

Servitization and sustainability some insights about its boundaries and mindsets

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Abstract

This study aims to give an overview of the academic literature on servitization and its relationship with sustainability. A systematic literature review was performed combining bibliometric and content analysis. The results provided the basis for some enlightenment on the repercussion of specific boundaries and mindsets.

Keywords: Servitization, Sustainability, Bibliometric study

INTRODUCTION

A wide range of companies around the world is adding value to their main corporate offerings through services (Vandermerwe and Rada, 1989, Hsu et al., 2014, Baines et al., 2009a). It is widely known that services are expected to become an important mean of profit and competitive advantage for industrial firms in the transition from product business to customized and integrated solutions.(Kohtamaki et al., 2013, Oliva and Kallenberg, 2003)

Traditional product-manufacturing companies are tough being forced to change their position to perform the integration of service offerings due to the increasing competitive intensity and market complexity (Gebauer, 2008).

Vandermerwe and Rada (1989) were the first to use the term servitization defined as the offering of market packages of customer focused combinations of goods, services, support, self-service and knowledge aiming to add value to core product proposal .(Baines et al, 2009). Nowadays, servitization is widely recognized as the innovation of a manufacturer's capabilities and processes to move from selling products, to selling integrated product-service offerings that deliver value in use. (Baines et al., 2009b, Baines et al., 2009a, Lightfoot et al., 2013)

Since its origins tough, it has been researched how to provide integrated solutions in a more complex pattern of organizational form, combining elements from systems selling and systems integration.(Davies et al 2007). Concerning economic benefit, latest quantitative models based on empirical results, confirm a positive relationship between the scale of service activities and

profitability, yet only when investments in service capability are translated into economies of scale. (Visnjic Kastalli and Van Looy, 2013)

On the other hand, emerges the term sustainability, whose concept adopted in the present research is the ability of organizations to manage their business not only by maximizing profits, but also by enhancing benefits for society and minimizing negative environmental impact, great source of humanity concerns. (Elkington, 1998)

In this context, the research question for the proposed paper is: *how has been the approaches of the academic literature on servitization? Are they somehow related to the current sustainability concerns?*

After this introduction the paper follows with the research methods, the main aspects of the systematic literature review, the content analysis results and some discussion. Conclusions are presented in the last section.

RESEARCH METHODS

The methodological approach applied was hybrid combining systematic review of the literature guided by bibliometric and content analysis methods. Evidences of this systematic literature review (Tranfield et al., 2003) are presented in the next subsections.

Sample and procedure

Data was obtained from the scientific database ISI Web of Knowledge, Web of Science Core Collection, until July 2015, without any restrictions on academic disciplines, magazines or publication dates. The keyword used to search was “servitization*”, it was conducted for Topic, only refined by the filter of published articles and reviews. Note that the symbol (*) includes any variation of the word and the keyword “sustainability” was not included in a second filter in order not to constrain the results. This analysis was made by reading the articles.

An amount of 57 articles published between 2007 and 2015 were found. The initial analysis presents the evolution of publications, citations, main journals to public in this field, authors, and works. Results are presented in two stages: Descriptive statistics of the general sample with their networks and selected articles content analysis.

This database was chosen for including only indexed journals with calculated JCR (Journal Citation Report) impact factor, and for providing essential metadata for bibliometric analysis, with respective abstracts, references, number of citations, list of authors, institutions and countries, among others. (Carvalho et al., 2013)

In addition, the Sitkis software version 2.0 (Schildt, 2002) was used to perform the social networking, relating the output data from ISI Web of Knowledge (Web of Science), the Ucinet 6.0 program to encode the relationships and the NetDraw to illustrate the relationship diagrams.

ANALYSIS AND DISCUSSIONS - RESEARCH RESULTS

Some of the descriptive results are presented in this section to give an overview on the researched papers. Figure 1 (a) shows the evolution of the publications over the years, with evident increasing over the last years. Although in this sample of the Web of Science Database, the term servitization is shown to be used from 2007 on, there are evidences that the interest in the concept has its origins in the 1960s. (Lightfoot et al., 2013)

The main country that most publishes in the field is England with 32 papers, representing 56% of the sample, as shown in Figure 1 (b), followed by Netherlands, USA and Germany.

