information Systems Engineering*, 3(6), 369-380.

Beuren, F.H., Gomes Ferreira, M.G., & Cauchick Miguel, P.A. (2013). Product-service systems: a literature review on integrated products and services. *Journal of Cleaner Production*, 47, 222–231.

Cavalieri, S., & Pezzotta, G. (2012). Product–Service Systems Engineering: State of the art and research challenges. *Computers in Industry*, 63(4), 278–288.

Martín-Peña, M.L., Pinillos, M.-J., & Reyes, L.-E. (2017). The intellectual basis of servitization: A bibliometric analysis. *Journal of Engineering and Technology Management,* 43, 83–97.

Nag, R., Hambrick, D.C., & Chen, M.-J. (2007). What is strategic management, really? Inductive derivation of a consensus definition of the field. *Strategic Management Journal*, 28(9), 935–955.

Park, H., & Yoon, J. (2015). A chance discovery-based approach for new product-service system (PSS) concepts. *Service Business*, 9(1), 115–135.

Reim, W., Parida, V., & Ortqvist, D. (2015). Product-Service Systems (PSS) business models and tactics - a systematic literature review. *Journal of Cleaner Production*, 97(SI), 61–75.

Ronda-Pupo, G.A., & Guerras-Martín, L.Á. (2012). Dynamics of the evolution of the strategy concept 1962-2008: A co-word analysis. *Strategic Management Journal*, 33(2), 162–188.

Vandermerwe, S., & Rada, J. (1988). Servitization of business: adding value by adding services. *European Management Journal*, 6(4), 314–324.

Systematic review on organizational change towards servitization in manufacturing firms

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Extended abstract:

Introduction

Moving from product centric to product-service (servitization) or customer centric organisationhasbecome interesting phenomena for both academic and business ecology. Earlier studies suggests that the adoption of servitization can bring growth in revenue, competitiveness and better natural environment (Lightfoot et al., 2013; Lindahl et al., 2009). However the transformation of an organisation/firm towards service centric is not an easy strategic choice, since it requires careful consideration of service design and capabilities. In order tosucceed with servitization, manufacturer is likely to need some new and alternative organizational principles, structures, and processes (Ahamed et al., 2013). To implement a servitization strategy successfully, organizations are required to change their strategies, operations and value chains, technologies,

people for supporting cultural shifts in the organizational blueprint, andsystem integration capabilities (Richard Wise, 1999; Oliva & Kallenberg, 2003; Benade, 2009). Bigdeli et al. 2015 stated that servitization also demands consideration of both business model andorganisational change.

The transition is a journey towards higher complexity and life cycle orientation that triggers a number of challenges originating from economic, technical and organizational uncertainties (Euchner & Ganguly, 2014). These uncertainties are huge barriers for the effective transformation (Lingegård & Svensson, 2014). Servitization is an organizational change process that generates new revenue streams through the provision of services associated with a firm's traditional goods(Vandermerwe & Rada, 1988). Firms are increasingly exploring the value of integrating goods and services (Lightfoot et al., 2013). Even though many scholars try to explain servitization thought the context of barriers, benefits, resource and capabilities and business model innovation, but literature on organisational context (structure, transformation and challenges) is still fragmented.

Consequently the aim of this study is to explore literature on organizational context during servitization in manufacturing firms.This study answers two key questions:

1. What are the organizational aspects related to servitization?
2. How organisational issues influence the transformation process leading towards service innovation?

This paper starts with a description of the systematic literature review method used in this study. This is followed by a descriptive analysis of the selected studies and a thematic discussion of the emergent themes from the literature, which identifies the constructs of servitization challenges. Later it explains finding of SLR on

organisational issues during servitization. To conclude, this paper presents a discussion of the implications and limitations of the study and provides a few avenues to future research.

Methodology

This study intends to explore the research on organizational issues in servitization research landscape; the authors use a systematic literature review methodology (Tranfield et al., 2003). This approach has been designed to managethe diversity of knowledge for a specific academic inquiry, which would then enable theresearcher both to map and to assess the existing intellectual territories and to specify researchquestions to develop existing body of knowledge further.To identify relevant articles, the search engine and search strings need to be identified in advance (Wong, 2004). Three research engines were used: Scopus, emeraldinsight and ScienceDirect. These databases are widely acknowledged as world-leading sources for academic research, and they are favourites with leading scholars in the same area (e.g. (Baines et al., 2009, Ng & Nudurupati, 2010). Search strings and results are shown in Table 1.

Search engine	Search strings	Selection criteria	Result
Scopus Emerald insight Science Direct	Organizational structure AND servitization Organizational transformation AND servitization Organization change AND servitization Organization AND servitization challenges	Article title, abstract & keywords	103

Table 1. Selection criteria and results

Findings

Key organisational issues are identified though systematic literature review.Some of key elements which influence servitization process are knowledge on change management, asset transformation, customer activity cycle buyer-supplier collaboration, behavioural transformation, social Manufacturing (SocialM) paradigm, performance-based contracts and value added services., industrial policy (culture change, skills, contracts and financing, organizational culture and organisational environment, collaboration with other actors.

These issues are discussed to support object of this study. This study contributes to the current body of knowledge by reaching a clear conclusion from the fragmented literature and explores these challenges impact on servitization in manufacturing firms.

Keywords: servitization, product-service centric, customer-centric, organisational issues

References

Ahamed, Z., Inohara, T., & Kamoshida, A. (2013). The Servitization of Manufacturing: An Empirical Case Study of IBM Corporation. *International Journal of Business Administration*, 4(2), 18.

Baines, T. et al. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, 20(5), 547–567.

Benade, R.V.W. and S. (2009). Servitization : a South African perspective. *Journal of Contemporary Management*, 6(1), 390–408.

Bigdeli, A.Z. et al. (2015). *Holistic approach to evaluating servitization: A content, context, process framework*. EurOMA.

Euchner, J., & Ganguly, A. (2014). Business Model Innovation in Practice. *Research-Technology Management*, o. Jg. (December), 33–40.

Lightfoot, H., Baines, T., & Smart, P. (2013). The servitization of manufacturing: A systematic literature review of interdependent trends. International *Journal of Operations & Production Management*, 33(11/12), 1408–1434.

Lindahl, M., Sakao, T., & Öhrwall Rönnbäck, A. (2009). Business Implications of Integrated Product and Service Offerings. *1st CIRP Industrial Product-Service Systems (IPS2) Conference*, 1-2 April 2009, Cranfield, UK, pp.165–172.

Lingegård, S., & Svensson, N. (2014). Scenarios for resource efficient rail infrastructure- Applying Integrated Product Service Offerings. *In Procedia CIRP*. pp. 134–139.

Ng, I.C.L., & Nudurupati, S.S. (2010). Outcome-based service contracts in the defence industry – mitigating the challenges. *Journal of Service Management*, 21(5), 656–674.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. International *Journal of Service Industry Management,* 14(2), 160–172.

Richard Wise, P.B. (1999). Go Downstream: The New Profit Imperative in Manufacturing. *Harvard Business Review*, 77(5), 133–141.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a Methodology for Developing Evidence- Informed Management Knowledge by Means of Systematic *Review. British Journal of Management*, 14(3), 207–222.

Vandermerwe, S., & Rada, J. (1988). Servitization of Business: Adding Value by Adding Services. *European Management Journal*, 6(4), 314–324.

Wong, M.T.N. (2004). *Implementation of innovative product service systems in the consumer goods industry*. University of Cambridge.

Parallel session 5

Territorial servitization

Chair: Yancy Vaillant

The Role of KIBs for Territorial Servitization: Evidence from Germany and Spain

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Extended abstract:

Introduction

The literature on industrial districts and clusters have traditionally analysed the additionalities at firm and territorial level from the cooperation of firms in the same industry (Aranguren, Maza, Parrilli, Vendrell-Herrero & Wilson, 2014; Boix & Vaillant, 2010). The growing interest from product firms in entering the

service sector to attract and retain industrial clients have opened the possibility for cross-sector operations and collaborations (Becattini, 2015; Vendrell & Wilson 2017).

Previous studies on servitization have devoted their attention to identify the main drivers (Vandermerwe & Rada, 1989), barriers and success factors of the servitization implementation process (Baines et al., 2017) and possible outcomes for manufacturing firms (Bustinza, Gomes, & Vendrell-Herrero, 2017). However, when evaluating the impact of servitization strategies, the emphasis has been primarily on the organizational level benefits and competitiveness (Rabetino, Kohtamäki, Lehtonen, & Kostama, 2015; Visnjic, Wiengarten & Neely, 2016). An exception to this is the recent study by Lafuente, Vaillant and Vendrell-Herrero (2017), which provides evidence about the territorial impact of servitization in the development of vigorous manufacturing sectors and consequent job creation. The lack of studies about the territorial impact of servitization is surprising considering the priority that recent governments and policy makers from developed countries have been placing on the need for manufacturing revitalization. It is in this context, and in the inability to compete on the basis of cost advantages against manufacturers from emerging regions, that manufacturers from developed markets have been increasingly integrating value adding services into their offers as an attempt to compete on the basis of innovative differentiation (Chesbrough, 2011).

Though a vast amount of research in the economic and strategy fields have helped us understand the importance and impact of Porterian clusters and Marshallian industrial districts on agglomerative and interorganisational production processes (Becattini, Bellandi, Dei Ottati & Sforzi, 2003; Lafuente, Vaillant & Rialp, 2007), very little is known about the drivers and effects of Territorial Servitization, i.e. the "aggregated outcomes resulting

from the various types of mutually dependent associations that manufacturing and knowledge-intensive service businesses create and/or develop within a focal territory" (Lafuente et al., 2017, pp. 2).

Therefore, the aim of this study is to investigate the antecedents of territorial servitization. While other studies highlight the virtuous circle involved in territorial servitization, i.e. how a local manufacturing sector stimulates and is simultaneously stimulated by the development of a complementary knowledge-intensive service sector, (Lafuente et al., 2017), a main empirical contribution of our study is that we develop the first measure of territorial servitization and test it in a multi-region context of two European countries. In addition, we also evaluate the impact of two other antecedents of territorial servitization, i.e. the exposure of the region to international trade and the availability of stock of knowledge in the region. Another contribution of this study is that it helps policy makers understand some of the conditions necessary to enhance the development of territorial servitization, and the consequent regional socio-economic growth. This is particularly important for developed economies attempting to revitalise innovative local manufacturing sectors (De Propris, 2016).

Research Context and Methodology

A unique dataset originated from different sources has been created. Data on KIBS density and territorial servitization (firm-level) is obtained from ORBIS, a dataset covering over 200 million firms worldwide, while aggregated information (regional-level) is provide by Eurostat. Data from these sources enabled us to create a panel dataset including 17 Spanish and 38 German regions for the period 2010–2014. The differences between these two European Union countries, one from central Europe and the other a

Mediterranean country, provide an interesting context with clear implications in terms of EU funding outcomes. This is the case because though both are highly decentralized countries, German State and regions share decision structures and investment cost while Spanish regions have strong autonomy in decisions and cost assignment (Bürzel, 1999). Such facts are important for analysing the differences between the EU funding outcomes and diverging cohesion between regions (Charron, 2016).

Preliminary Results and Managerial Implications

Although it is true that servitization –and related concepts as product-service systems (Baines & Lightfoot, 2013), open service innovation (Chesbrough, 2011), or product-service innovation (Bustinza et al., 2017) – is being extensively analysed from an internal organizational perspective, few investigators are studying servitization through external determinants (Baines et al., 2017), as strategic alliances through KIBS, and even fewer are studying its impact at a regional level (Lafuente et al., 2017). Our study sheds light on the regional impact of KIBS deepening, trade, and accumulated knowledge and innovation levels resulting from territorial servitization.

On the whole, this research has implications for policy-makers. On the one hand, there is an opportunity for a European manufacturing renaissance underpinned by dynamics of manufacturing based on innovation and differentiation (De Propris, 2016) rather than on pure cost, as a way to prevent relocation to countries with lower costs. This renaissance should be based upon upgrading innovative manufacturing competences, an underlying characteristic of servitization. On the other hand, policy-makers need to consider regional autonomy in decisions and cost

assignment in order to achieve the outcomes desired as this research has shown.

Keywords: territorial servitization, KIBS, knowledge, trade, regional studies

References

Aranguren, M.J., De La Maza, X., Parrilli, M.D., Vendrell-Herrero, F., & Wilson, J.R. (2014). Nested methodological approaches for cluster policy evaluation: An application to the Basque Country. *Regional Studies*, 48(9), 1547–1562.

Baines, T., & Lightfoot H. (2013). *Made to serve: How manufacturers can compete through servitization and Product Service Systems*. London, UK: John Wiley & Sons.

Baines, T., Bigdeli, A.Z., Bustinza, O.F., Shi, V.G., Baldwin, J., & Ridgway, K. (2017). Servitization: Revisiting the state-of-the-art and research priorities. *International Journal of Operations & Production Management*, 37(2), 256–278.

Becattini, G. (2015). Beyond geo-sectoriality: The productive chorality of places. *Journal of Regional Research*, 32, 31–41.

Becattini, G., Bellandi, M., Dei Ottati, G., & Sforzi, F. (2003) *From industrial districts to local development. An itinerary of research*. Cheltenham: Edward Elgar.

Boix, R., & Vaillant, Y. (2010, August). Industrial districts in rural areas of Italy and Spain. *Paper presented at the meeting of 50th Congress of the European Regional Science Association. Jönköping*, Sweden.

Bürzel, T.A. (1999). Towards convergence in Europe? Institutional adaptation to Europeanization in Germany and Spain. *JCMS: Journal of Common Market Studies*, 37(4), 573–596.

Bustinza, O. F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2017). Product–service innovation and performance: The role of collaborative partnerships and R&D intensity. *R&D Management*, in press.

Charron, N. (2016). Diverging cohesion? Globalisation, state capacity and regional inequalities within and across European countries. *European Urban and Regional Studies*, 23(3), 355–373.

Chesbrough, H.W. (2011). Bringing open innovation to services. *MIT Sloan Management Review*, 52(2), 85–90.

De Propris, L. (2016). *A fourth industrial revolution is powering the rise of smart manufacturing. The Conversation Trust: UK.* Retrieved from: https://theconversation.com/a-fourth-industrial-revolution-is-powering-the-rise-of-smart-manufacturing-57753

Lafuente, E., Vaillant, Y., & Rialp, J. (2007). Regional differences in the influence of role models: Comparing the entrepreneurial process of rural Catalonia. *Regional Studies*, 41(6), 779–796.

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2017). Territorial servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. International *Journal of Production Economics*, in press.

Rabetino, R., Kohtamäki, M., Lehtonen, H., & Kostama, H. (2015). Developing the concept of life-cycle service offering. *Industrial Marketing Management*, 49, 53–66.

Vandermerwe, S., & Rada, J. (1988). Servitization of business: adding value by adding services. *European Management Journal*, 6(4), 314-324.

Vendrell-Herrero, F., & Wilson, J.R. (2017). Servitization for territorial competitiveness: Taxonomy and research agenda. *Competitiveness Review: An International Business Journal*, 27(1), 2–11.

Visnjic, I., Wiengarten, F., & Neely, A. (2016). Only the brave: Product innovation, service business model innovation, and their impact on performance. *Journal of Product Innovation Management*, 33(1), 36–52.

Knowledge-intensive territorial servitization: regional driving forces and the role of the entrepreneurial ecosystem

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Extended abstract:

During the last decade EU policy makers have intensified their efforts to promote and develop a solid knowledge-intensive business service (KIBS) sector as part of their strategy for consolidating knowledge-based economies (European Commission, 2012). The relationship between KIBS firms and manufacturing businesses and its territorial economic effects, a process referred to as territorial servitization, represents a growing research stream with increased interest among scholars and policy makers (Lafuente et al., 2016).

Nevertheless, territories do not realize the generally positive effects of the potential dynamics between KIBS and manufacturing at the same intensity. Few studies have dealt with the potential feasibility of knowledge-intensive servitization strategies at the territorial level (Arnold et al., 2016; Lafuente et al., 2016); however, further territorial-specific sources of heterogeneity may explain the observed differences in the economic benefits resulting from

knowledge-intensive territorial servitization. We argue that the successful channelling of entrepreneurial resources to the economy via a healthy entrepreneurial ecosystem (Acs et al., 2014) may contribute to enhance territorial servitization processes. Additionally, we analyse the supra-regional effects originated from territorial spillovers (see e.g., Griliches, 1979; Acs & Varga, 2005) on territorial servitization outcomes.

By adopting an approach to territorial servitization that accounts for spatial interactions between neighbouring regions, this study evaluates the effects of both manufacturing specialization at the regional level and the entrepreneurial ecosystem on the rate of new KIBS businesses in European regions. More concretely, we hypothesize that the regions' entrepreneurial ecosystem plays a key role in moderating the relationship between the region's manufacturing base and the formation of new KIBS firms. Also, we argue that this interconnectedness does not necessarily prevail only within regional borders but rather it is determined by local spatial externalities.

The empirical analysis uses a unique database created from multiple sources—Eurostat, Regional Entrepreneurship and Development Index, Global Entrepreneurship Monitor (GEM), and the European Cluster Observatory—that includes information for 121 European regions from 24 countries during the period 2012-2014. We employ spatial econometrics models (Spatial Durbin models) to deal with potential spatial effects (Anselin, 1988; Anselin & Bera, 1998; Dettori et al., 2012; Pijnenburg & Kholodilin, 2014).

