
Editorial

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Product-service innovation (PSI), also referred to as servitisation refers to the phenomenon of companies adding services to their offerings as a means of increasing competitiveness, turnover and market power (Vandermerwe and Rada, 1988; Bustinza et al., 2018a). Although the challenges faced by manufacturing firms in transitioning from products to product-service systems (PSS) are multiple, PSI has been proven to possess the capacity to generate economic, environmental and social benefits for a diverse set of stakeholders (Vendrell-Herrero et al., 2014; Opazo-Basáez et al., 2018; Bustinza et al., 2019). Due to this fact, many manufacturers recognise the integration of services as a source of sustainable competitive advantage and corporate profitability (Bustinza et al., 2015; Lee et al., 2016).

Over the last decade, the interest in the role of services in manufacturing has continued to expand (Baines et al., 2017; Raddats et al., 2019). Despite the rapid growth in research interest and results from both academia and business, several research questions remain still controversial. Therefore, the papers of this special issue entitled ‘Advancements in industrial marketing: exploring product-service innovation strategies for sustainability’ seeks to address a variety of issues and concerns in PSI research, including the role of digital technologies in service deployment, as well as strategic approaches aimed at foster service provision.

In this regard, the papers of this special issue have been logically organised into two general description categories. Accordingly, the first category denominated ‘Manufacturing technologies (digitalisation) supporting PSI’ contains four papers aimed at capturing the current state of the field in PSI and digital technologies. The second group named ‘Strategic orientation to promote PSI’ comprises three papers focused on analysing different strategic orientations towards PSS.

The aim of this special issue is at enhancing the discussion in PSI (i.e., servitisation). The articles have been blind reviewed and some were presented at the Eighth International Conference on Business Servitization (ICBS) held in San Sebastian, Spain (<http://www.servitization.org>), which allowed both formal and informal discussion of specific aspects of the developing research between authors and guest editors. In total, 18 authors from a range of business, engineering, and management disciplines have contributed to the present special issue and shared their recent research findings.

The next section provides theoretical underpinnings in PSI/servitisation literature that summarises the general positioning of the articles compiled in this special issue. The further section summarises the academic contributions included. The final section presents conclusions as well as future research directions based on key findings.

2 Theoretical underpinnings

One of the most significant challenges of PSI/servitisation for both researchers and practitioners is how to efficiently and effectively transform a manufacturing organisation to exploit the service offerings potential (Vendrell-Herrero et al., 2017; Bustinza et al., 2018b). Despite the growing research interest in organisational aspects related to the move to PSI/servitisation, the issue of digital servitisation remains unresolved (Kamp and Parry, 2017; Kohtamäki et al., 2019). A wide stream of research claims that companies that invest in digital technologies can harvest valuable outcomes, since the adoption of such technologies results in increased processes efficiency and responsiveness (Opazo-Basáez et al., 2018; Sánchez-Montesinos et al., 2018). As such, the term digital

servitisation has been coined for the use of digital tools oriented at these transformational processes whereby a company shifts from a product-centric to a service-centric business model and logic (Vendrell-Herrero et al., 2017; Coreynen et al., 2020).

Nowadays, companies are empowered by the deployment of information technology (IT) systems that combine key technological advancements, including:

- 1 virtualisation systems, e.g., cloud computing (CC)
- 2 mobility systems, e.g., social media, the internet of things, smartphones, and tablets
- 3 embedded analytics systems, e.g., big data (Rymaszewska et al., 2017).

To date, there is a critical discussion on the recent advancements on digital technologies, and PSI/servitisation (Frank et al., 2019; Paiola and Gebauer, 2020) and a growing body of research focusing on this topic (Basaez et al., 2014; Cenamor et al., 2017; Vendrell-Herrero et al., 2020).

Despite the growing interest in firms' digital transformation for service deployment, there are still gaps related to the usage of ground-breaking technologies, such as three-dimensional (3D) printing technology and/or CC as well as business strategies and/or business model innovations crafted under unprecedented technological advancements (Green et al., 2017; Boehmer et al., 2020).

In addition to novel digital technologies applied to PSI/servitisation, innovation in processes and digital capabilities emerge also as topics of growing interest (Bustinza et al., 2018b; Kohtamäki et al., 2019). This is primarily due the design of PSS is more complex than traditional product design, since to create value in use, firms should re-consider current talent, processes, products, and product usage (Opazo-Basáez et al., 2019; Marić and Opazo-Basáez, 2019). In this regard, the Avatar Journey Mapping tool helps in shifting from product-thinking to system thinking (Rabelo et al., 2008). Correspondingly, digitalisation is closely related to efficient, reliable and cost-efficient operations for manufacturing companies adopting digital servitisation (Opazo-Basáez et al., 2018). Yet, further research is needed to understand how digital technologies support the transformation toward services in manufacturing companies (Kamp and Parry, 2017; Vendrell-Herrero et al., 2017).