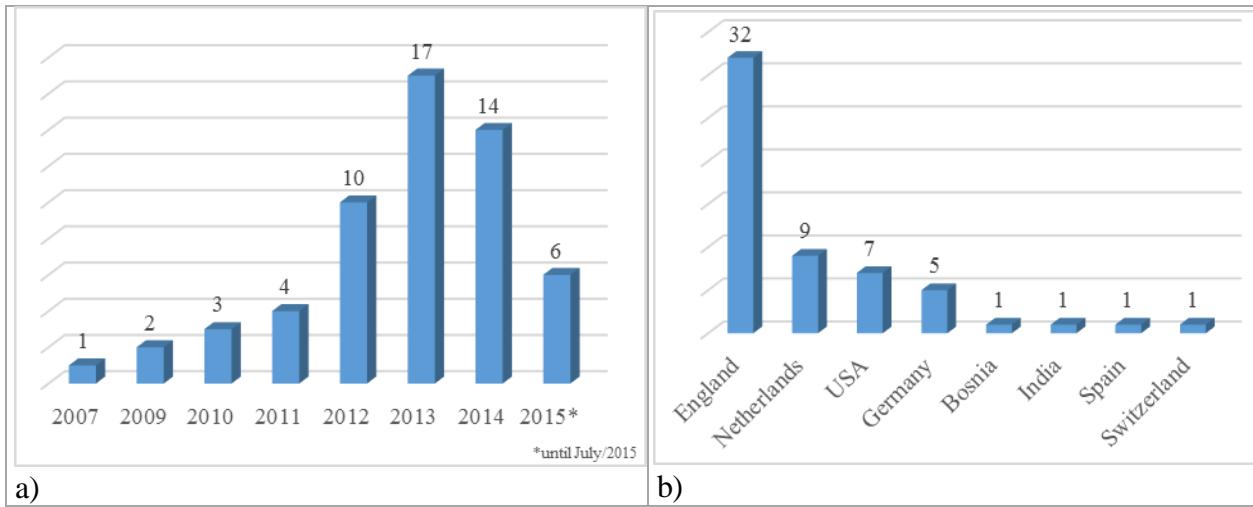


Figure 1:a)Publication year of the articles in the sample; b) Countries where the researchers belong

There were 31 different journals that published articles related to the term servitization. The minimum impact factor (JCR from 2014), among the ones that published at least 2 articles, was 0.577 from the Journal of Business to Business Marketing (Figure 2). Since this theme has been discussed by relevant journals, it is an evidence of its relevance. The two main journals published 6 articles each, corresponding to 22% of the sample, namely: Proceedings of the Institution of Mechanical Engineers Part b-Journal of Engineering Manufacture (0,954) and International Journal of Operations & Production Management (1,736). The twelve journals presented in Figure 2 were responsible for 65% of the published papers.



Figure 2: Main journals of the article sample with respective JCR in parenthesis (Criteria: minimum of 2 articles).

The main Web of Science categories of the publications: Management, Business, Manufacturing, Industrial and Mechanical Engineering, Operations Research and Multidisciplinary Engineering (see Figure 3).

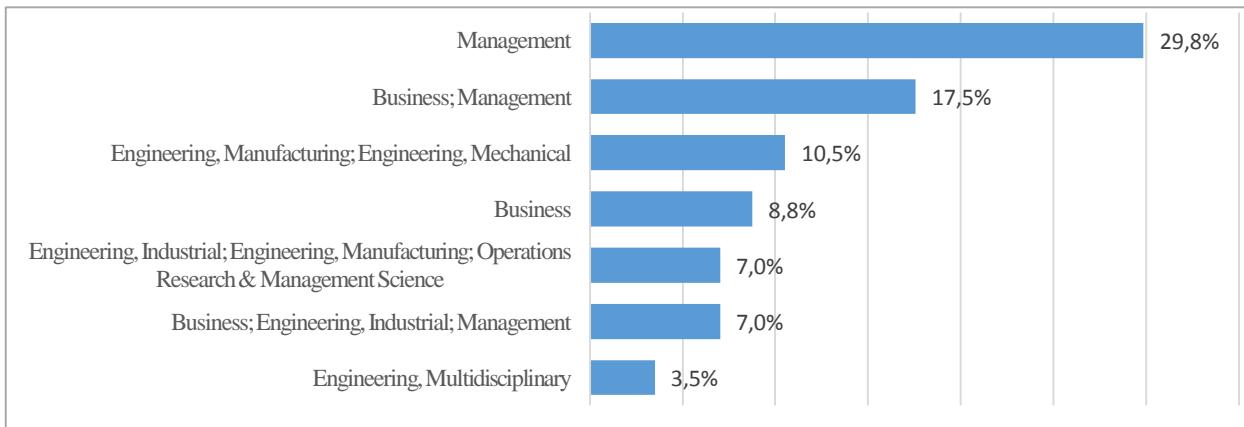


Figure 3: Web of Science main categories of the article sample (Criteria: minimum of 4 articles)

The top 10 articles concerning their total citations distribution over the years are illustrated in Figure 4. It shows the tendency of the papers relevance. Although the first paper of the sample was published in 2007, the year of 2010 was chosen as cut line criteria since it was when some variation on the citations distribution occurred.