Relevant policy recommendations can be drawn from our empirical results. The findings suggest that small manufacturing businesses benefit more from a healthy entrepreneurial ecosystem that strengthen their potential interaction with KIBS businesses. Also, the existence of a high quality entrepreneurial ecosystem—including both high quality firms and institutions—may explain why

some regions can attract new KIBS firms from the neighbouring regions.

Therefore, the consolidation of KIBS sectors seems to call for the development of both resilient manufacturing firms and high quality local entrepreneurial ecosystems. Thus, beyond bringing manufacturing and KIBS firms together, policy makers must focus on the design of specific actions that may facilitate quality enhancement of the local conditions. Policy actions should target the introduction of mechanisms for attracting talent and knowledge resources (human capital), and promoting networking (social capital) and connectivity to increase proximity advantage in KIBS delivery in activities where client-provider face-to-face interactions are still relevant and occur within localized business networks. Yet, policies should accommodate the regional development level and receptivity. For example, some regions may require a higher level of industry-specific support, while for other regions the development of strong networks and enhanced local connectivity seem relevant to bring manufacturing and KIBS businesses together. The REDI index constitutes an interesting tool to identify and handle existing bottlenecks that may hinder other, more relevant, ecosystem factors that contribute to improve the territorial servitization level of European regions.

Keywords: territorial servitization, entrepreneurial ecosystem, Regional Entrepreneurship and Development Index (REDI), knowledge-intensive business services (KIBS), reindustrialization

References

Acs, Z.J., Autio, E., & Szerb, L. (2014). National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy,* 43, 476-494.

Acs, Z.J., & Varga, A. (2005). Entrepreneurship, agglomeration and technological change. *Small Business Economics*, 24(3), 323-334.

Anselin, L. (1988). *Spatial Econometrics: Methods and Models*. Boston, MA: Kluwer Academic Publishers.

Anselin, L., & Bera, A.K. (1998). Spatial dependence in linear regression models with an introduction to spatial econometrics. In A. Ullah and D. Giles (Eds.), *Handbook of applied economic statistics* (pp. 237-289). New York: Marcel Dekker.

Arnold, J.M., Javorcik, B., Lipscomb, M., & Mattoo, A. (2016). Services Reform and Manufacturing Performance: Evidence from India. *Economic Journal*, 126(590), 1-39.

Dettori, B., Marrocu, E., & Paci, R. (2012). Total factor productivity, intangible assets and spatial dependence in the European regions. *Regional Studies*, 46(10), 1401-1416.

European Commission (2012). *Knowledge-intensive (business) services in Europe*. Luxembourg: Publications Office of the European Union (doi: 10.2777/59168).

Griliches, Z. (1979). Issues in assessing the contribution of research and development to productivity growth. *The Bell Journal of Economics*, 10(1), 92-116.

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2016). Territorial Servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. *International Journal of Production Economics*, in press.

Pijnenburg, K., & Kholodilin, K.A. (2014). Do regions with entrepreneurial neighbours perform better? A spatial econometric approach for German regions. *Regional Studies*, 48(5), 866-882.

Territorial benefits of servitisation processes in the wind-to-energy industry

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Extended abstract:

Introduction

Manufacturing companies benefit from the servitisation process by increasing their customer orientation, innovativeness, profitability, revenue and firm value. Previous research has discussed these benefits for companies, but research is increasingly focusing on understanding how focal territories benefit from servitisation processes (e.g. Vendrell-Herrero & Wilson, 2017). Our study shows focal territories benefit from the servitisation processes in four ways. First, instead of looking empirically into territorial servitisation across various manufacturing industries, we focus on one single industry, namely, wind-to-energy (W2E). Second, we rely on qualitative interviews with experts from Denmark, Germany, and Spain rather than a quantitative research approach to identify how focal territories benefit from the servitisation processes. Third, our qualitative data are organised according to the gradual, long-term characteristics of servitisation processes throughout W2E industry development. Fourth and finally, the findings apprise propositions on how territories benefit from servitisation processes, which can be tested empirically in future research.

Key findings

Our findings reveal the mechanisms by means of which servitisation processes in the wind-to-energy (W2E) industry lead to territorial benefits. For the industry formation phase, the sustainability of employment and territorial competitiveness emerge through benefits such as (1a) enabling rapid internationalisation, (1b) creating employment opportunities for customers, and (1c) guiding innovation efforts toward dominant wind turbine designs. In the growth phase, territorial benefits include (2a) opening-up new customer segments, (2b) specialising in service competences, and (2c) attracting incumbents from other industries. In the maturity phase, the benefits refer to (3a) raising the odds of survival during consolidation period, (3b) expanding the product portfolio, (3c) enabling technological leaps, and (3d) creating new business opportunities.

Some benefits are consistent with previous contributions in this field. Raising the odds of survival during consolidation period is in line with the notion that services make companies more resistant to economic cycles. Services are not only a more stable source of revenue, but also help companies to maintain product prices.

Creating employment opportunities, specialising in service competences, guiding innovation efforts and creating new business opportunities has also been discussed previously (e.g. Lafuente et al., 2017; Kamp & Apodaca, 2017; Vendrell-Herrero & Wilson, 2017). These findings deepen our insights into these benefits. In the industry formation phase, such employment opportunities related to services occur for wind turbine operators (customers) rather than wind turbine manufacturers. Service competences are intertwined with competences for increasing quality, strengthening production and creating innovations. Co-specialization of competences leading to innovation and strengthening the competitiveness confirms the idea of the industrial clusters, in which firms in the same locality

specialise on different stages in the value chain (Boix & Galletto, 2009).

There are differences between dominant use and dominant product design (Cusumano et al., 2015). A dominant use design occurs relatively quickly and is driven by service practices diffused among initial customers. The diffusion of service practices occurs as part of the entrepreneurial role model of positive examples in discovering the W2E opportunities (Lafuente et al., 2007). A dominant product design is longer in a state-of-flux. Intimate knowledge exchange among suppliers and turbine manufacturers makes it easier to navigate through the state-of-flux period.

Enabling a rapid internationalisation, opening up new customer segments, expanding the product portfolio, attracting incumbents and enabling technological leaps have not been discussed previously. Companies can internationalise rapidly, if wind turbine operators (customers) rather than wind turbine manufacturers, drive servitisation processes. Territories benefit from this in two ways. On the one hand, manufacturers grow rapidly by focusing only on manufacturing. Rapid manufacturing growth creates employment opportunities. On the other hand, customers create new employment opportunities in operation and maintenance activities, which quickly become common service practices among customers.

This finding deepens the lead market model. This model deals with the creation of new markets for environmentally benign products in other countries and the generation, as a result, of export opportunities for the pioneering territory (lead markets) (Beise & Rennings, 2005). R&D services facilitate the emergence of dominant product designs, and servitisation efforts among wind turbine customers diffuse a dominant use design. The cultural homogeneity, congruity, and proximity underlying the collaborative R&D services between suppliers and wind turbine manufacturers within the three focal territories might positively influence the

emergence of dominant product designs (Becattini, 2015; Boschma, 2005).

Attracting incumbents from other industries is a finding that extends existing theories. Incumbent companies do not disrupt the accumulation of competences, which keeps company in the focal territories. Incumbent companies introduce important service competences to the growing W2E industry, which strengthens the spatial configuration of competences in the focal territory. Similarly, technology leaps also extend existing theories. The servitisation literature generally assumes that product technologies become increasingly mature and require service differentiation. Leaps in product technologies are an interesting and important phenomenon, which could be an attractive future research direction.

While some benefits merely confirm existing theories and others extend the existing theory, we encourage researchers to further investigate how territories benefit from servitisation processes, because the benefits presented here are by no means exhaustive. Future research on territorial benefits in other industries would certainly be of interest.

Keywords: Wind-to-Energy industry, industry development phases, territorial benefits

References

Beise, M., & Rennings, K. (2005). Lead markets and regulation: a framework for analyzing the international diffusion of environmental innovations. *Ecological Economics*, 52, 5-17.

Becattini, G. (2015). Beyond geo-sectoriality: the productive chorality of places. Investigaciones Regionales, 32(1), 31-41.

Boix, R., & Galletto, V. (2009). Innovation and industrial districts: a first approach to the measurement and determinants of the I-district effect. *Regional Studies*, 43, 1117-1133.

Boschma, R. (2005). Proximity and innovation: a critical assessment. *Regional Studies*, 39(1), 61-74.

Cusumano, M.A., Kahl, S.J., & Suarez, F.F. (2015). Services, industry evolution, and the competitive strategies of product firms. *Strategic Management Journal,* 36(4), 559-575.

Kamp, B., & Ruiz de Apodaca, I. (2017). Are KIBS beneficial to international business performance: Evidence from the Basque Country. *Competitiveness Review: An International Business Journal*, 27(1), 80-95.

Lafuente, E., Vaillant, Y., & Rialp, J. (2007). Regional differences in the influence of role models: Comparing the entrepreneurial process of rural Catalonia. *Regional Studies*, 41(6), 779-796.

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2017). Territorial Servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. *International Journal of Production Economics*, in press. http://dx.doi.org/10.1016/j.ijpe.2016.12.006

Vendrell-Herrero, F., & Wilson, J.R. (2017). Servitization for territorial competitiveness: Taxonomy and research agenda. *Competitiveness Review: An International Business Journal*, 27(1), 2-11.

New service oriented manufacturing and place-based division of labour: The case of the textile industrial district of Prato

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Extended abstract:

The massive introduction of disruptive technologies of the last decades is changing the nature of traditional manufacturing goods. In particular, local manufacturing systems based on specialized small and medium sized enterprises (SMEs) are deeply challenged by servitization processes, and should adapt both their socio-institutional structure and the local division of labour within global market and production relations (Lafuente et al., 2016).

This paper explores possibilities of territorial servitization for such type of systems, proposing an interpretative framework based on two specific place-based features: local know-how and transaction costs. The textile industrial districts of Prato, an archetypal example of industrial district based on SMEs, are adopted to evaluate the proposed framework.

The impact of servitization tendencies is investigated under a longitudinal perspective. A cluster analysis methodology is applied

to a unique dataset including information for all the companies and sectors of the Prato's local systems for the period between 2005 and 2013. The dataset allows at identifying variations in the multiplicity of local know-how. In the past, the Prato productive structure's adaptability in face of market challenges has inspired scholars to draw or test general models of place-based industrial development, like the Marshallian industrial district. Different scenarios of transition seem to open up now to the Prato districts, and highlight opportunities and difficulties in adjusting a traditional manufacture based on SMEs to processes of territorial servitization.

The results of the analysis of the proposed territorial servitization process in local manufacturing systems of SMEs (industrial districts, IDs) reveals that the emerging hyper-connected markets increase the value of integrating smart and connectivity components and related services in local manufacturing operations. This type of territorial servitization constitutes an opportunity, but also a competitive challenge to the vitality of such systems.

In the context of IDs, the spawning and the integration of new embedded competencies and specializations depend on the pre-existing multiplicity of local know-how and on the local transaction costs (Becattini, 1990; Bellandi & Sforzi, 2004). Various combinations of such factors may push towards different trajectories. In cases of fierce competitive challenges, different trajectories tend to coexist within the same local system, given the decentralized exploration undertaken by sets of the ID's business (and social) leaders and the reduced strength of old local models. The factors of heterogeneity are magnified by the very nature of the servitization processes. The intangible, personal, changeable, only partially local, and often obscure content and value of what has to be exchanged increases the transaction costs. Such costs may be lowered in niches populated by entrepreneurs with a strong drive towards business networks' experimentation and related investments

in skills, technologies, and network design. An alternative is to manage the high transaction costs with vertically integrated solutions (Strambach, 2008).

Robust collective and public actions by local institutional bodies would be necessary to support the diffusion of conditions of low transaction costs. In ID contexts characterized by a high pre-existing multiplicity of productive know-how and a not worn-out entrepreneurial drive, such conditions would help the spawning of new specializations, their local integration, and the growth of new KIBS providers and new types of manufactures, like the Makers that we have identified in Prato.

Keywords: Industrial district, new manufacturing, servitization processes, KIS, transaction costs, local trajectories

References

Becattini, G. (1990). The industrial district as a socio-economic notion. In: F. Pike, G. Becattini, & W. Sengenberger (Eds.), *Industrial Districts and Inter-Firm Cooperation in Italy* (pp. 37–51). Geneva: International Institute for Labour Studies.

Bellandi, M., & Santini, E. (2017). Resilience and the role of arts and culture-based activities in mature industrial districts. *European Planning Studies*, 25(1), 88-106.

Bellandi, M., & Sforzi, F. (2004). The multiple paths of local development. In G. Becattini, M. Bellandi, G. Dei Ottati and F. Sforzi (Eds.), *From Industrial Districts to Local Development. An Itinerary of Research* (pp. 210-226). Cheltenham: Edward Elgar.

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2016). Territorial servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. *International Journal of Production Economics*, in press.

Strambach, S. (2008). Knowledge-Intensive Business Services (KIBS) as drivers of multilevel knowledge dynamics. *International Journal of Services Technology and Management*, 10(2-4), 152-174.

Parallel session 6

Antecedents and outcomes of servitization

Chair: Glenn Parry

The Financial Consequences of Servitization in Manufacturing Firms: An Empirical Analysis

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Extended abstract:

The relationship between the service provision and firm performance in manufacturing firms is vague and far from conclusive (Baines, 2015). This is due to a lack of empirical research investigating these relationships with a large sample (Eggert et al., 2011; Fang et al., 2008). Prior servitization research which investigates the consequences of servitization, suggested that servitization is a beneficial strategy in which manufacturers can differentiate themselves from competitors (Baines et al., 2009; Oliva & Kallenberg, 2003), it can lead to higher profitability (Suarez et al.,

2013; Visnjic et al., 2014), increase in market value (Fang et al., 2008) and increase customer loyalty (Baines & Lightfoot, 2013).

However, these studies give little robust evidence of the real impact of servitization on firm financial performance (Gebauer, Fleisch & Friedli, 2005; Visinjic & Van Looy, 2013), add to that these empirical studies yielded contradicted results which demands a fine-grained empirical research to clarify the true nature of this relationship (Benedetti, Neely & Swink, 2015). In addition to this, there is also a need to further explain why the expected benefits of servitization do not materialise in many cases, causing the so called "service paradox" (Gebauer et al., 2005). The following table introduces the most relevant empirical studies that investigated the servitization consequences.

The present paper contributes with empirical evidences to the continuing debate regarding servitization performance, particularly in terms of financial outcomes.

Study	Findings	Methodology	Country	Impact	Limitations
Gebauer et al., 2005	Extended service business leads to increased service offerings and higher costs, but not to correspondingly higher returns (Service Paradox)	Qualitative Case studies 30 manufacturing firms	Germany and Switzerland	596	Small sample size service paradox is limited and caused by cognitive phenomena
Fang et al. 2008	Increase in market value, non-linear relationships The impact of a firm's transition to services on firm value	Quantitative/ 477 publicly traded manufacturing / COMPUSTAT	USA	449	Links the impact of the service ratio to firm value, while isolating other performanc e variables.

Neely, 2008	Servitization of manufacturers generate higher revenues but generate lower net profits as a % of revenues than pure manufacturing firms	Quantitative/ regression analysis/ 12,521 listed companies from OSIRIS database	Worldwide	828	Servitized companies classifications and measurement inaccurate
Eggert et al., 2011	Services supporting the product (SSPs) directly increase firm profitability, while services supporting the clients' actions (SSCs) do not display any link with long-term profitability.	Quantitative/ Survey of 414 companies / SEM	Germany	101	Self-reported data Limited operationalization of servitization in term of (SSPs) and (SSCs)
Kohtamäki et al., 2013	Non-linear relationship between industrial service offering and sales growth	Quantitative/ included 404firms. Survey /SEM	Finland.	73	Measurement of an industrial service strategy. Performance indicators far from inclusive (only using sales growth)

Table 1. Summary of existing studies

Method & Data Used

The data was selected from the Worldscope Database that provides financial and profile data from companies from over 70 countries. The data was classified based on the US-SIC codes relating to listed manufacturing firms, in terms of presence of servitization (manufacturing vs manufacturing companies involved

in servitization strategies). The final sample included manufacturing listed companies from UK, USA, Germany and China, and will be analysed with STATA software using regression analysis to understand the effects of servitization on financial performance.

Key Contributions

Product and service innovation through industrial services and servitization and their impact on financial performance remains an unexplored area, particularly in terms of empirical evidence. This paper key contribution will be the identification of the most relevant factors that enhance servitized firm's financial performance and make a solid comparison between financial performance of manufacturing firms in the four countries mentioned before. The paper will also shed some light on why these financial performance discrepancies occurred in the context for servitized manufacturing. Furthermore, our regression models will be introducing control variables to our dependant variables.

Keywords: Servitization, Financial Consequences, Regression.

References

Baines, T. (2015). From the editor: Exploring service innovation and the Servitization of the manufacturing firm. *Research-Technology Management*, 58(5), 9–11.

Baines, T.S., & Lightfoot, H.W., (2013). Servitization of the manufacturing firm. *International Journal of Operations & Production Management*, 34(1), 2-35.