Among the many challenges encountered in literature addressed by manufacturers when shifting towards a product-service provider it is reported the need to adapt the customer journey mapping (CJM) as a service design method for business-to-business (B2B) frameworks (Kölsch et al., 2017), in order to support sales and project execution processes. Moreover, territorial servitisation (TS) (Lafuente et al., 2017, 2019; Vendrell-Herrero and Wilson, 2017; Gomes et al., 2018) and place leadership (PL) (Bailey et al., 2010) are accounted as additional challenges for manufacturing firms. In this vein, there are many researchers devoted to understand how some structural characteristics could push local productive systems (LPS) towards sustainability configurations of PSS for effective TS (Bellandi and Santini, 2019) and how 'PL' can drive re-routing under the uncertainty in the PSI/servitisation shift (Sforzi and Boix, 2019).

3 Categorisation and description of articles

3.1 *Manufacturing technologies (digitalisation) supporting PSI*

The first paper, by Marić, examines 3D printing technology in the context of PSI. Motivated by a literature gap regarding the consumer-level 3D printing technology in business and management disciplines, the article questions how entrepreneurs develop their business strategies for challenging 3D printing market. The findings of the study denote entrepreneurial drivers to leap into 3D printing market arena, as well as the means to create and capture business value on this embryotic and volatile market. Likewise, the article elucidates aspects of business strategy and business model development, where small and medium enterprises (SMEs) can best position themselves on the market through a consumer-centric business model. The study contributes to the ongoing scholar discussions surrounding 3D printing technology, as well as opening new research perspectives on 3D printing and PSI/servitisation fields. Furthermore, the study also provides practical insights for the stakeholders interested in business ventures on 3D printing market.

The second paper by Muhammad discusses the implications and effectiveness of CC in product-service businesses, mainly SMEs. Concretely, it argues that a major part of SMEs perceive IT systems as complex systems that are difficult to maintain and are costly, and that these systems require expert individuals to operate and keep them running. Consequently, it addresses CC as enterprise solutions, which allow organisations to obtain and use high-end technologies that require minimum support to be operated and at a lower cost. Moreover, the article discusses service level agreements (SLAs) and contracts, as a way to make cloud secure and trustworthy for the enterprises seeking state-of-the-art solutions that are legally recognised, well governed and with proper and clear service terms and conditions that a customer can understand.

Continuing with this category, de la Calle et al. analyses how digital technologies support PSI/servitisation transformation. By using a sample of more than 2,000 Spanish manufacturing SMEs, the research applies a 3D framework differentiating between:

- 1 digital technological capabilities through the use of advanced manufacturing technologies (AMT)
- 2 digital capabilities for business relationships at the supply chain level
- 3 digital capabilities for the development and deployment of software and applications.

Adopting a logistic regression, results obtained claim that possessing a sales system to reach customers (B2C) through the internet, and training staff in software and IT usage are outstanding digital capabilities for PSI/servitisation for Spanish manufacturing companies. Likewise, results reveal that AMT association with customer-focused systems increase opportunities for customisation, providing insights for academics, policy makers, and business practitioners and opening future research roadmaps.

Last paper in this category, West et al. investigates the integration of machines and people in services execution. To that aim, the article provides insights from three cases and develops a final integrative model consisting on a visual tool assigned as the counterpart to a person or empathy map of a persona. As such the article deepens in the understanding of a machine or product and the environment in which it operates. The application of this model has been successfully adopted in teaching, in hackathons, and

with projects with industrial firms, using the avatar as the focal point in journey mapping to discover insights rapidly. Accordingly, the model can be applied to asset life cycle or applied to a single service intervention, providing a versatile tool to help us better understand the complex industrial systems in which we operate today.

3.2 Strategic orientation to promote PSI

The first paper of this category, by West et al. explores the use of CJM in B2B environments compared with B2C settings, based on the proposition that B2B environments integrate diverse actors, a matter that calls for a ‘stakeholder’ management. The article unveils the need to assess the multiple complexities of the buying and selling processes. The mapping process developed in this paper emerged from three industrial studies. Reflections on how each firm applies mapping, i.e., both the mapping process and the purpose of the mapping were generated. Using cross-case analysis, an upgraded mapping process is developed taking into account multiple actors, individual roles and responsibilities, processes, and timing. As such, the present approach attempts to provide B2B firms with new tools to understand and support better their customers whether they provide traditional or digital services.

The second paper in this category, by Bellandi and Santini, presents a conceptual framework for the exploration of how TS relates to the presence of a PL impinging on path transformation in LPSs. Concretely, this article argues that knowledge agglomeration of intensive business services (KIBS) might foster the renewal of LPSs towards a new PSS configurations, while the outsourcing of value-added services might raise appropriation problems. Accordingly, the paper explores scenarios where different TS trajectories depend on the coupling of types of PL and patterns of structural components. Results emerged from the study indicate that a strong and open PL would support coordinated solutions among conflictual views and interests, whereas a weak PL or a strong and closed PL might impair the strength of TS trajectories, make them more uncertain, and take to lock-ins if not to an overall decline of the LPS.