The most cited paper of Baines et al. (2007) , bringing the design and conceptualization of product and service system, is still the most relevant one. On the contrary, Raja et al (2010) with some insights on human resources needs to implement services solutions, seems to be losing relevance, especially if compared with the paper of Bastl et al (2012) about the impact on inter-organizational relationships with suppliers on servitized firms . Concomitantly with the work of Schmenner (2009) that enlightens about the necessity of servitization as a competitive strategy whose origin dates back 150 years .

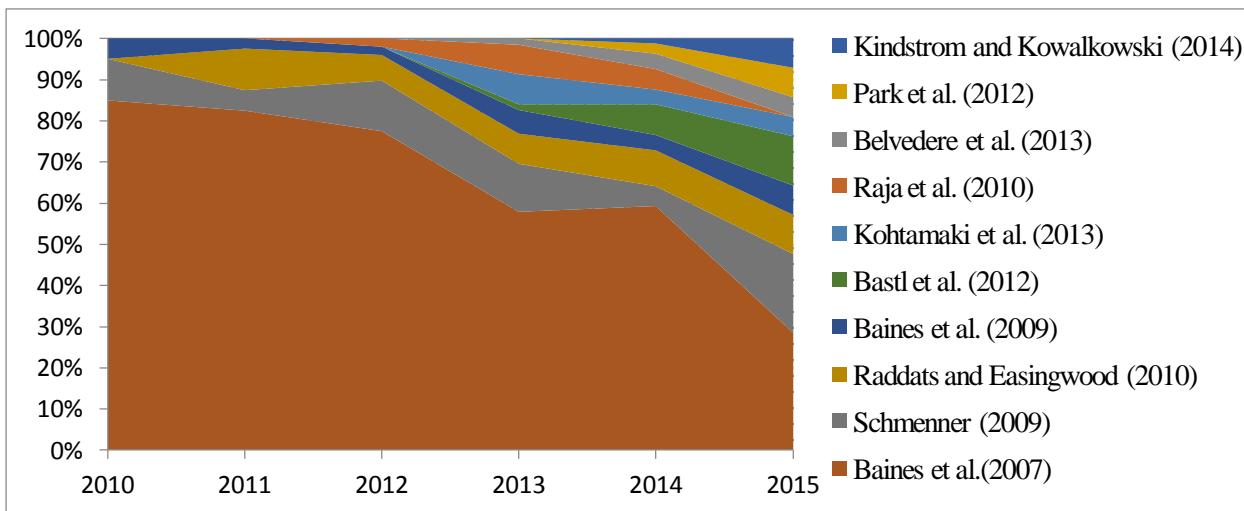


Figure 4: Articles of the sample citations distribution (Criteria: Top 10 of total citations)

The 13 most relevant publications of the sample are in Table 1. The rank is a result of the average citations per year of each paper multiplied by the Journal Impact Factor (JCR). This metric enables recent relevant publication to be identified, even not having many citations in absolute terms. The total citations of the top articles is also shown as a comparative parameter.

There are many common aspects in both of the articles rank (Figure 4 - *total citations* and Table 1 - *average citations*JCR*). Despite the combined approach within each paper, concerning Lightfoot et al (2013) propositions, they were classified as follows:

- Competitive strategy: (Schmenner, 2009, Raja et al., 2010, Kindstrom and Kowalkowski, 2014, Raddats and Kowalkowski, 2014, Zhen, 2012, Lightfoot et al., 2011);
- Customer value (Belvedere et al., 2013);
- Customer relationships (Raddats and Easingwood, 2010, Bastl et al., 2012, Kohtamaki et al., 2013, Finne and Holmstrom, 2013);
- Product-service configuration (Baines et al., 2007, Baines et al., 2009b, Lightfoot et al., 2013)