Benedettini, O., Neely, A., & Swink, M. (2015). Why do servitized firms fail? A risk-based explanation. *International Journal of Operations & Production Management*, 35(6), 946-979.

Eggert, A., Hogreve, J., Ulaga, W., & Muenkhoff, E. (2011). Industrial services, product innovations, and firm profitability: a multiple-group latent curve analysis. *Industrial Marketing Management*, 40(5), 661-670.

Fang, E., Palmatier, R.W., & Steenkamp, J.B. (2008). Effect of service transition – strategies on firm value. *Journal of Marketing*, 72, 1–14.

Gebauer, H., Fleisch, E., & Friedli, T. (2005). Overcoming the service paradox in manufacturing companies. *European Management Journal*, 23(1), 14-26.

Kohtamäki, M., Partanen, J., Parida, V., & Wincent, J. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*, 42(8), 1374–1385.

Neely, A. (2008). Exploring the financial consequences of the servitization of manufacturing. *Operations Management Research*, 1(2), 103-118.

Suarez, F., Cusumano, M., & Kahl, S. (2013). Services and the Business Models of Product Firms: An Empirical Analysis of the Software Industry. *Management Science*, 59(2), 420-435.

Visnjic-Kastalli, I., & Van Looy, B. (2013). Servitization: Disentangling the impact of service business model innovation on manufacturing firm performance. *Journal of Operations Management*, 31(4), 169–180.

Visnjic, I., Wiengarten, F., & Neely, A. (2014). Only the Brave: Product Innovation, Service Business Model Innovation, and Their Impact on Performance. *Journal of Product Innovation Management*, 33(1), 36-52.

The Impact of Servitization and Digitization on the Financial and Economic Performance of the Firm: A Systematic Approach

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Extended abstract:

This paper proposes a new systematic method to assess the impact of servitization and digitization on firm's success. Our method, which is replicable and scalable, quantifies servitization, digitization and their synergy by analyzing their effect on firm financial and economic outcomes.

To illustrate the effectiveness of the proposed method, we use an example of the British publishing industry. By means of text mining and econometric analysis of secondary data, we analyze data on 258 UK book publishers over a period of 10 years (1508 observations) and distinguish between servitized firms (S-firms), digitized firms (D-firms), digitized and servitized firms (DS-firms) and pure firms (P-firms) which are neither servitized nor digitized (control group). We detect no significant difference in terms of economic performance between P-firms and D-firms. S-firms and DS-firms show significantly greater economic performance over P-firms.

Although we find evidence of servitization paradox among publishers, both digitized publishers-firms and DS-firms show greater economic performance than P-firms. Financial performance is greater for S-firms but lower for DS-firms offering a broader range of value propositions.

Keywords: Servitization, Digitization, Servitization Paradox, Publishing Industry

Are information and communication technologies enablers for servitization? The case of Spanish manufacturing companies

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Extended abstract:

Objective/rationale

Many industrial economies, with a sound manufacturing industry, have witnessed in recent decades a decrease in its relative weight in their regional and national GDP. Simultaneously, manufacturing companies have had to face a huge increase in overseas competition. Low cost economies have transformed the way many industrial sectors compete.

As a consequence, looking for new business opportunities and more sustainable competitive advantages, manufacturing companies have developed new related services. Sometimes, these services are added to the traditional products and other times, they open new and very different offerings to current and new customers. This trend, named servitization, has become a field of interest for both academics and practitioners in the last decades.

It enables firms to overcome some difficulties of existing manufacturing businesses developing new and easier to protect,

capabilities, as well as nurturing new relationships with existing and new customers. That way they explore new income sources while, usually, reinforcing and protecting their present business.

Although the potential interest of servitization for manufacturing companies seems to be clear, there are also many difficulties to profit this strategy. New capabilities and resources are necessary, among them digital skills and technologies. The increasing digitalization in both personal and professional life has opened many opportunities for servitization.

The digital transformation of business models is changing the way both consumers and companies behave. Consequently, firms have enhanced their offering, sometimes adding services. Some authors are exploring the connection between digitalization and servitization and to what extent digital capabilities can enable servitization.

The aim of this work is to go deeper in this relationship in a broad sense. We are not focusing only in the so called "digital servitization" referring to the provision of digital services embedded in a physical product. We will also consider whether information and communication technologies (ICTs) are influencing the general level of servitization in companies.

Methods / Results / Findings

Our research method is a conceptual-to-empirical approach. Firstly, we develop a comprehensive review of the relevant literature about the interaction between both digitalization and the use of ICTs and servitization. The main objective of this first step is to clearly define the area of study. Thus, the conceptualization of the relationship among the suggested concepts and the definition of its characteristics will be done.

Regarding the second step, it is based on an empirical study using quantitative data from the ESEE Survey (Encuesta de Estrategias Empresariales). This survey is conducted by the Spanish Ministry of Economics and Competitiveness on the business strategies of Spanish manufacturing companies. The empirical analysis pursues the description of the Spanish companies according to its technology intensity and its servitization level. The analysis is carried out through a descriptive exploratory research considering the period from 1994 to 2010. There are taken into account some variables such as the use of ICTs, flexible manufacturing systems, the use of CAD/CAM and whether the manufacturing companies collaborate with customer/supplier/competitors.

Implications/conclusions

This research provides insights about the relationship of two current issues: digitalization and servitization. The conclusions will be of value to both academics and practitioners. The academics can take advantage of this study as there is a lack of empirical studies regarding this topic. Practitioners can evaluate the interest of being involved in a digitalization process for facilitating a servitization process. Furthermore, they can inform their decision-making processes using insights gleamed from this research.

Keywords: digitalization, servitization, manufacturing companies

The evidence of servitization from Spanish manufacturing companies

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Extended abstract:

Introduction

The servitization in manufacturing firms is a quite observable fact which is circulating in academic debates from the last two decades and is currently adopted by multiple manufacturing firms. Servitization is considered to be a relationship between manufacturer and customer; it is a change process when services are offered with the assets. The work of (Chase & Gavin, 1989) found that firm's competitiveness can be increased by adding complementary services. However, traditional thinking about servitizing turn around firms selling packages of service and assets together it, in order to increase values and sales (Vandermerwe & Rada, 1988). This strategy can strengthen relationships with customers, also to create new stable revenue, to set high barriers for competitors (Baines et al., 2009, 2011). Moreover, the most

important part is to perform a servitization approach effectively, firms are required to modify their strategies, functions, technologies, personnel for sustaining educational moves in the organizational proposal, and scheme mixing competences (Oliva & Kallenberg, 2003). Companies are aware that the territorial servitization is a production process linking services and industry, and it may enhance the local impact of manufacturing activity on regional competitiveness facilitating local knowledge diffusion (Lafuente et al., 2017).

Methodology

This article uses a database of Spanish manufacturing companies to carry out a quantitative analysis. The database of this study is obtained from SABI (Iberian System of Analysis of Balances). The initial search involved identifying all companies with primary or secondary SIC (Standard Industrial Classification) codes in the range of 10-39 inclusive, this search resulted in the identification of 1,456,709 companies. The second stage of the study involved adding a company size filter; the result finally reduces the database to 1,000 companies.

Moreover, it was analyzed the evolution of services, including its dependence or not dependence on variables such as the size of the organizations or the perceived stability of a market and its relation with parameters that determine business performance. A study of the state of the art was initially perform to provide a theoretical basis for this research by prior selection of manufacturing firms. The databases and public information of each company were analyzed by the FACTIVA database. It is the world's leading source of news, data and ideas. In addition to the databases mentioned another main source of information to make possible this research are the web pages of the companies. So, a manual codification

process through the analysis of each company's website was carried out to verify if the companies are or are not servitized. Finally, during the manual process a final sample of 927 companies was obtained.

Different statistical analyses allow at observing the relationship of different independent variable as dependent variables, as the same time control variables. This work presents the state and process of adoption made by servitization strategy on Spanish manufacturing companies.

Conclusions

After the study a large number of Spanish manufacturing companies in the 17 Spanish regions. It is confirmed that less than half of companies (41% of them) have an interest in adopting the strategy of servitization until now. This is coincident with previous studies based on the difficulty of implementing the service strategy (Chen, 2010).

On the other hand, the results show that Spanish companies that are servitized with more than two services have a positive effect and statistically a significant performance. In general, the average amount of service provided by manufacturing firms to really influence in companies' incomes, they should provide at least three types of service. In this manner, it can positively related to the amount of service to the business performance of the company; when the number of services is less than two, it does not influence the performance of the company.

Keywords: servitization, manufacturing firms, strategy, Spain

References

Baines, T., Lightfoot, H., Peppard, J., Johnson, M., Tiwari, A., Shehab, E., & Swink, M. (2009). Towards an operations strategy for product-centric servitization. *International Journal of Operations & Production Management*, 29(5), 494-519.

Baines, T., Lightfoot, H., & Smart, P. (2011). Servitization within manufacturing exploring the provision of advanced services and their impact on vertical integration. *Journal of Manufacturing Technology Management*, 22(7), 947-954.

Chase, R., & Gavin, D. (1989). The service factory. *Harvard Business Review*, 67, 61-69.

Chen, J.X. (2010). An empirical test of the effect of manufacturing service-orientation on corporate performance: A comparison between Chinese and American enterprises. *Journal of Business Economics*, 4, 33-41.

Lafuente, E., Vaillant, Y., & Vendrell-Herrero, F. (2017). Territorial Servitization: Exploring the virtuous circle connecting knowledge-intensive services and new manufacturing businesses. *International Journal of Production Economics*, in press. http://dx.doi.org/10.1016/j.ijpe.2016.1 2.006.

Neely, A. (2008). Exploring the financial consequences of the servitization of Manufacturing. *Operations Management Research*, 1(2).

Vandermerwe S., & Rada J. (1988). Servitization of business: Adding Value by Adding Services. *European Management Journal*, 6 (4), 314-24.

Parallel session 7

Servinomics

Chair: Esteban Lafuente

KIBS and Innovation in the Machine Tool Manufacturers. Some evidences from the Basque Country

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Extended abstract:

Theoretical Framework

Innovation is a complex process that depends on a variety of factors and actors that are external to the company, therefore, cannot be produced in isolation on the exclusivity of the internal resources of companies (Doloreux, 2002). Today there is a wide variety of organizations that interact with companies (such as universities, technology centres, chambers of commerce, business associations and KIBS), which, given the different nature of each type of organization, makes it necessary to analyse their relationships.

In particular, KIBS (specialized in TICS, R&D, Engineering, Marketing, and Business Management) are the actors that could be an important source of innovation and act as knowledge brokers, as they support their clients in the development of their innovation processes (Miles et al., 1995, Muller & Zenker, 2001; Seclen, 2014).

Innovation in the Machine-Tool Industry

The machine tool industry is the backbone of modern manufacturing and the first engine of economic growth. Traditionally it has been considered that the machine tool can cut or transform the surface of a piece of metal (Rosenberg, 1963). However, at present they are not limited to metal machining, but machine tool technology is used to work glass, ceramics and other materials with new compounds which are expected to have wide applications in the future. In this context, there is a consensus on the importance of the machine tool industry on advanced manufacturing (CECIMO, 2011).

In the machine tool industry its main knowledge base is tacit knowledge about the behaviour of previous generations of machines, their conditions of use and the needs of their users. In this way, the essential competitiveness of the machine tool manufacturers rested on the mechanics field (Lissoni, 2001). However, today innovation in the machine tool industry is increasingly incorporating science-based coded knowledge (such as, new materials, microelectronics, micro-system technology, laser technology, nanotechnologies, advanced software, etc. (Wengel & Shapira, 2004), so companies need to improve their capacity to absorb knowledge (Chen, 2009).

Assumption of Hypothesis

The aim of this research is to know the relationship between the KIBS (and other agents of the environment) and the innovation of the machine tool manufacturers. This approach provides a framework for the analysis of the relationships with external agents that machine tool manufacturers can establish within their innovation processes.

In this way, the research questions are: What kind of innovations do machine tool manufacturers make? What kind of knowledge intensive services do machine tool manufacturers often require? What kinds of innovations do the Manufacturers of machine tools from their links with KIBS and other agents of innovation? Is there a positive relationship between KIBS and the innovation results of machine tool manufacturers? Do machine tool manufacturers that relate to KIBS get better innovation results compared to their counterparts that not related?

Methodology

The methodology that supports this research is the methodological triangulation (Denzin, 1970). In particular, we use the hypothetical-deductive method for the contrast of the hypotheses raised, and also we made a qualitative analysis from semi-structured interviews to experts from the public, private and academic fields, whose opinion is of great specific importance. Therefore, this research has a descriptive and correlational scope.

Results and Discussion

70% of Spain's machine tool production is concentrated in the Basque Country. In general, the type of innovation made by machine tool manufacturers is incremental in accordance with the requirements of their customers and the relationships with the agents of innovation are weak. However, those companies that have relationships with the agents of innovation present better results of innovation against those that don't have it. Also, the different types of KIBS have heterogeneous results on the innovation of the companies.

Keywords: KIBS, Innovation, Machine Tool Industry, Servitization

References

CECIMO (2011). *Study on Competitiveness of European Machine Tool Industry*. December, Brussels.

Chen, L.C. (2009). Learning through informal local and global linkages: the case of Taiwan's machine tool industry. *Research Policy*, 38, 527-535.

Denzin, N.K. (1970). *Sociological Methods: a Source Book*. Chicago: Aldine Publishing Company.

Doloreux, D. (2002). What we should know about regional innovation system, *Technology and Society*, 24, 243-263.

Lissoni, F. (2001). Knowledge codification and the geography of innovation: the case of Brescia mechanical cluster, *Research Policy*, 30(9), 1479-1500.

Miles, I., Kastrinos, N., Flanagan, K., Bilderbeek, R. & Den Hertog, P. (1995). *Knowledge-intensive business services: users, carriers and sources of innovation*. Manchester: PREST.

Muller, E., & Zenker, A. (2001). Business services as actors of knowledge transformation: the role of KIBS in regional and national innovations systems. *Research Policy*, 30, 1501-1516.

Rosenberg, N. (1963). Technological Change in the Machine Tool Industry. *The Journal of Economic History*, 23(4), 414-443.

Seclen, J.P. (2014). *KIBS and Innovation in Micro Enterprises Manufacturers of Machine Tool: The cases of the Basque Country and Emilia-Romagna*, (Doctoral Thesis), University of the Basque Country, Spain.

Wengel, J., & Shapira, P. (2004). Machine tools: the remaking of a traditional sectoral innovation system, In F. Malerba (Ed). *Sectoral Systems of Innovation: concepts, issues and analyses of six major sectors in Europe*. (pp. 243-286). Cambridge: University Press.

The effects of public procurement practices on the servitization of companies. An analysis of cases in Finland and Spain

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Extended abstract:

Introduction

The public sector plays a key role as procurer due to its size and the management of strategic areas, education for instance. Companies supplying the public sector can take advantage of meeting the demand of a large consumer with medium and long-

term contracts and with shorter contracts related to regularly occurring tendering. In this sense, public procurement may boost the transition to innovative services by private companies, with benefits for both public and private sector. Likewise, public procurement shows a remarkable capacity to contribute to regional development. In some cases, local or regional companies are awarded a contract, which increases local economic activity. Supplying the public sector also allows these local companies to grow and develop the necessary skills to compete or collaborate with foreign businesses.

However, the potentially positive impact of public procurement on the servitization of the private sector broadly depends on how the opportunities for public-private collaboration materialize to the extent permitted by the procurement law. In this regard, the preparations of a competitive tendering as well as the correct identification of the public needs to be satisfied are key issues that push or hinder the process.

This paper aims to analyze the influence of different public procurement practices during the preparations for tendering on the servitization of companies. Understanding the role of these practices over the whole life cycle of the procurement process (preparation, tendering, and contract management) can be both an opportunity and a challenge. On the one hand, an appropriate design of the activities during the preparation phase may provide an opportunity for companies to switch to a servitized model. On the other hand, an inadequate use of the activities allowed by the procurement law can constitute a significant barrier, which can harm the whole procurement process. This study represents a notable contribution to an unexplored field, such as the effect of public procurement procedures on the servitization of companies.

Methodology and main results

To address our objective, the case study methodology is used. Two cases are analyzed and compared, one from Finland and another one from Spain. Several interviews will be conducted with both public and private agents in these countries. These cases provide valuable knowledge regarding the main difficulties that both public and private sector face in the context of servitization.

Our findings indicate that public procurement softens several significant obstacles for servitization, such as financial barriers or the lack of business capacity. The public sector can also set an example for private customers of servitized companies, helping them to overcome one important market barrier, such as poor understanding of servitization. This fact is exemplified with the public procurement of energy management services, which has increased the number of companies switching from just developing a product to offering certain additional services, such as energy audits and energy consumption management. This paper brings new insights by focusing on public procurement of printing services and catering services.

The results also show that small companies face difficulties to adapt their production processes to the requirements of the public procurer. At the same time, there is a relevant dependence between the design of the tender process before public bidding and the successful entry of companies adopting servitization. This conclusion has strong implications regarding the capacity to servitize depending on the size of the companies, as well as for regional development. Thus, the connection between public procurement and servitization of local businesses brings valuable lessons for policy and managerial decisions.