Finally, the paper by Kharlamov and Parry, investigates if there is a move to offer more services prevalent in the publishing industry. Following an unsupervised methodology consisting in word pairings and textual similarities the present article attempts to differentiate from previous research on PSI/servitisation based on a positivist approach. The paper holds the hypothesis that any trends in data would naturally emerge and groups form. However, no group emerges from the data. The result may be interpreted as:

- 1 the methodology may be flawed
- 2 the dataset is not representative of the publishing industry – though it has been used previously and firm groupings found
- 3 evidence for servitisation in the publishing industry is not as strong as positivist analysis suggests and that previous methods may suffer from confirmation bias.

4 Conclusions and future research

The present special issue aims at contributing to the growing literature on PSI/servitisation, digital servitisation, PSS, and TS. The theoretical developments as well as the qualitative/quantitative evidence presented offer important lessons for academics, managers, and policy makers. In conclusion:

- The consumer-segment of 3D printing market possesses a high potential for investors and entrepreneurs. However, there exist a real need to innovate in new business strategies and business models to remain sustainable in the long run. Hence, due to embryotic characteristics of 3D printing market, SMEs can obtain competitive edge through consumer-centric business models. Within these models, however, it is required to offer tailored and customised offerings with supportive services, to meet the need of consumers throughout the product life cycle. Further analysis on 3D printing should integrate different regional, national or global contexts to provide a more complete set of entrepreneurial drivers to enter 3D printing market arena. Additionally, future research should also consider to elaborate a detailed list of major challenges faced by entrepreneurs in their business ventures, business strategies and business model developments, which may differ significantly from context to context.
- CC technology holds the capacity to eliminate the requirement to own technological products by providing the opportunity to servitise any IT infrastructure and use it as planned and predicted. This feature makes of CC a technological advancement founded under the servitisation orientation, allowing users to serve themselves from any infrastructure by subscribing to it for a foreseeable time. Further research should elucidate contractual aspects of CC such as click wrap contracts and cloud SLAs offered by servitised cloud vendors. This aspect can further help in understanding the necessary requirements to make use of CC properly and can help firms to enhance their services by improving and better governing them through contracts.
- Service infusion requires diverse technological capabilities, which properly combined can become a key source of sustainable competitive advantage. However, combined AMTs do not foster servitisation by themselves. Conversely, AMTs combination with customer-oriented systems offer interesting opportunities for customisation and therefore to servitisation. Future research should provide a deeper analysis of the types of services developed by companies as well as categorise the different technological capabilities in firms. Likewise, such capabilities should be analysed under specific types of PSI. Finally, forthcoming investigations should consider the analysis of technological resources for co-creation in services, taking into account also additional factors that may play a key role in this relationship, an important issue to date unexplored.
- The avatar model offers a practical counterpart to the persona or empathy map, and so it provides deeper insights to the process that a machine fulfils and how people interact with it. The model approach contains many similarities to the persona or empathy map, which allow the analysis of both traditional services and digitally enabled services. Moreover, the model approach supports service identification along the product life cycle on both maintenance and operativeness. As such, it provides a

visual tool set that operational and design engineers are able to adopt for discovering new services and data patterns. Upcoming research should test new avatar journeys (and blueprints), and more interactions between people and machines using this model approach, including different environments as a way to expand their applicability.

- Customer journey maps corroborate to be a useful tool for equipment sales process, service sales processes, and execution activities. This help firms in obtaining/providing a clear understanding on the information flows supporting a proactive rather than a reactive sales process. Accordingly, the mapping offers deep insights into customers, and how sales, products, and services are managed, improving customer retention, as well as boosting sales volume and margins. Future investigations should shed light on the design of a generic framework and tested it within the PSS as well as B2C environments. Particularly, the framework should be applied to understand firm's service execution aimed at improving customer experience.
- Favourable structural patterns might push local productive systems (LPS) to reach sustainable PSS configurations throughout effective TS trajectories. Moreover, PL helps to drive the rerouting under path-uncertainty. A matter that suggests that the localisation of service providers in a manufacturing LPS is not enough to promote the emergence of PSS. Future research, should attempt to better understand both the contexts of different manufacturing LPS entering TS trajectories towards PSS rerouting, and channels through which the supportive or hindering action of PL on rerouting deploys.
- No observable differences in the strategies of publishers, based on the company publicly available information were found. Such results might be consequential upon either the publicly available dataset is not representative of the publishing strategy in industry or that there is no real evidence of servitisation in the publishing sector. Further research in this area should experiment with a different method using webscraping to gather textual descriptions of activities and offers from company websites.

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