Keywords: public procurement of innovation, servitization, Finland, Spain, barriers, regional development.

References

Caloghirou, Y., Protogerou, A., & Panaghiotopoulos, P. (2015). Public procurement for e-government services: challenges and problems related to the implementation of a new innovative scheme in Greek local authorities. In C. Edquist, N. Z.-I. Vonortas, & J. Elder, *Public Procurement for Innovation* (209-235). Cheltenham: Edward Elgar Publishing.

Ceschin, F. (2013). Critical factors for implementing and diffusing sustainable product-Service systems: insights from innovation studies and companies' experiences. *Journal of Cleaner Production,* 45, 74–88. http://dx.doi.org/10.1016/j.jclepro.2012.05.034

D'Antone, S., & Santos, J.B. (2016). When purchasing professional services supports innovation. *Industrial Marketing Management*, Elsevier Inc., 58, 172–186.

Edquist, C. (2015). *Innovation-related Public Procurement as a Demand-oriented Innovation Policy Instrument*. Lund: CIRCLE.

Hartmann, A., Roehrich, J., Frederiksen, L., & Davies, A. (2014). Procuring complex performance: the transition process in public infrastructure. *International Journal of Operations & Production Management*, 34 (2), 174–194.

Helms, T. (2016). Asset transformation and the challenges to servitize a utility business model. *Energy Policy*, 91, 98–112. 10.1016/j.enpol.2015.12.046.

Mont, O. (2002). Drivers and barriers for shifting towards more service-oriented businesses : Analysis of the PSS field and contributions from Sweden. *The Journal of Sustainable Product Design*, 2, 89–103.

Oliva R, & Kallenberg, R. (2003). Managing the transition from products to services. *International Journal of Service Industry Management*, 14, 160–172.

Roshchanka, V., & Evans, M. (2016). Scaling up the energy service company business: market status and company feedback in the Russian Federation. *Journal of Cleaner Production*, (112), 3905-3914.

Stern, P., Hellman, J., Rijnders-Nagle, M., Terrell, M., & Åström, T. (2011). *How Public Procurement can stimulate Innovative Services*. Stockholm: Nordic Innovation Centre (NICe).

Windrum, P., & Koch, P. (2008). *Innovation in public sector services: entrepreneurship, creativity and management*. Abingdon: Edward Elgar.

Product-service innovation and exports: evidence from European SMEs

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Extended abstract:

Introduction

Through information technologies and dematerialization of goods, product firms are able to adopt, design and deliver new smart and connected products that change the competitive landscape. The International Business community is turning the attention to this issue as it reshapes the composition of global value chains (Laplume et al., 2016) and the way firms internationalize (Brouthers et al., 2016). By borrowing from current trends in operations management and international trade, this study aims to evaluate the relationship between product-service innovation and internationalization through exports, a relevant issue but yet unexplored (Bustinza et al., 2017a).

Product firms sell services in addition to products as a way to engage with customers at different stages of product lifecycle and enhance its competitiveness (Cusumano et al., 2015). Quantitative literature evaluating product-service innovation has mainly focused on examining the effects of servitization on firm performance

measured as operative margin (VisjnicKastalli & Van Looy, 2013), sales growth (Kohtamäki et al., 2013) or overall key performance indicators (Bustinza et al., 2017b). However, to the best of our knowledge the quantitative relationship between servitization and firm internationalization has not yet been explored.

Ariu (2016) finds that whilst only 8% of Belgian exporting firms export both products and services, it is remarkable that those firms account for more than 30% of total exports. This empirical fact suggests that firms undertaking product-service innovation are more capable in international markets than firms willing to export goods and services in isolation. The addition of services in product firms offers therefore the opportunity to extract value from customers in a larger timespan and ultimately overcome uncertainties underlying the operations with foreign markets. To the best of our knowledge this is the first study to shed light on this issue.

Methods

This study uses a unique database of European manufacturing SMEs. The extensive survey conducted in 2011 and 2014 on more than 4,000 firms crucially contains, among other key variables related to firm competitiveness, information on the level of product service-innovation –measured with the relative revenues coming from integrated industrial solutions– as well as their exporting behaviour.

Firms in the sample operate in the following industries: Manufacture of chemical goods (6.46%), Manufacture of basic metals (10.30%), Manufacture of machinery and equipment (10.91%), Manufacture of computers and electronics (9.64%), other manufacturing (14.83%), Logistics (13.74%) and industry related

services (34.23%). Quantitative analysis is based on OLS and binary choice models.

Findings and Implications

Our results show that selling integrated solutions significantly increases the propensity to export. In addition to that, our analysis contains two control variables, R&D intensity and labour productivity. The effect of those variables on exporting behaviour and exporting intensity is positive and largely significant. The preliminary results are conditional on sector, time and size fixed-effects. However, more sophisticated modelling techniques are needed to estimate more precisely the effect of servitization on exporting (i.e. panel data and Doubly-Robust Matching procedures).

Conclusion

From an empirical stance the findings on this study contribute to the quantitative analyses assessing the firm level additionalities of product-service innovation. This research shows an interesting empirical fact: there is a positive correlation between servitization and exports. This result contributes to the international business, operations management and international trade communities.

Keywords: Servitization, innovation, export, SMEs.

References

Ariu, A. (2016). Services versus goods trade: a firm-level comparison. *Review of World Economics,* 152(1), 19-41.

Brouthers, K.D., Geisser, K.D., & Rothlauf, F. (2016). Explaining the internationalization of ibusiness firms. *Journal of International Business Studies*, 47(5), 513-534.

Bustinza, O.F., Vendrell-Herrero, F. & Baines, T. (2017a). Service implementation in manufacturing: An organizational transformation perspective. *International Journal of Production Economics*, in press.

Bustinza, O. F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2017b). Product-service innovation and performance: The role of collaborative partnerships and R&D intensity. *R&D Management*, in press.

Cusumano, Kahl, & Suarez (2015). Services, industry evolution, and the competitive strategies of product firms. *Strategic Management Journal*, 36(4), 559-575.

Kohtamäki, M., Partanen, J., Parida, V., & Wincent, J. (2013). Non-linear relationship between industrial service offering and sales growth: The moderating role of network capabilities. *Industrial Marketing Management*, 42(8), 1374-1385.

Laplume, A.O., Petersen, B., & Pearce, J.M. (2016).Global value chains from a 3D printing perspective. *Journal of International Business Studies*, 47(5), 595-609.

Visnjic-Kastalli, I., & Van Looy, B. (2013). Servitization: disentangling the impact of service business model innovation on manufacturing firm performance. *Journal of Operations Management*, 31, 4, 169–180.

The relevance of quantity and quality entrepreneurship for regional performance: The moderating role of the system of entrepreneurship

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Extended abstract:

While entrepreneurship is believed to be a major determinant of growth, even latest empirical studies provide mixed and unconvincing evidence about the ultimate causal relationship between entrepreneurship and growth (Acs et al., 2017; Acs & Varga, 2005; Bruns et al., 2017; Mthanti & Ojah, 2017; Stam, 2008). Over the last two decades there have been several attempts to capture this effect and explain the variations over countries.

According to Wennekers and Thurik (1999) and Carree and Thurik, (2006), intermediate linkages play an important role in the transmission mechanism. Acs et al. (2009) and Braunerhjelm et al. (2010) identify knowledge diffusion as the key mechanism that links entrepreneurship and growth. Institutional factors could also moderate the connection between entrepreneurship and growth (Aparico et al., 2016). A consistent finding of many studies is that both entrepreneurship activity and the effect of entrepreneurship on growth vary over development level (Acs, 2006; Naudé, 2010). Entrepreneurship is found to be positively and significantly influencing growth or productivity in the case of developed countries. Results are less convincing if we include less developed nations (Erken et al., 2016; Galindo & Méndez, 2014; Van Stel et al., 2005).

Not all types of entrepreneurship are equally important (Grilo & Thurik, 2008). Wide range of measures like self-employment rates or the Global Entrepreneurship Monitor (GEM) TEA (total early-phased entrepreneurial activity) are found to moderately influence economic growth while innovation-related or high growth startups/ gazelles show much stronger impact on economic growth (Bruns et al., 2017; Wong et al., 2005). Besides traditional entrepreneurial activity rates, there are other measures of entrepreneurship. One of these is the Global Entrepreneurship Index (GEI) that is a complex indicator of entrepreneurial attitudes, abilities and aspirations measuring the national entrepreneurship system (Acs et al., 2014). Up to now there have been two attempts to examine the effect of GEI on economic growth. Within the framework of the knowledge spillover theory, Lafuente et al. (2016) found that GEI is an important driver of economic growth. Results are less convincing when GEI is applied in the traditional production function framework where GEI is proved to be important only for developing countries (Acs et al., 2017). The most promising research

direction is the so-called neo-Schumpeterian approach where innovation and firm dynamics enhance growth (Aghion & Howitt, 1992). Along these lines, Minniti and Lévesque (2010) developed a model where research-based, Schumpeterian entrepreneurship spurred growth in developed while imitative, Kirznerian entrepreneurship was important in less developed countries.

Various researchers propose that national level investigations are not appropriate and the spillover effects of entrepreneurship can be more effectively captured at sub-national levels (Malecki, 1993; Feldman, 2001; Acs & Armington, 2004; Fritsch, 2013). Yet, the proof on the ultimate effect of entrepreneurship on economic growth at regional level has not been found yet (Stutzer et al., 2014).

Entrepreneurship has been often invoked as a valid mechanism to boost economic outcomes at the territorial level. Our paper attempts to shed light on the determinants of regional economic growth by setting up both a theoretical and empirical bridge between entrepreneurship activity, regional system of entrepreneurship in 121 European Union NUTS1 and NUTS2 regions. In a simple model setup we study the impact of the entrepreneurship/innovation system, the Kirznerian and the Schumpeterian startups on employment growth and GVA per worker. While for Kirznerian and Schumpeterian startups we use the Global Entrepreneurship Monitor (GEM) data, we break with the traditional early-phased entrepreneurial activity ratio (TEA) and develop new measures.

The paper is structured as follows. In the next section we analyze existing entrepreneurship measures and present two new indicators. In Section 3 we show the regional entrepreneurship measurement, the Regional Entrepreneurship and Development Index (REDI). In Section 4, we present our model and set up our hypotheses. Section 5 is about data description and the methodology. In Section 6 we report our results and discuss it, and finally, the paper concludes.

Keywords: Entrepreneurial ecosystem, Kirznerian entrepreneurship, Schumpeterian entrepreneurship, territorial development

References

Acs, Z. J. (2006). How is entrepreneurship good for economic growth? *Innovations*, 1 (1), 97-107.

Acs, Z. J., & Varga, A. (2005). Entrepreneurship, agglomeration and technological change. *Small Business economics*, 24 (3), 323-334.

Acs, Z. J., Audretsch, D.B., Braunerhjelm, P., & Carlsson, B. (2005). *The Missing Link: The Knowledge Filter and Entrepreneurship in Endogenous Growth*. CEPR Discussion Paper No. 4873.

Acs, Z. J., Estrin, S., Mickiewicz, T., & Szerb, L. (2017). *Institutions, Entrepreneurship and Growth: The Role of National Entrepreneurial Ecosystems* (February 3, 2017). Working Paper available at SSRN: https://ssrn.com/abstract=2912453

Acs, Z. J., & Armington, C. (2004). Employment growth and entrepreneurial activity in cities. *Regional Studies*, 38 (8), 911-927.

Acs, Z. J., Autio, E., & Szerb, L. (2014) National Systems of Entrepreneurship: Measurement issues and policy implications. *Research Policy*, 43, 476-494

Acs, Z. J., Braunerhjelm, P., Audretsch, D. B., & Carlsson, B. (2009). The knowledge spillover theory of entrepreneurship. *Small Business Economics*, 32 (1), 15-30

Aghion, P., & Howitt, P. (1992). A model of growth through creative destruction. *Econometrica*, 60 (2), 323-351.

Braunerhjelm, P., Acs, Z.J., Audretsch, D.B., & Carlsson, B. (2010). The missing link: knowledge diffusion and entrepreneurship in endogenous growth. *Small Business Economics*, 34 (2), 105-125.

Bruns, K., Bosma, N., Sanders, M., & Schramm, M. (2017). Searching for the existence of entrepreneurial ecosystems: aregional cross-section growth regression approach. *Small Business Economics*, 49 (1), 31-54.

Carree, M.A., & Thurik, R. (2006). Understanding the role of entrepreneurship for economic growth. In: Carree, M. A. and Thurik, R. (eds.), *The Handbook of Entrepreneurship and Economic Growth* (In-ternational Library of Entrepreneurship). Edward Elgar Publishing Limited, Cheltenham, UK and Brookfield, US.

Erken, H., Donselaar, P., & Thurik, R. (2016). Total factor productivity and the role of entrepreneurship. *Journal of Technology Transfer*, in press. https://doi.org/10.1007/s10961-016-9504-5.

Feldman, M.P. (2001). The entrepreneurial event revisited: firm formation in a regional context. *Industrial and Corporate Change*, 10(4), 861-891.

Fritsch, M. (2013). New business formation and regional development: A survey and assessment of the evidence. *Foundations and Trends® in Entrepreneurship,* 9 (3), 249-364.

Galindo, M.Á. & Méndez, M.T. (2014). Entrepreneurship, economic growth, and innovation: Are feedback effects at work?. *Journal of Business Research*, 67 (5), 825-829.

Grilo, I., & Thurik, R. (2008). Determinants of entrepreneurial engagement levels in Europe and the US. *Industrial and Corporate Change*, 17 (6), 1113-1145.

Lafuente, E., Szerb, L., & Acs, Z.J. (2016). Country level efficiency and national systems of entrepreneurship: A data envelopment analysis approach. *Journal of Technology Transfer*, 41(6), 1260-1283.

Malecki, E. (1993). Entrepreneurship in regional and local development. *International Regional Science Review,* 16(1-2), 119-153.

Minniti, M., & Lévesque, M. (2010). Entrepreneurial types and economic growth. *Journal of Business Venturing*, 25(3), 305-314.

Mthanti, T., & Ojah, K. (2017). Entrepreneurial orientation (EO): Measurement and policy implications of entrepreneurship at the macroeconomic level. *Research Policy,* 46(4), 724-739.

Naudé, W. (2010). Entrepreneurship, developing countries, and development economics: new approaches and insights. *Small Business Economics*, 34(1), 1-12.

Stam, E. (2008). Entrepreneurship and Innovation Policy. In: Nooteboom, B. and Stam, E. (eds.), *Micro-Foundations for Innovation Policy*. Amsterdam: Amsterdam University Press and Chicago: Chicago University Press.

Van Stel, A., M. Carree, & Thurik, R. (2005). The Effect of Entrepreneurial Activity on National Economic Growth. *Small Business Economics*, 24, 311-321.

Wennekers, S., & Thurik, R. (1999). Linking entrepreneurship and economic growth. *Small Business Economics*, 13 (1), 27-56.

Wong, P.K., Ho, Y.P., & Autio, E. (2005). Entrepreneurship, innovation and economic growth: Evidence from GEM data. *Small Business Economics*, 24 (3), 335-350.

Parallel session 8

Co-creation

Chair: Heiko Gebauer

How Does Individual Actions Support Servitization: Understanding the Micro-foundations

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Extended abstract:

Introduction

Manufacturing companies across various industries are increasingly moving toward providing industrial services to their customers (Kowalkowski et al., 2015; Reim et al., 2016). Several factors, including product differentiation, competitive advantage, new/recurring revenue streams, and profitability, have driven this transformational change (Oliva & Kallenberg, 2003; Baines et al., 2009; Raddats et al., 2016). This organizational change process has been termed as "servitization" (Vandermerwe & Rada, 1988; Baines et al., 2009; Baines et al., 2017) in the literature. In practice, though, this transition toward providing more advanced services is often found to be challenging for manufacturing companies (Lightfoot et

al., 2013, Baines et al., 2017), and many fail in their efforts at providing large-scale advanced service offerings.

Researchers acknowledge that many firms fail to achieve their goals of servitization, because service provision requires taking a path divergent from the existing product oriented perspective to a more service oriented approach in manufacturing firms (Bowen et al., 1989; Storbacka et al., 2013; Kowalkowski et al., 2015). However, implementing a service perspective entails significant organizational changes from top to bottom, which affects individuals, teams, units and organization. This organizational change results in innumerable complexities, conflicts and resistance that need to be managed or resolved to move forward with the servitization efforts (Turunen & Toivonen, 2011; Huikkola et al., 2016). Extant research on servitization has focused on various firm- and network-level aspects for dealing with resistance to servitization (Kowalkowski et al., 2015; Baines et al., 2017). These relate to strategy and culture (Oliva & Kallenberg, 2003; Martinez et al., 2010), operations management (Smith et al., 2014; Reim et al., 2016), research and development (Aurich et al., 2009; Kohtamäki et al., 2013), capabilities (Paiola et al., 2013; Lenka et al., 2017) and marketing and sales (Ulaga & Loveland, 2014; Macdonald et al., 2016). However, insights on how individuals, central to the servitization journey, influence the transformation have been singularly lacking.

Although significant contributions have been made to servitization literature, there is a lack of knowledge related to micro-foundations or individual level focus on how to respond to organizational level transformational challenges associated with servitization. Individual actions play a vital role in a firm's ability to realize its intended goals, at an organizational level (Felin et al., 2015). Indeed, it is individuals who practically search and identify valuable opportunities for new services, and then drive development and lobby for their utilization within their firms. To our knowledge,

however, no other study within servitization literature has specifically investigated how individuals actually engage in driving servitization efforts forward. Therefore, in this study we focus on advancing understanding of how individuals can successfully respond to organizational level resistance through coherent actions that enable implementation of servitization.

Research Method and Data Analysis

We adopted a multiple case study method to address our research purpose. We draw on exploratory interviews in six large industrial firms that are successfully providing advanced service to their customers. Multiple respondents from both managerial and operational levels belonging to various units, such as R&D, sales and distribution, and regional units were interviewed. These units were chosen because they were actively involved in developing and implementing new advanced service offerings within the case firms. A total of 35 interviews were conducted across diverse respondents. All interviews were recorded, transcribed and coded into categories, themes and dimensions along the suggestions of Gioia (Corley and Gioia, 2004; Gioia et al., 2013). To ensure data triangulation, we also used access to secondary data, which includes internal documents, presentations and annual reports.

Findings

Our preliminary findings show how committed individuals employ various tactics to overcome and/or respond to organizational resistance towards servitization. In particular, this study identifies a pattern of individual tactics across case firms, which are contingently applied depending on the nature of the firm and the individuals' own socio-organizational networks. More specifically, we identify four prominent response tactics i.e

evangelizing, bootlegging, leveraging and collaborating employed by individuals to overcome the experienced resistance and support servitization efforts within the case firms. Additionally we also document the various conditions, contingencies and personal dynamics that influence the choice of a tactic adopted by the individual.

Response Tactics		
Description	**Conditions when suitable to use**	**Key benefit**
Evangelizing tactic		
Building awareness and convincing others to adopt and believe strongly in a service approach in the firm	▫ Individuals have a strong network within the firm ▫ Focus on changing the general mindset of others toward building consensus in the long term ▫ Few service oriented initiatives implemented with moderate degree of success in the firm	Generating support for servitization initiative
Bootlegging tactic		
Working covertly often without authorization on service initiatives in the firm	▫ Individuals faced rejection when seeking support from management in the firm ▫ Focus on moving ahead with immediate action immaterial of having legal or collegial authority ▫ Early states of introduction of service oriented initiatives in the firm with not much evidence of success	Establishing proof of concept and unique selling points for servitization initiative
Leveraging tactic		
Using internal and/or external resources and competence to enhance efforts or obtain advantage for service initiatives in the firm	▫ Individuals have a strong entrepreneurial attitude and adept at spotting win-win scenarios ▫ Focus on accessing and capitalizing from all possible resources and capabilities accessible for supporting the service initiative ▫ A few service initiatives implemented with a moderate degree of success in the firm	Keeping servitization initiative moving despite resource scarcity
Collaborating tactic		
Using collegial or legal authority to overcome an obstacle to achieve service oriented goals in the firm	▫ Individuals having good relationships within the firm with favorable collegial and legal authorities higher up in the hierarchy ▫ Focus on using collegial and legal influence to somehow get around the barriers in the way of successful implementation of service initiative ▫ A few service initiatives implemented with a high degree of success and there is general acceptance of the need for servitizing in the firm	Building collegial alignment for servitization initiative

Figure 1. Response tactics and their suitable conditions for use and key benefits

Conclusion

Our findings in this study have several implications for servitization theory and practice. This study contributes to the servitization literature first, by identifying and explaining a set of tactics that individuals employ to overcome the resistance to servitization. This highlights the importance of understanding the micro-foundations of servitization, about which not much is known in the literature. Second, we outline how different tactics worked at

different phases of the servitization process, which also depended on the abilities and socio-organizational status of the individual within the firm. This furthers understanding of the discussion on the critical success factors in a servitization process, in particular the role of individuals, which has not been acknowledged in the literature. Finally, we extend the micro-foundation theory in the context of servitization, where we clearly see the micro-macro interaction effect in the servitizing firms.

Keywords: Servitization, Response tactics, Micro-foundation, Individual level

References

Aurich, J., Wolf, N., Siener, M., & Schweitzer, E. (2009). Configuration of product-service systems. *Journal of Manufacturing Technology Management*, 20(5), 591-605.

Baines, T.S., Lightfoot, H.W., Benedettini, O., & Kay, J.M. (2009). The servitization of manufacturing: A review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management*, 20(5), 547–567.

Baines, T., Ziaee Bigdeli, A., Bustinza, O.F., Shi, V.G., Baldwin, J., & Ridgway, K. (2017). Servitization: Revisiting the state-of-the-art and research priorities. *International Journal of Operations and Production Management*, 37(2), 256-278.

Bowen, D.E., Siehl, C., & Schneider, B. (1989). A framework for analyzing customer service orientations in manufacturing. *Academy of Management Review*, 14(1), 75–95.

Corley, K.G., & Gioia, D.A. (2004). Identity ambiguity and change in the wake of a corporate spin-off. *Administrative Science Quarterly,* 49(2), 173-208.

Felin, T., Foss, N. J., & Ployhart, R.E. (2015). The microfoundations movement in strategy and organization theory. *Academy of Management Annals*, 9(1), 575-632.

Gioia, D.A., Corley, K.G., & Hamilton, A.L. (2013), Seeking qualitative rigor in inductive research notes on the Gioia methodology. *Organizational Research Methods*, 16, 15-31.

Huikkola, T., Kohtamäki, M., & Rabetino, R. (2016). Resource realignment in servitization: A study of successful service providers explores how manufacturers modify their resource bases in transitioning to service-oriented offerings. *Research Technology Management*, 59(4), 30-39.

Kohtamäki, M., Partanen, J., & Möller, K. (2013). Making a profit with R&D services—The critical role of relational capital. *Industrial Marketing Management*, 42(1), 71–81.

Kowalkowski, C., Windahl, C., Kindström, D., & Gebauer, H. (2015). What service transition? Rethinking established assumptions about manufacturers' service-led growth strategies. *Industrial Marketing Management*, 45(1), 59–69.

Lenka, S., Parida, V., & Wincent, J. (2017). Digitalization Capabilities as Enablers of Value Co-Creation in Servitizing Firms. *Psychology & Marketing,* 34(1), 92-100.

Lightfoot, H., Baines, T., & Smart, P. (2013). The servitization of manufacturing: A systematic literature review of interdependent trends. *International Journal of Operations & Production Management*, 33(11/12), 1408-1434.

Macdonald, E.K., Kleinaltenkamp, M., & Wilson, H.N. (2016). How business customers judge solutions: Solution quality and value in use. *Journal of Marketing*, 80(3), 96-120.

Martinez, V., Bastl, M., Kingston, J., & Evans, S. (2010). Challenges in transforming manufacturing organisations into product-service providers. *Journal of Manufacturing Technology Management*, 21(4), 449–469.

Oliva, R., & Kallenberg, R. (2003). Managing the transition from products to services. *International Journal of Service Industry Management*, 14(2), 160–172.

Paiola, M., Saccani, N., Perona, M., & Gebauer, H. (2013). Moving from products to solutions: Strategic approaches for developing capabilities. *European Management Journal*, 31(4), 390–409.

Raddats, C., Baines, T., Burton, J., Story, V.M., & Zolkiewski, J. (2016). Motivations for servitization: The impact of product complexity. *International Journal of Operations and Production Management*, 36(5), 572-591.

Reim, W., Parida, V., & Sjödin, D.R. (2016). Risk management for product-service system operation. *International Journal of Operations & Production Management*, 36, 665-686.

Smith, L., Maull, R., & Ng, I.C. (2014). Servitization and operations management: A service dominant-logic approach. *International Journal of Operations & Production Management,* 34(2), 242–269.

Storbacka, K., Windahl, C., Nenonen, S., & Salonen, A. (2013). Solution business models: Transformation along four continua. *Industrial Marketing Management*, 42(5), 705–716.

Turunen, T., & Toivonen, M. (2011). Organizing customer-oriented service business in manufacturing. *Operations Management Research*, 4(1–2), 74–84.

Ulaga, W., & Loveland, J.M. (2014). Transitioning from product to service-led growth in manufacturing firms: Emergent challenges in selecting and managing the industrial sales force. *Industrial Marketing Management*, 43(1), 113–125.

Vandermerwe, S., & Rada, J. (1988). Servitization of business: Adding value by adding services. *European Management Journal*, 6(4), 314–324.

Assessing the role of smart services as enablers of value (co)-creation in Project Management

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Extended abstract:

Introduction

Service-Dominant Logic arises as a new paradigm to analyse value creation in projects (Smyth, 2017). In the same manner, new technological developments with high-impact in projects such as BIM (Building Information Modelling) or Big Data are increasingly showing their potential to enhance interactions between stakeholders and especially with end customers (Holmström, 2014; Bilal et al., 2016). Nevertheless, there is still little research on the influence of such technologies on servitized business models and value co-creation in project business.

Consequently, the main objective of this paper is to shed light on the strategic transformation that project management shows as a consequence of the introduction of smart services in projects. Hence, we attempt to assess how the introduction of these services enables value (co)-creation at a front-end of a project and positively influences value realization when the project is finally delivered.

Methodology

Following a case-study approach we expect to assess different aspects surrounding smart services introduction in a project: 1) technological implementation; 2) degree of the servitization in the business model; 3) disadvantages and barriers to smart services introduction; 4) benefits and competitive advantages arising from introduction of smart services.

Conclusions

In the final discussions and conclusions derived from our research we delve into the study of servitization phenomenon in project management and providing new knowledge to illustrate the strategic change with respect to the value creation and business model configuration in project business.

Keywords: Smart Services, Project Management, Value Co-Creation, Strategic Change

References

Bilal, M., Oyedele, L., Qadir, J., Munir, K., Ajayi, S., Akinade, O., Owolabi, A., Alaka, H. & Pasha, M. (2016). Big Data in the construction industry: A review of present status, opportunities and future trends. *Advanced Engineering Informatics*, 30(3), 500-521

Galera-Zarco, C., Bustinza, O., & Fernandez-Perez, V. (2016, February). Adding value: how to develop a servitisation strategy in civil engineering. I*n Proceedings of the Institution of Civil Engineers–Civil Engineering,* 169(1), 35-40.

Holmström, J., Singh, V., & Främling, K. (2014). BIM as infrastructure in a Finnish HVAC actor network: Enabling adoption, reuse, and recombination over a building life cycle and between projects. *Journal of Management in Engineering*, 31(1), A4014006.

Kopmann, J., Kock, A., Killen, C.P., & Gemünden, H.G. (2017). The role of project portfolio management in fostering both deliberate and emergent strategy. *International Journal of Project Management*, 35(4), 557-570.

Laursen, M., & Svejvig, P. (2016). Taking stock of project value creation: A structured literature review with future directions for research and practice. *International Journal of Project Management*, 34(4), 736-747.

Morris, P.W. (2013). *Reconstructing project management*. John Wiley & Sons.

Robinson, W., Chan, P., & Lau, T. (2016). Finding New Ways of Creating Value: A Case Study of Servitization in Construction: One company's journey toward servitization illustrates how systems integrators can capture value through long-term customer relationships. *Research-Technology Management*, 59(3), 37-49.

Schroeder, A., Galera Zarco, C., Baines, T., & Ziaee Bigdeli, A. (2016). Barriers to capturing the value of advanced services and digitisation in the road transport industry. *In Spring Servitization Conference SSC2016*.

Turner, R. (2016). *Gower handbook of project management*. Routledge.

Winter, M., Smith, C., Morris, P., & Cicmil, S. (2006). Directions for future research in project management: The main findings of a UK government-funded research network. *International Journal of Project Management,* 24(8), 638-649.

Vendrell-Herrero, F., Bustinza, O.F., Parry, G., & Georgantzis, N. (2017). Servitization, digitization and supply chain interdependency. *Industrial Marketing Management*, 60, 69-81.

Co-creating Product-Service System value through ecosystem engagement

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Extended abstract:

Introduction

The servitization of manufacturing represents the evolution of companies' business models "from a 'pure product' orientation towards an integrated Product-Service System (PSS)" perspective (Gaiardelli et al., 2014). The role of smart technologies as enablers of servitization is recognised by many authors as essential (Neely, 2009). Such technologies are able to collect a large quantity of data (big data) coming from myriads of sources (Hartmann et al., 2016), facilitating seamless information flows across the ecosystem partners and supporting the implementation of the PSS strategy

(Auramo & Ala-Risku, 2005). However, the convergence of big data availability and information processing technology boosts PSS value creation. This means that data needs to be translated into information, knowledge and eventually wisdom to support decision making for value creation (Rowley, 2007).

Methodology

A mixed research methodology was carried out. It consisted of:

- Literature review – definition of theoretical key constructs.

- Published industrial use cases – identification of key actors, their job-to-be-done through an assessment of value proportion.

- Survey – collection of direct feedback from a range of stakeholders with an interest in industrial equipment and with different positions in the ecosystem.

- Interviews – development of follow-up interviews to provide complementary contextual depth to the survey.

- Process development – creation of a prototype process that supports increased engagement of the critical actors.

Results and Discussion

The survey and interview data were generally in agreement with the literature: the owner/operators were looking for support with new PSS solutions that would increase the interactions between the key ecosystem actors. The expectation was that joint problem solving would increase the speed of problem resolution, reduce costs and create better solutions. This is in agreement with the open innovation concept (Chesbrough & Appleyard, 2007) that recommends increased stakeholders' engagement in innovation (Freeman et al., 2012).

The main findings of the survey and the 15 interviews were segmented into two themes, customer relationships and underlying considerations, listed in Table 1. Interview results suggested that the best solutions provided information to allow people to make the decisions, rather than the machines taking their own decisions based on pure technical data.

Customer relationship	Underlying considerations
The 'customer' may not be able to describe clearly what they need, yet many are able to describe the outcomes they are trying to achieve.	There must be transparency in the data collection and as a company says, a 'single point of truth', this means that every party in the ecosystem should use the same data source.
Clear customer/use segmentation must be undertaken based on position in supply chain/ecosystem and the outcomes they are seeking.	The data collected must be used openly for root-cause-analysis rather than defensively to protect warranty positions, this requires trust between the players in the ecosystem.
Each customer persona must have a clear value proposition, it is no long sufficient to have one value proposition for 'customers'.	There are internal consumers of the data collected and this can support new product and service development, so the data (technical and operational) must flow down to them.
Loss of personal interactions can lead to a perception of a lower level of value as customers take the service as the new norm.	

Table 1. Survey: main findings

Using the survey and the interviews results and integrating these with the best practices identified in the literature, a five-step process to assist industrial firms to integrate ecosystem actors into the PSS value creation was designed:

- Step 1 – identify partners for joint problem solving, in accordance with an open innovation paradigm (Chesbrough & Appleyard, 2007).

- Step 2 – develop an empathy mapping to gain a fuller understanding of customer (Tripp & Tripp, 2013). Consumption of the information (Rowley, 2007) should be in a form that creates action and data should be transformed into information relevant to the person consuming it.

- Step 3 – translate outcomes or goals that the owner is seeking, into for relevant and controllable within the monitoring environment (Botsman & Rogers, 2010). The relationship between the technical issues and the commercial implications are a key demand from the owner/operators of the equipment.

- Step 4 – describe customer value propositions.

- Step 5 – describe where the customer's value accrues.

Conclusions

The increasing implementation of smart technologies can potentially represent an enabling element in a servitization transformation, facilitating data, information and knowledge sharing between the PSS ecosystem partners. A broad investigation on how ecosystems actors should be engaged along with different value creation approaches is therefore needed. In this paper, a process to support ecosystem engagement in PSS value creation is proposed. Since many of the ecosystem actors are 'customers' in different forms that depend on how data are managed, additional investigation of the term 'customer' emerges as essential. In particular, further analyses are required to evaluate how customers' engagement changes accordingly with their position in the service ecosystem and with their individual objectives. Finally, additional case studies in organisations operating in other business and countries are needed to test the applicability of the proposed process and to identify the main drivers that foster faster collaborations.

Keywords: Servitization; value creation; eco-system engagement; smart technologies

References

Auramo, J., & Ala-Risku, T. (2005). Challenges for going downstream. *International Journal of Logistics Research and Applications*, 8(4), 333-345.

Botsman, R., & Rogers R. (2010). *What's mine is yours: The rise of collaborative consumption*. New York, NY: Harper Collins.

Chesbrough, H.W., & Appleyard, M.M. (2007). Open innovation and strategy. *California Management Review*, 50(1), 57.

Freeman, K., Spenner, P., & Bird, A. (2012). Three Myths about What Customers Want. *Harvard Business Review*, May.

Gaiardelli, P., Resta, B., Martinez, V., Pinto, R., & Albores, P. (2014). A classification model for product-service offerings. *Journal of Cleaner Production*, 66, 507-519.

Hartmann, P.M., Zaki, M., Feldmann, N., & Neely, A. (2016). Capturing value from big data-a taxonomy of data-driven business models used by start-up firms. *International Journal of Operations and Production Management*, 36(10), 1382-1406.

Neely, A. (2009). Exploring the financial consequences of the servitization of manufacturing. *Operations Management Research*, 1(2), 103-118.

Rowley, J. (2007). The wisdom hierarchy. Representations of the DIKW Hierarchy. *Journal of Information Science,* 33, 163-180.

Tripp, C., & Tripp, B.C. (2013). No Empathy - No Service. *Design Management Review*, 24(3), 58-64.

Exploring how technological and social drivers affect the experience of co-creation in the video game industry

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Extended abstract:

Introduction

When being analysed from a service logic perspective, customers are considered as both contributors and interpreters of value rather than assessors of value only (Payne, Storbacka & Frown, 2008; Gronroos & Voima, 2011; Schembri & Sandberg, 2002). In other words, the creation of value is tightly related to the experience of it. Or as Cova and Salle (2008) put it: *"By co-creating the function as well as the meaning of its experience, the customer co-constructs value for himself"*. However, whereas the majority of customer value experience researchers still consider the experience of value in terms of outcomes of co-creation processes (e.g. Gummerus, 2013; MacDonald et. al., 2011), some others start paying attention to how value is experienced while co-creating it both individually and

collectively (Helkkula, Kelleher & Pihlström, 2012; Ellway & Dean, 2016). Following Ellway and Dean (2016) such experiences can be seen as a "*unique and context-bound, phenomenological interpretation of value creation activity*".

This paper contributes to this stream of literature by examining the co-creation experience value of users (gamers) of the sandbox (open world) video game Minecraft. Environments in sandbox games like Minecraft are characterized as virtual communities (De Valck, Van Bruggen & Wierenga, 2009) that thrive in an open innovation context that purposefully allows players to creatively co-create and customize their own value experiences, that is, in their own user sphere (Grönroos & Voima, 2013). In this paper, we connect the drivers of co-creation experience to the actual experiences of the users (gamers). By indicating these drivers, we draw on Verleye (2015) who propose the following determinants of co-creation experience: the level of technology and connectivity, the role readiness of users, and the characteristics of interaction between the service provider and users. We are guided by the following research questions: First, how are key drivers that allow users to co-create value manifested in the context of the user? Second, how is the co-creation of value actually experienced by users? Answering these questions will provide us both theoretically and practically valuable insights in co-creation experience and how service providers can strengthen their value proposition by adjusting the drivers that lead to this experience.

Methodology & data collection

Data was obtained through netnographic research (Medberg & Heinonen, 2014) into community forums and video platforms of the Minecraft game. A total of 84 threads and 169 posts within six

forums, as well as 23 videos have been selected and analysed (see Table 1).

Type of data	Quantity	Application in analysis
Dataset 1: Participant observation (Online forums)	6 forums in total including: 84 threads analyzing 169 posts	Identification and analysis of: ▪ the four determinants of co-creation experience in terms of the degree and variation ▪ consumer resources, roles, and motivation ▪ co-creation experiences and values including their linkage to the determinants
Dataset 2: Participant observation (Videography)	23 videos in total with a cumulated length of: 284 minutes	Explanation and in-depth analysis of: ▪ the determinants of co-creation experience in terms of mechanic and impact ▪ the uploaders role and motivation ▪ visualization of co-creation experience

Table 1. Overview of empirical data

Findings

For sake of space, we summarized our findings in Table 2. We first start with describing how key determinants of co-creation experiences are embedded in the sphere of the users of the Minecraft video game, follwed by a few illustrative quotes of gamers to link the drivers to the actual experience of these drivers by users of the game.

We found that the drivers of co-creation experience depended on each other which lead to synergistic effects that enhanced the

actual co-creation experience. We also observed that co-creation experiences occur at an individual as well as collective level and that both reinforce each other, both negatively and positively.

Key determinants of value co-creation experiences as derived from Verleye (2015)	**Manifestation of determinants in co-creation experiences**	**Illustrative example(s) of co-creation experiences**
The level of technology (the availability of online tools, devices and interfaces which enable personalized experiences)	Technological inputs providing a variety of game mechanisms and technological features which facilitate unique creations, experimentations, learning, and opportunities to customize.	*"[…] I like games where I'm given a lot of freedom. I can shape the world how I want it to be. I can make whatever I want. I can go anywhere and do anything I want. Add in skins, and you can be anything you want! If what I want to do isn't in the game currently, I'm almost certain there's a mod I can install that will add it, thanks to the modding community! Plus, with each new update, there are more things to do, more sights to see, more things I can make."*
The level of connectivity (methods of interconnecting parties by communication channels and support tools)	High interconnectivity is achieved through having many interfaces: a variety of services, in-game messaging, Voice of Internet (VoIP), discussion boards, YouTube and community platforms, …	*"[…] I am VinnieGaming (YouTube) and I am looking for people or a group that wants to do YouTube/ Twitch in the future. The idea of this message is to get people or a group of people well acquainted with each other for better content […]."*
The role readiness of the customer (skills of a customer in the context of a specific service)	Awerenes of the skills and knowledge needed to play, typically concerning design and coding skills, understanding of game context and mechanisms, knowledge of plug-ins, and clarity of the role within the gamers community.	*"[…] If you're, as I assume, trying to learn how to make mods/minecraft extensions in some regard, I'd, of course, recommend learning Java. […] Some java stuff, especially when you're trying to develop things as addons to minecraft, is quite hard, especially from the get-go."* *"[…] A solid 24 hours of walking around my experimental track, trying to visualize the design that would achieve what i wanted it to achieve, and pondering those circuit thingies on the wiki; and it clicked. And kept on clicking. The flood gates are open and i, jezzaman, UNDERSTAND the design and practical application of redstone circuits! Mwahaha!"*
Characteristics of interactions between supplier and users as well as between different users (i.e. the quality, the intensity and degree of acquaintance between two partners)	Intensive and easily accessible encounters between gamers about game experiences and knowledge support through common support channels as well as private encounters (e.g. MineCon). Interactions between service providers and gamers in an informal way.	*"The suggestion forum is a great part of the minecraft forums where we all can post our ideas on how to make minecraft a more enjoyable game. However, how often does Mojang actually come and look at the forums? […]"*

Table 2. Manifestation of co-creation drivers linked to actual experiences

Theoretical Implications

This research combined the concepts of value co-creation (Grönroos & Voima, 2013) and co-creation experiences (Ellway & Dean, 2016) in relation to Verleye's (2015) determinants of co-creation experiences. We contribute to the literature by drawing attention to the importance of understanding the links between the supportive drivers of co-creation (technology, connectivity, readiness, interaction) and the actual experience of it in an open-innovation context like the Minecraft video game.

Managerial Implications

Altough generalizable to some extend, we argue that particularly service providers of games and game designers should be aware of what their users experience while creating value for themselves and for the gamer community. We highlight the importance of aligning the drivers of co-creation experiences and take into consideration how each driver critically depends on the other and how this affects the actual co-creation experiences of users.

Conclusion

Minecraft's nature and novel environment, which allows players to co-create their personalized gaming experience, set a milestone in the video game industry. In the context of this sandbox video game, we examined the relationship between key drivers of co-creation in relation to co-creation experiences of gamers as facilitated by the game service provider.

Keywords: Service-Dominant (S-D) Logic, Determinants of Co-Creation Experiences, Case Study, Video Game Industry, Netnography

References

Cova, B., & Salle, R. (2008). Marketing solutions in accordance with the SD logic: co-creating value with customer network actors. *Industrial Marketing Management*, 37(3), 270-277.

De Valck, K., Van Bruggen, G.H., & Wierenga, B. (2009). Virtual communities: A marketing perspective. *Decision Support Systems,* 47(3), 185-203.

Gummerus J. (2013). Value creation processes and value outcomes in marketing theory: strangers or siblings? *Marketing Theory,* 13, 19-46.

Helkkula, A., Kelleher, C., & Pihlström, M. (2012). Characterizing value as an experience: implications for service researchers and managers. *Journal of Service Research,* 15, 59-75.

Ellway, B.P., & Dean, A.M. (2016). The reciprocal intertwining of practice and experience in value creation. *Marketing Theory*, 16, 299-324.

Grönroos, C., & Voima, P. (2011). *Making sense of value and value co-creation in service logic*. Working Paper No. 559. Retrieved from https://helda.helsinki.fi/handle/10138/29218

Grönroos, C., & Voima, P. (2013). Critical service logic: making sense of value creation and co-creation. *Journal of the Academy of Marketing Science*, 41(2), 133-150.

Medberg, G., & Heinonen, K. (2014). Invisible value formation: a netnography in retail banking. *International Journal of Bank Marketing,* 32(6), 590-607.

Macdonald, E.K., Wilson, H., Martinez, V., & Toossi, A. (2011). Assessing value-in-use: a conceptual framework and exploratory study. *Industrial Marketing Management*, 40(5), 671-682.

Macdonald, E.K., Kleinaltenkamp, M., & Wilson, H.N. (2016) How business customers judge solutions: Solution quality and value in use. *Journal of Marketing*, 80, 96-120.

Payne, A.F., Storbacka, K., & Frow, P. (2008). Managing the co-creation of value. *Journal of the Academy of Marketing Science,* 36(1), 83–96.

Schembri, S., & Sandberg, J. (2002). Service quality and the consumer's experience: Towards an interpretive approach. *Marketing Theory,* 2(2), 189-205.

Verleye, K. (2015). The co-creation experience from the customer perspective: its measurement and determinants. *Journal of Service Management*, 26(2), 321–342.

Parallel session 9

Paradoxes and identities

Chair: Rodrigo Rabetino

Firm Boundaries in Servitization

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Extended abstract:

Background/objectives

To generate various strategic, marketing, and financial benefits, manufacturers have increasingly started to develop, market, and sell services and solutions to their clients (Gebauer & Fleisch, 2007). The existing servitization research has studied this value migration from several theoretical perspectives. The extant research has acknowledged that manufacturer needs to redefine and alter its organizational identity (Jacobides & Winter, 2005), position in the value system (Rabetino et al., 2015; Wise & Baumgartner, 1999), and possessed capabilities (Huikkola et al., 2016) to master the transition from goods to services. In order to manage this strategic shift, the

previous studies have suggested that manufacturers should start to resemble more alike service companies than manufacturing firms (Porter & Heppelmann, 2015). Furthermore, the studies have suggested that manufacturers should move closer to the end-customers while meeting their changing needs with new innovative business models (Wise & Baumgartner, 1999). Because resource configurations are contingent on a particular business model, firms must realign their resources and activities while redefining their horizontal and vertical scope in order to establish a unique position (Huikkola et al., 2016; Porter, 1991). Thus, the implementation of such a new business model requires firms to redefine their horizontal and vertical organizational boundaries (Chesbrough & Rosenbloom, 2002; Teece, 2007), which can be defined as "the scope of product/markets addressed" and "the scope of activities undertaken in the industry value chain", respectively (Santos & Eisenhardt 2005: 492).

The present study extends recent research on firm boundaries in servitization (Rabetino & Kohtamäki, 2013; Salonen & Jaakkola, 2015) and analyzes the implications of the service transition on the redefinition of organizational boundaries by answering the following research question: how does repositioning during the transformation toward customer solutions influence manufacturers' organizational boundaries? We address this question by using a multiple-case study to analyze the servitization of four Finnish servitized global manufacturers. This study contributes to the servitization literature by highlighting different drivers of repositioning; analyzing the mechanisms that arise when firms change their organizational boundaries; and underlining the interplay of different firm boundary theories when firms undergo service transition.

Methods

We used a multiple-case study as our research strategy to analyze how four leading global manufacturers have adjusted their organizational boundaries for repositioning along the value system continuum while implementing successful servitization strategies.

We conducted altogether 29 face-to-face executive interviews between 2010 and 2014. The audiotaped interviews ranged from 40 to 105 minutes. In addition to the primary data, extensive secondary data collection was conducted to cover issues that were not addressed during the interviews. To make sense of the data, we first constructed a within-case analysis. A spreadsheet program was used to list all of the corporations' reported investments, divestments, joint ventures, acquisitions, stake-ins, alliances and license agreements. Then, an analysis of how each corporation's identity, power, and resources/capabilities had changed during the time period was conducted. After that, a cross-case analysis was constructed to discover patterns and variety across the cases in terms of identity, power, and resources changes (Beverland & Lindgreen, 2010; Eisenhardt, 1989; Huberman & Miles, 1994).

Results

The results of the study indicate that a first step toward customer solutions, alliances and joint ventures are common coordinating mechanisms in the upstream end that simultaneously allow companies to minimize the transaction costs and exploit potential localization advantages. Although it is becoming a strategic area, procurement was centralized to suppliers. Because this situation may increase the subsystem suppliers' bargaining power, the case companies have to develop a strong supply base while finding mechanisms to limit suppliers' bargaining power and to cope with dependence and transaction costs. The trend seems to be the

adoption of a hybrid form between a vertically integrated system seller and an agnostic system integrator that combines the benefits of both models (Davies et al., 2007).

By contrast, the level of vertical integration increases at the downstream end. Although companies do not generally use alliances, licensing agreements, and joint ventures, the new investments, acquisitions, and stake-ins are clearly the preferred mechanisms to acquire the required service-related knowledge and capabilities in downstream. The collected data demonstrates not only the need for diversifying the industry risk, expanding the installed base, and being closer to customers while packaging services for higher margins but also the attempt to safeguard strategic domain and leverage capabilities that lead the case firms to shift to vertical integration (Cacciatori & Jacobides, 2004; Davies et al., 2006).

To increase our understanding of the roles of identity, power and competence in the case companies' repositioning, our cross-case analysis focuses on how the interplay between identity, power, and competence development explains the transformation in the organizational boundaries when companies move along the value system toward customer end. The interviewees used many ways to describe the change in their corporate identity from a product and technology organization to a customer solution provider. Commonly, they concluded that the change was intense and that it influenced offerings, processes, structures and organizational culture such that they found a balance between efficiency-centered manufacturing values and customer-oriented service values. Modifying corporate identity does not imply an instantaneous change in organizational identity and culture. Such a change does not come easily, and it is generally not finalized after many years of transition. While hiring new people with different attitudes and mindsets was used "as [a] boundary mechanism to reshape

identity" (Santos & Eisenhardt 2005: 503), the identity change has also increased the need to acquire new capabilities and knowledge (Nag et al., 2007) and to control the industry bottlenecks (Jacobides, 2011) in order to create and implement innovative solutions while assuring system reliability and profitability (Salonen et al., 2006) and guaranteeing the life-cycle performance (Rabetino et al., 2015).

Shifting toward a customer-centric organization has increased the need for developing new knowledge and capabilities to deliver novel solutions for different customer segments (Brady et al., 2005; Ceci & Masini, 2011). In particular, the case firms obtained new downstream resources and capabilities through acquisitions. Particularly, the interviewees emphasized the importance of capabilities that are central to integrated solutions, such as solution sales, value quantification, network management, and software development capabilities.

Although in the past, they operated as subsystem providers, the case companies found it difficult to access to the end users because third parties controlled the access to them. For the case companies, the fact that current customers blocked them from selling integrated solutions to their customers' customers presented a significant challenge. When product systems are sold to intermediate customers, service agreements should be separately sold to the system end users. To overcome industry bottlenecks and sell product and services simultaneously, the case companies had to change their position and move downstream closer to the end customers. As suggested by Pil and Holweg (2006), the analyzed companies tried to find permeable penetration points within the value system to influence end users' demands. Such an effort was validated by the interviewees and multiple strategic actions, such as establishing acquisitions and new alliances. Executives believed that the firm's bargaining power within the value system can be increased by broadening the scope of offerings toward integrated solutions

and by moving downstream to offer integrated solutions—instead of separately selling add-on services to the customer after first delivering the product-system to a solution provider.

Implications

Repositioning is required to bundle products and services and to provide integrated solutions for the customers. In cases where a third party is located between the system integrator and the end user, some of the system integrators seem to go downstream within the value system in order to establish a position as a solutions provider. Although this transition involves a clear redefinition of a companies' corporate identity, it also requires the systematic development of new resources and capabilities.

Second, the present study highlights the mechanisms utilized to servitize manufacturing companies for improved market power, a broader scope of offerings, and new resources and capabilities. Whereas upstream moves are largely based on collaborative practices, the chosen mechanisms for downstream moves are investments and acquisitions, which add new competences, reduce external dependencies, enable control of core resources and key linkages in the value system, and minimize risk at the time of life-cycle service provision.

The redefinition of firm boundaries is important to consider when planning and implementing servitization. For companies preparing for service transition, the study provides important tools for planning such implementation. Power, organizational identity, and capabilities provide important concepts to consider and to overcome the challenges of the organizational change. For already servitized solution providers, this study presents a framework to analyze the challenges that they face in finding potential structures that need development.

Keywords: Servitization, boundaries, value system, repositioning

References

Beverland, M., & Lindgreen, A. (2010). What makes a good case study? A positivist review of qualitative case research published in Industrial Marketing Management, 1971–2006. *Industrial Marketing Management*, 39(1), 56–63.

Brady, T., Davies, A., & Gann, D.M. (2005). Creating value by delivering integrated solutions. *International Journal of Project Management*, 23(5), 360–365.

Cacciatori, E., & Jacobides, M.G. (2004). *The limits of the market: Vertical re-integration, explained* (No. Working paper- September 15), Working paper- September 15, London.

Ceci, F., & Masini, A. (2011). Balancing specialized and generic capabilities in the provision of integrated solutions. *Industrial and Corporate Change,* 20(1), 91–131.

Chesbrough, H., & Rosenbloom, R.S. (2002). The role of the business model in capturing value from innovation: Evidence from Xerox corporation's technology spin-off companies. *Industrial and Corporate Change*, 11(3), 529–555.

Davies, A., Brady, T., & Hobday, M. (2006). Charting a path toward integrated solutions. *MIT Sloan Management Review*, 47(3), 39–48.

Davies, A., Brady, T., & Hobday, M. (2007). Organizing for solutions: Systems seller vs. systems integrator. *Industrial Marketing Management,* 36(2), 183–193.

Eisenhardt, K.M. (1989). Building theories from case study research. *Academy of Management Review,* 14(4), 532-550.

Gebauer, H., & Fleisch, E. (2007). An investigation of the relationship between behavioral processes, motivation, investments in the service business and service revenue. *Industrial Marketing Management*, 36(3), 337-348.

Huberman, M., & Miles, M. (1994). Data management and analysis methods. In N. Denzin, & Y. Lincoln (Eds.), *Handbook of qualitative research* (pp. 428–444). London: Thousand Oaks.

Huikkola, T., Kohtamäki, M., & Rabetino, R. (2016). Resource Realignment in Servitization. *Research-Technology Management*, 59(4), 30-39.

Jacobides, M.G., & Winter, S.G. (2005). The co-evolution of capabilities and transaction cost: Explaining the institutional structure of production. *Strategic Management Journal*, 26, 395–413.

Nag, R., Corley, K.G., & Gioia, D.A. (2007). The intersection of organizational identity, knowledge and practice: Attempting strategic change via knowledge grafting. *Academy of Management Journal*, 50(4), 821–847.

Pil, F.K., & Holweg, M. (2006). Evolving from value chain to value grid. *MIT Sloan Management Review*, 47(4), 72–80.

Porter, M.E. (1991). Towards a dynamic theory of strategy. *Strategic Management Journal*, 12(S2), 95–117.

Porter, M.E., & Heppelmann, J.E. (2015). How smart, connected products are transforming companies. *Harvard Business Review*, 93(10), 96–114.

Rabetino, R., & Kohtamäki, M. (2013), System integration, integrated solutions and industry organization: A value system approach. *IMP 2013*, Atlanta, GA, USA.

Rabetino, R., Kohtamäki, M., Lehtonen, H., & Kostama, H. (2015), Developing the concept of life-cycle service offering. *Industrial Marketing Management,* 49, 53–66.

Salonen, A., Gabrielsson, M., & Al-Obaidi, Z. (2006). Systems sales as a competitive response to the Asian challenge: Case of a global ship power supplier. *Industrial Marketing Management*, 35(6), 740–750.

Salonen, A., & Jaakkola, E. (2015). Firm boundary decisions in solution business: Examining internal vs. external resource integration. I*ndustrial Marketing Management*, Elsevier Inc. https://doi.org/10.1016/j.indmarman.2015.05.002.

Santos, F.M., & Eisenhardt, K.M. (2005). Organizational boundaries and theories of organization. *Organization Science*, 16(5), 491–508.

Teece, D.J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13),1319–1350.

Wise, R., & Baumgartner, P. (1999). Go downstream: The new profit imperative in manufacturing. *Harvard Business Review*, 77(5), 133–142.

What are the main barriers for Servitization in organizations? Exploring the servitization paradox

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Extended abstract:

The servitization paradox refers to the fact that although servitization promises to improve competitiveness and growth of companies, reality shows that achieving the expected results is not always easy. Different authors have analyzed the drivers to succeed when adding services to the offer but according to Hou and Neely (2013) there has not been such a development on the analysis of the barriers to servitization; in fact, these authors had clustered these barriers into seven categories: competitors, suppliers and partners; society itself and environment; customers; finance; lack of knowledge or information; products and activities; and, organizational structure and culture.

Confente et al. (2015) Identified another eight obstacles to servitization in the footwear industry in Italy: costs; attitude;

investments; minimum order quantity; district destruturaction; problems in collaboration; problems in coordination; and, problems in communication.

Li et al. (2015) studied the servitization in Chinese manufacturing companies. After analyzing 134 companies from 12 sectors in one of the provinces of China the results indicate that there is a positive and significant relationship between the service and the performance of the companies analyzed. In addition, the service strategy seems more appropriate for larger firms, and performance improves once servitization has grown from a threshold.

Avlonitis et al. (2014) point out 4 aspects to be considered in order to be successful in servitization: setting a strategic direction, developing capabilities, establishing a service culture and adjusting the organization's design.

As Baines and Guang Shi (2014) point out, the implementation of servitization has the necessary conditions to obtain the expected benefits. When the organization lacks the confidence and capabilities to offer advanced services, or when clients are not convinced or uncomfortable with them. In organizations it requires a change of culture and new skills for technological innovation. It also seems necessary that organizations shift from product orientation towards customer orientation (Vargo & Lusch, 2004, Vargo & Lusch, 2008).

To get organizations to transform themselves from being suppliers of products to service providers according to Barnett et al. (2013) there are many challenges that include strategy, organization and management, recruitment, risk, culture and operations. For this reason, the authors consider that in order for a paradigm shift to take place, two types of changes must be made: the perspective of managers and the business models. According to Bustinza et al.

(2013) the service addition requires a combination of different management approaches to be successful.

In the transformation of manufacturing companies to services companies Grönroos (2007) believes that adopting the service logic is a way to maintain a sustainable competitive advantage and escape price wars. Nordin and Servadio (2012) through a qualitative study propose a conceptual framework of key aspects to carry out the servitization in manufacturing companies. In this conceptual framework, the authors identify three types of dimensions: the organizational dimension (with an internal focus), the procedural dimension (a hybrid focus), the relational dimension (with external focus: suppliers and customers).

They propose to analyze three dimensions of the servitización (namely organizational, procedural, relational) that are translated in several propositions and contrast them in a case study. According to Mont (2001) in spite of the benefits that the servitization can contribute to the organizations also exist a series of barriers to take into account that they have to do with barriers linked to the company, the market and the concept.

After the literature review we analyse the case of a small and medium manufacturing company that is in the process of servitization. We would have interviews with the main actors of the servitization process and would try to identified the main barriers and solutions. Our conclusions seek to contribute to the literature on servitization barriers and also to practitioners in the process of becoming more servitized.

Keywords: Servitization paradox, customer orientation, servitization barriers, SME

References

Avlonitis, V., Frandsen, T., Hsuan, J., & Karlsson, C. (2014). *Driving competitiveness through servitization: A guide for practitioners*. The CBS Competitiveness Platform.

Baines, T.S., Lightfoot, H.W., Benedettini, O., & Kay, J.M. (2009b). The servitization of manufacturing: a review of literature and reflection on future challenges. *Journal of Manufacturing Technology Management,* 20, 547-567.

Baines, T., & Lightfoot, H. (2013). *Made to serve: How manufacturers can compete through servitization and product service systems*. Hoboken, NJ: John Wiley & Sons.

Baines, T., & Shi, V.G. (2015). A Delphi study to explore the adoption of servitization in UK Companies. *Production Planning & Control*, 26,1171-1187.

Barnett, N. J., Parry, G., Saad, M., Newnes, L.B., & Goh, Y.M. (2013). Servitization: Is a paradigm shift in the business model and service enterprise required? *Strategic Change*, 22(3-4), 145-156.

Bigdeli, A.Z., Baines, T., Bustinza, O.F. & Guang Shi, V. (2015). Holistic Approach to Evaluating Servitization: A Content, Context, Process Framework. *EurOMA 2015* Neuchâtel, Switzerland.

Bustinza, O.C., Parry, G., & Vendrell-Herrero, F. (2013). Supply and demand chain management: The effect of adding services to product offerings. *Supply Chain Management: An International Journal*, 18(6), 618-629.

Confente, I., Buratti, A., & Russo, I. (2015). The role of servitization for small firms: drivers versus barriers. *International Journal of Entrepreneurship and Small Business*, 26(3), 312-331.

Grönroos, C. (2000). Creating a relationship dialogue: Communication, interaction and value. *The Marketing Review*, 1(1), 5-14.

Hou, J., & Neely, A. (2013). *Barriers of Servitization: Results of a Systematic Literature Review.* Cambridge Service Alliance, Cambridge.

Li, J. H., Lin, L., Chen, D. P., & Ma, L.Y. (2015). An empirical study of servitization paradox in China. *The Journal of High Technology Management Research*, 26(1), 66-76.

Mont, O. (2001). *Introducing and developing a product-service system (PSS) concept in Sweden.*

Nordin, F., & Servadio, L. (2012). Critical issues during servitization: An in-depth case study. *Int. Ser. Res. Conf. Hanken School of Economics*, Helsinki, Finland.

Vargo, S.L., & Lusch, R.F. (2004). Evolving to a new dominant logic for marketing. *Journal of Marketing*, 68(1), 1-17.

Vargo, S.L., & Lusch, R.F. (2008). Service-dominant logic: Continuing the evolution. *Journal of the Academy of Marketing Science*, 36(1), 1-10.

Practical Pitfalls of Servitization Implementation: Examples from a Medium-Size United States Manufacturer

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Extended abstract:

Attitude and Perception

The first set of pitfalls is related to mindset of the employees, particularly front-line employees with direct customer contact (Sales, Customer Service, Product Management). Many of the services included expansion and monetization of a service previously provided in a more limited scope at no charge, and this group was tasked with communicating and explaining the change to the customer. The objections and pitfalls raised were:

- We've never charged for that before.
- Our customers will never pay for that.
- Can we include that in the price of the part?

These are all valid concerns, and failure to provide front-line employees with solid, defensible arguments for the service and the charges could quickly derail an implementation.

Logistics and Processes

Beyond mindset, there can be substantial obstacles related to process of providing and fulfilling the service. When an organization has developed systems and processes around the flow

of goods (quoting, ordering, manufacturing, shipping, invoicing) it may not be compatible with the integration of a service component. Some of the obstacles faced were:

- We sell parts! We don't know how to sell services.
- We don't know how much to charge for it.
- How do I quote it/put it on a PO?
- How do we bill for that?
- We don't have the people/processes/mind-set to support that.

Keywords: Servitization, Organizational Change, Implementation, Manufacturing Firms.

Parallel session 10

Servitization design and individual attitudes

Chair: Daniel Arias

The types of service categories provided by electrical engineering companies in the Czech Republic

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Extended abstract:

Introduction

To overcome the challenges of increasing competition, many traditional manufacturing firms are moving from industrial goods toward the provision of services and solutions (Antioco et al., 2008). This transformation toward integrated product-service solutions and increased levels of industrial services has been fueled by the development of industry (Kohtamaki et al., 2015).

Services added to the portfolio of offerings by product-based firms are usually more basic services such as inspection, maintenance and ad hoc repair of the installed base: products that have already been sold to the customers (Gebauer et el., 2010; Kowalkowski et al., 2013). The services have become not only more numerous but many times also more advanced. In that respect, the research literature has made a distinction between basic services as ad hoc repairs and the supply of spare parts, and more advanced offerings as full-service contracts and performance agreements (Stremersch et al., 2001).

The aim of the paper is to find out what types of service categories (with the focus on advanced services) provide electrical engineering companies in the Czech Republic to their customers.

Advanced services

Many existing products are accompanied by services, which could increase the product value for their clients. For potential customer, it can be more attractive, when the product is offered with appropriate service.

According to Fischer et al. (2012), the extension of the service offerings includes the following three service categories: 1) customer services, 2) product-related services and 3) services supporting business needs. Two different types of services (basic services and advanced services) are involved in the second category named as product-related services. Basic services help companies to quickly manage product breakdowns (e.g. spare parts, repair, inspections and basic training). Advanced services help to avoid product breakdowns (e.g. preventive maintenance service, process optimization, training and maintenance contracts).

Research questions

The aim of the paper is to find out what types of service categories (with the focus on advanced services) provide electrical engineering companies in the Czech Republic to their customers. Thus, the following research questions RQ1 and RQ2 were proposed.

RQ1: What types of service categories provide electrical engineering companies in the Czech Republic to their customers?

RQ2: How electrical engineering companies in the Czech Republic put emphasis on advanced services?

The findings should help to deeply understand to manufacturing companies and their strategy in choosing of service categories.

Future research is planned to be more focused on advanced services.

Research Methodology

The questionnaire focusing on the types of service categories is a part of a larger questionnaire focusing on the services provided by electrical engineering companies. The questionnaire (mostly in Likert scale) consisted of parts used in previous researches (Kanovska and Tomaskova, 2012; Bartosek and Tomaskova, 2013) and was extended by some new questions.

The respondents participating in the research were directors or managers of electrical engineering companies in the Czech Republic, South Moravian Region. The data were collected from February to November 2014. The research focused on the following industry classifications belonging to CZ-NACE 26 (Manufacturing of computer, electronic and optical products): CZ-NACE 26.1, CZ-NACE 26.3, CZ-NACE 2651, CZ-NACE 266, and CZ-NACE 27 (The production of electric equipment): CZ-NACE 27, CZ-NACE 271, and CZ-NACE 273. According to the Czech Statistical Office, the total number of these SMEs in South Moravian Region reaches 109. A total of 60 filled out valid questionnaires were processed, therefore the research study covers a representative sample (55,05 %) of existing companies.

Findings

The types of service categories (RQ1).

Data in the Table 1 show the types of service category and their absolute / relatives numbers by the manufacturers participating in the research.

According to the findings in Table 1, we can easily see which types of service categories are mostly involved in service offerings.

The most common services among the electrical engineering companies are customer services (product information, product documentation and product delivery) and then product-related services - basic services (warranty repairs and post warranty repairs).

Type of Service Category			**Absolute Number**	**Relative Number**
Customer services		product information	54	90,00 %
		product delivery	42	70,00 %
		product documentation	48	80,00 %
Product-related services	Basic Services	ad hoc repairs	32	53,33 %
		warranty repairs and post warranty repairs	47	78,33 %
		spare parts	37	61,67 %
		inspections and basic training	40	66,67 %
	Advanced Services	full-service contractors	32	53,33 %
		performance agreement	31	51,67 %
		preventive maintenance service	20	33,33 %
		training and maintenance contracts	20	33,33 %
Service Supporting Business needs		business consulting	15	25,00 %
		technical consulting services (R&D, design and construction, feasibility studies)	15	25,00 %

Table 1. Categories of the types of service offering by electrical engineering companies in the Czech Republic (Source: Author, by using classification made by Fischer et al. (2015))

Advanced services in product-oriented companies

The respondents pay more attention to basic services such as warranty repairs and post warranty repairs than to advanced services. The reason of the lower numbers can be seen in the problem that the advanced services address more complex and ongoing requirements (Dachs et al., 2014), which might have previously been addressed by more discrete offerings (e.g., the sale of a product and some basic or advanced services).

Discussion and conclusion

A lot of current manufacturing companies perceive services as a key factor for revenue growth and profitability. Nowadays, almost 50 % of the total revenues come from services (Gebauer et al., 2016). Advanced services are mainly the most important source of service revenues. Advanced services are connected with incorporating maintenance, repair and overhaul contracts. According to the research, electrical engineering companies offer wide range of services, such as customer services, product-related services (basic and advanced services) and services supporting business needs. Manufacturers are mostly focused on customer services and on basic services, which are the part of product-related services. As Story et al. (2016) mentions, the advanced services require flexible, evolutionary implementation as manufacturers respond to customer needs, which are in turn driven by the evolving markets they face.

It would be very useful to focus more on the results showing lower interest of respondents in advanced services. Therefore, the next intention is to prepare deep interviews with managers to know more about their advanced services strategy.

Keywords: Basic and advanced services, Electrical engineering companies, Czech Republic, Services in product-oriented companies, Service offering.

References

Antioco, M., Moenaert, R.K., Feinberg, R.A., & Wetzels, M.G. (2008). Integrating service and design: the influences of organizational and communication factors on relative product and service characteristics. *Journal of the Academy of Marketing Science*, 36, 501-521.

Bartosek, V., & Tomaskova, E. (2013). Interfunctional Coordination from Company Functions Point of View. *Acta Academica Karviniensis*, 13(3), 5-18.

Dachs, B., Biege, S., Borowiecki, M., Lay, G., Jäger, A., & Schartinger, D. (2014). Servitisation of European manufacturing: evidence from a large scale database. *Service Industries Journal*, 34(1), 5-23.

Fischer, T., Gebauer, H., & Fleisch, E. (2012). *Service business development: strategies for value creation in manufacturing firms.* Cambridge: Cambridge University Press.

Gebauer, H., Edvardsson, B., Gustafsson, A., & Witell, L. (2010). Match or mismatch: strategy-structure configurations in the service business of manufacturing companies. *Journal of Service Research,* 13(2), 198-215.

Gebauer, H., Joncourt, S., & Saul, C. (2016). Services in product-oriented companies: past, present, and future. *Universia Business Review*, (49), 32-53.

Kanovská, L., & Tomaskova, E. (2012). Interfunctional coordination at hi-tech firms. *Inzinerine Ekonomika–Engineering Economics*, 23(1), 70-76.

Kohtamaki, M., Hakala, H., Partanen, J., Parida, V., & Wincent, J. (2015). The performance impact of industrial services and service orientation on manufacturing companies. *Journal of Service Theory and Practice,* 25(4), 463-485.

Kowalkowski, C., Witell, L., & Gustafsson, A. (2013). Any way goes: Identifying value constellations for service infusion in SMEs. *Industrial Marketing Management*, 42(1), 18-30.

Story, V. M., Raddats, C., Burton, J., Zolkiewski, J., & Baines, T. (2016). Capabilities for advanced services: A multi-actor perspective. *Industrial Marketing Management*, 36(5), 572-591.

Stremersch, S., Wuyts, S., & Frambach, R.T. (2001). The Purchasing of Full-Service Contracts: An Exploratory Study within the Industrial Maintenance Market. *Industrial Marketing Management*, 30(1), 1-12.

Designing and pricing of advanced service offerings based on customer value

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Extended abstract:

Introduction

Manufacturing companies are currently competing for the identification of innovative value propositions to position themselves in the market and this led to a shift from providing traditional transaction-based and product-centric offerings towards the provision of integrated solutions to their customers (Pezzotta et al., 2014). When companies fail to account for collective and relational goals in customer solutions, a mismatch can occur between firms' solutions and those that customers envision meaning that understanding the integration process of customer networks and revise value propositions is essential to improving service design (Epp & Price, 2011).

The purpose of this paper is to describe the results and the process developed from the designing and pricing of advanced

services that was supported with the customer value proposition (Osterwalder & Pigneur, 2010).

Research methodology

Internal interviews with different representatives of departments within the firms were focused to assess availability of the internal data and to obtain direct feedback from a range of different perspectives in both qualitative and quantitative form. External interviews with long-standing senior managers from the industry understanding the end-to-end sales process were performed to support the current state-of-art on pricing. The structure and the questions were based on the initial literature review. The focus was on pricing objectives, strategies and tools. Customer surveys were focused to collect insight from the target group. The industrial use cases of two firms were used to develop the process. The first firm in this study was an established middle-size company in the global market servicing OEM clean room equipment.

The second firm was a small-size company in the global market of offshore wind solutions for bolting. In both companies, a set of internal workshops were performed to develop the process of designing and pricing of service offerings.

The final stage of the methodology was to take the two industrial use cases, the literature review, survey and interview results to build a prototype process that could support designing and pricing of service offerings based on customer value. The objective in building a process was to create one that supported and highlighted the importance of designing and pricing service offerings based on market analysis, internal value creation and customer value.

Results and Discussion

The internal interviews involved different company departments and provided insight about pains and gains of the customers, price sensitivity and where possible economics such as estimated costs, customer and business information and competitive pressures around the provision of both planned and unplanned services from the internal perspective. The results of the external interviews provided details of the objective of pricing and the strategies applied to obtain the objectives and tools subsequently used to support the achievement of the objectives. Customer surveys provided insight about pains and gains of the customers, price sensitivity and where possible economics from the customer perspective. Using the results of the use cases workshops and integrating these with the best practices identified in the literature, interviews and surveys, the authors have designed a process to assist industrial firms to understand better and improve the design and pricing of service offerings based on value that the customer are expecting. The proposed framework for designing and pricing services is shown in Figure 1. It provides a model for building a modular value proposition for services and pricing the offering according to customer value.

Figure 1. Three-step framework for developing and pricing valuable services

Step 1. Customer and value identification

Customer identification is best done through ecosystem mapping. To create a detailed understanding of value the customer value propositions are to be created for key actors from the ecosystem (Stickdorn & Schneider, 2011).

Step 2. Building and prototyping solutions

Building and prototyping solutions describe the solution development based on customer problem that was defined in Step 1. Each proposed solution should address the business problem. The framework develops three different solutions: the Complete or 'gold plated' solution, a Basic solution (or the "minimal viable product") and the best match (see Figure 2). For each solution 3-5 additional options should be created. A comparison with the current solution should be undertaken in the final step. To help with this process, it is useful to consider the two extremes of 'do-it-yourself' and 'do-it-for-me' as well as a more normal 'do-it-with-me' delivery model. The next step is to create a module structure for the offer based on standardized process and options (Kowalkowski, et al., 2011).

Step 3. Service offering value quantification and pricing

The final stage of service offering value quantification using West and Kujawski's (2016) value-based pricing framework (Figure 3). This starts from the value in use concept, benchmarking of price, estimation of the value (or cost) of the pains and gain in an attempt to identify the total value delivered to the customer. It identifies the net value and the customer "pains" and "gains" on the base of the product-service value model (Smith et al. 2014). The final state shown is the cost built up with an estimation of the potential remaining margin.

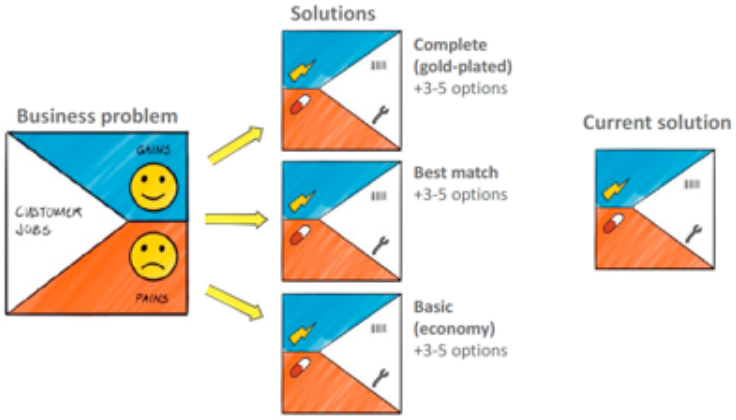

Figure 2. Three level solution offering development based on customer problem identification

Figure 3. Value-based pricing framework

Conclusions

This paper contributes by confirming that understanding the customer value is important in design and pricing of industrial services. It reinforces the need to understand the key actors within the ecosystem, determine the value exchange between them and specify service pricing dimensions that are important to the

customer. This work shows that scope and price are related to delivered customer value. It helps to convert discovered customer value into tangible and intangible service offering that is priced according to quantified customer value.

The quantification of customer value supports the process of designing value-based pricing of services.

Keywords: service offering, customer value, value-based pricing, modularity

References

Epp, A., & Price, L. (2011). Designing solutions around customer network identity goals. *Journal of Marketing*, 75(2), 36-54.

Kowalkowski, C., Kindström, D., & Brehmer, P. (2011). Managing industrial service offerings in global markets. *Journal of Business & Industrial Marketing*, 26(3), 181–192.

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Wiley. London.

Pezzotta, G., Pinto, R., Pirola, F, & Ouertani, M-Z. (2014). Balancing Product-service Provider's Performance and Customer's Value. The Service Engineering Methodology. *Journal of Procedia CIRP*, 16, 50-55.

Attitudes towards future professional orientation of pre-university students. Evidence of different regional approaches and its impact on entrepreneurial servitization

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Extended abstract:

Introduction

Entrepreneurial education is becoming a subject of increasing interest due to the incipient interests of national governments to increase productivity as well as increasing the possibilities for young population to create new sources of employment. Policy-makers together with academicians and practitioners are developing initiatives to foster the entrepreneurial mindset since early educational levels (Davey et al., 2011). One of these initiatives is the Young Business Talents (YBT)[1] competition that involves high school students between the ages 15-21 into a business simulation experience that allows them to experiment and apply their knowledge and skills by managing virtual firms within a

[1] In order to obtain complete information about YBT please visit http://www.youngbusinesstalents.com

competition. This competition intends to facilitate students a direct access towards the business environment in a practical way to get to know firsthand the decision process standing behind any company.

Since the term servitization is based on the creation of value by developing services from products (Baines et al., 2009), educational business simulations fostering entrepreneurial attitudes create value by developing an educational service from a virtual product that participants need to manage properly within the simulation. As a matter of fact, participants learn by doing on the basis of a Spartan product defined as a product within a product. This means that students base their decisions on the expectation to optimize the results of the firm around a virtual product that simulates the dairy products market. This product-business universe takes place within the simulation application product including it. Hence, considering that servitization creates additional value adding capabilities (Hewitt, 2002), these types of educational experiences can be categorized as entrepreneurial servitization as the main service obtained from this experience is educational training towards entrepreneurship.

In this exploratory work, we present the view expressed through a massive questionnaire of more than 20,000 participants of the YBT 2016 edition to identify the attitudes and tendencies of young Spanish pre-university students as well as the most relevant issues that may impact their future and that of the whole society. This paper is limited to the Spanish territory. The presented results have transcendence in the short and long term that may imply the need for changes in the way to address educational and social needs. In some of our results, comparisons with other countries are presented, to provide a broader view that allows the company for a more concrete and deeper evaluation. The studied universe of teenagers between 15 and 21 years old is crucial. Since it is at this age when they settle the criteria and attitudes that will prevail and affect much of their adult life.

Methodology and main results

Social research through a survey on young pre-university students between the ages of 15 and 21, Studies of 1º, 2º and 3º year of Bachillerato (High School) and Ciclos medio y superior de Formación Professional (Professional training).

Universe studied: 1.461.729 young people.

Universe considered: Infinite.

Information collection instrument: Structured questionnaire of 8 questions, 5 closed and 3 open questions. The questionnaire is answered by the individuals in the sample online at the time of the enrolment in Young Business Talents.

Sample: 8,972 individuals.

Sampling method: Random clustering

Data were collected between October and November 2016 with a degree of confidence of 95%; P=Q=0.50; Error: +/- 1.10%

The majority of young Spanish pre-university students (37.92%) consider that working for a private company is the best option for their future career path. However still 1 out of 4 students expect to be civil servants. 73.19% of the sample has a clear idea about what profession and activities they would like to do in the future. 36.09% of the students would like to become entrepreneurs in the near future. Data from last year report (see YBT report 2015) showed that 41.40% opted for entrepreneurship which counts for a difference of 12.83% between both samples.

The interest of young people to become entrepreneurs is significantly different according to different regions. The regions with the highest predisposition to create a company are Región de

Murcia (40.22%), the interior Spanish north east region composed by Aragón-La Rioja-Navarra (39.71%), Cataluña (39.19%) and Islas Canarias (38.15%). The area where the young people are less willing to found a company is formed by the north central Spanish zone composed by Asturias-Cantabria-País Vasco (30.73%), Castilla-La Mancha (32.56%) and Extremadura (32.92%).

If we compare the degree of interest for entrepreneurship with other Southern European countries like Greece, Italy and Portugal, the distances are very large among the young people of the sample. With 48.09% the Greeks have the highest will to undertake a company followed by Portugal with 46,47%. Most of the Spanish prefer working for a private company and therefore they have the slightest willingness to start a company (36.09%). Italy remains with a slightly higher percentage than Spain (38.34%).

Comparing with Mexico the difference is even larger. With 65.30% Mexico is the country with the highest degree of entrepreneurship. 25.79% of the young Spanish students are considering working as civil servants as the best option for the future. The ranking of 7 firms, in order of preference, to work in the future are:

1. Inditex
2. Apple
3. Google
4. Nivea
5. Nike
6. Microsoft
7. Coca Cola

There is also a great willingness for Spaniards to change the place of residence for work. 90.03% of the students would change the province for their profession (See Graphic 3). There is an increase of 1.97% compared to 2015 (88.29%). Only 81.26% would change to another country for their future profession (See Graphic 8). In 2015 it was 83.60%. There is a decrease of 2.79%. The most attractive cities for working are, in order of preference: Madrid, Barcelona, Sevilla, Valencia, Malaga, Cadiz and Granada. The most attractive countries according to preferences are the United States, the United Kingdom, Germany, Italy, Australia and France.

Gender	Yes	No	Total
Female	92,75 %	7,25 %	100 %
Male	88,06 %	11,94 %	100 %
Total	90,26 %	9,54 %	100 %

Table 1. Geographical mobility relating to provinces by gender

Comparing to the willingness of Spanish pre-university students by gender, the difference between female students and male students is significant.

36.09% of young students intend to become entrepreneurs while 37.92% of them prefer to work for the private sector. In 2015 this figures were 41.40% and 32.51% respectively. The rest of them (25.79%) intend to become civil servants. Compared to 2015 with 26.07% this involves a decrease of 1.07%.

The importance of this information acquires relevance when studying the different zones. We could recognize that the work preferences are different compared to each region. Hence, 25.79% of the pre-university students considered to be civil servants as the

best option for the future. The differences between the different zones of the country are significant. Young people from Extremadura (37.69%), Región Murcia (32.81%) and Castilla-La Mancha (31.98%) are those who prefer the most to become civil servants. The provinces with the least intention to become civil servants are Cataluña (15.36%) and Comunidad de Madrid (18.81%).

The young people with the most entrepreneurial spirit in Spain are those in the provinces formed by Murcia (40.22%), Aragón-La Rioja-Navarra (39.71%) and Cataluña (39.19%). The lowest results are formed by Asturias-Cantabria-País Vasco, Castilla-La Mancha and Extremadura with 30.73%, 32.56% and 32.94%. The difference between the more entrepreneurial states and the less entrepreneurial provinces is 30.88%.

Compared to the students who want to work for a private company, the areas Cataluña (44.96%), Catilla y León (44.23%) and Madrid (43.57%) show the highest results respectively. The lowest results are formed by Murcia, Extremadura and Galicia with 26.74%, 29.38% and 33.37% respectively.

Compared to Italy, Portugal and Greece the young Spanish pre-university students score 36.09% being the last in this ranking of those intending to start a company while having the highest incentive to be wage earners in the public sectors (25.79%). With 37.92% Spaniards also show the second highest result after Portugal (44.96%) based on working in the private sector.

2015				
Country	**Working for a company**	**Working as a civil servant**	**Become an entrepreneur**	**Total**
Spain	32,51 %	26,07 %	41,42 %	100 %
Italy	38,43 %	16,49 %	45,08 %	100 %
Portugal	23,87 %	8,84 %	67,29 %	100 %
Greece	42,24 %	15,26 %	42,50 %	100 %
Mexico	19,86 %	13,87 %	66,68 %	100 %
2016				
Spain	37,92 %	25,79 %	36,09 %	100 %
Italy	37,18 %	24,48 %	38,34 %	100 %
Portugal	44,96 %	8,57 %	46,47 %	100 %
Greece	37,51 %	14,36 %	48,09 %	100 %
Mexico	29,38 %	5,24 %	65,30 %	100 %

Table 2. Preferences by type of work compared to countries

Gender	**Working for a company**	**Working as a civil servant**	**Become an entrepreneur**	**Total**
Female	37,32 %	29,21 %	33,47 %	100,00 %
Male	38,69 %	22,38 %	38,94 %	100,00 %
Total	37,92 %	25,79 %	36,09 %	100,00 %

Table 3. Type of work by gender

Considering the choice of the type of work by gender, we can observe that there is a significant difference between female and male students. In general, it can be recognized that both parts prefer to work for a company in the future (37.92%). But it also can be seen that females prefer working as a civil servant (29.21%) while males are more interest in funding an own company (38.94%).

Conclusions

In this initial study we present the view of Spanish students prior to participate in an entrepreneurial servitization experience. There are definitely clear differences between perceptions on professional careers for Spanish students compared to other countries. Still Spanish students are keener to become civil servants which clearly show that the expectations of having a job for life are a crucial issue for Spanish students. There are clear differences between Autonomous Communities and genders.

This report intends to serve as a general view of perceptions among young students. However, deeper research is needed to analyze every dimension. Only descriptive data is shown without further statistical analysis which will be object of future studies regarding whether the participation in simulation experiences modify the entrepreneurial orientation of participants.

References

Baines, T. S., Lightfoot, H. W., Benedettini, O., & Kay, J. M. (2009). The servitization of manufacturing. *Journal of Manufacturing Technology Management*, 20(5), 547-567.

Davey, T., Plewa, C., & Struwig, M. (2011). Entrepreneurship perceptions and career intentions of international students. *Education + Training*, 53(5), 335-352 .

Hewitt, P. (2002). *The government's manufacturing strategy. Secretary of State for Trade and Industry*. Available at: www.dti.gov.uk/manufacturing.

This book abstracts summarizes the proceedings of the **6th International Conference on Business Servitization (ICBS 2017),** held at the Barcelona School of Building Construction (EPSEB), Barcelona, Spain.

This edition of the **International Conference on Business Servitization (ICBS)** deals with the Servitization of Regions. The analysis of what drivers, processes and actors play a crucial role in enabling and promoting manufacturing renaissance, technological upgrading and product-service innovation in regions is of crutial importance for understanding how regions can efficiently transit to a more knowledge-based development models. The servitization of regions offers an opportunity for local manufacturing economies to resume growth and sustain long-term competitiveness. As such, the renaissance of manufacturing through territorial servitization not only facilitates the upgrading of existing manufacturing competences, but it also offers an opportunity to to develop and anchor new technological capabilities across regions.

In this 6th edition of the ICBS we have brought together more than 45 researchers from 36 Universities and Research Institutes located in 13 countries across Europe and America. In summary, the conference is organized in ten different parallel sessions that seek to fuel the academic debate around the different aspects of Territorial Servitization.

Additionally, this conference welcomes relevant keynote speakers as Prof. Yancy Vaillant (Toulouse Business School, TBS) analyzing "The Servitization of Regions" and Dr. Ivanka Visnjik (ESADE) speaking about "Product innovation, service business model innovation and their impact on performance.

ISBN: 978-84-946352-7-4

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