Network Analysis

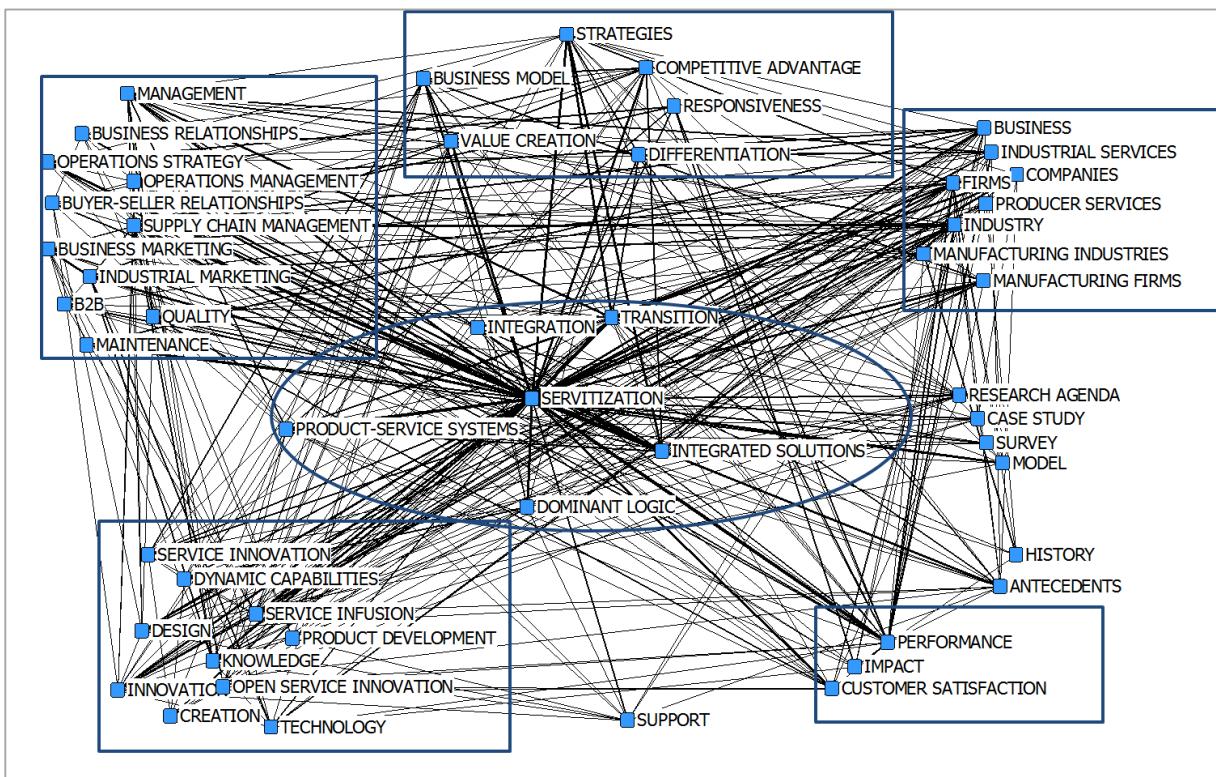


Figure 5: Network representing the main keywords used by the articles sample and its relations

* Note: The lines weight illustrate the intensity of the relations between the keywords

The keywords network (Figure 5) presents the main words used at least by two articles in the sample. The lines strength connecting the nodes illustrate the frequency of the keyword use in the same article simultaneously. The main subjects approached include: (1) strategy, (2) business/industry, (3) operations management (4) performance and (5) innovation, centered the main research area: servitization. Since the sample was restricted, one can observe high intensity on the relationship among the keywords (thickness of the lines). Evidencing the propositions of Lightfoot et al (2013).

Table 1: Most relevant articles in the sample by number of total citations and citations per year*JCR.

Author (Year)	Title	Journal (JCR)	Total Citations (Rank)	Average Citations *JCR (Rank)
Baines et al.(2007)	State-of-the-art in product-service systems	Proceedings of the Institution of Mechanical Engineers Part B-Journal of Engineering Manufacture(0,954)	208 (1)	22,05 (1)
Schmenner (2009)	Manufacturing, service, and their integration: some history and theory	International Journal of Operations & Production Management(1,736)	30 (2)	7,45 (2)
Raddats and Easingwood (2010)	Services growth options for B2B product-centric businesses	Industrial Marketing Management(1,82)	23 (3)	6,97 (3)
Kohtamaki et al. (2013)	Making a profit with R&D services - The critical role of relational capital	Industrial Marketing Management(1,82)	10 (6)	6,06 (4)
Bastlet al. (2012)	Buyer-supplier relationships in a servitized environment An examination with Cannon and Perreault's framework	International Journal of Operations & Production Management(1,736)	12 (5)	5,21 (5)
Finne and Holmstrom (2013)	A manufacturer moving upstream: triadic collaboration for service delivery	Supply Chain Management-An International Journal(3,5)	3 (20)	3,50 (6)
Raja et al. (2010)	Concurrent and disconnected change programmes: strategies in support of servitization and the implementation of business partnering	Human Resource Management Journal(1,86)	10 (7)	3,11 (7)
Lieckens et al. (2013)	Optimization of a stochastic remanufacturing network with an exchange option	Decision Support Systems(2,313)	4 (10)	3,08 (8)
Belvedere et al. (2013)	A quantitative investigation of the role of information and communication technologies in the implementation of a product-service system	International Journal of Production Research(1,477)	6 (8)	2,95 (9)
Zhen, L. (2012)	An analytical study on service-oriented manufacturing strategies	International Journal of Production Economics(2,752)	4 (11)	2,75 (10)

The article to reference network (Figure 6) exhibit the main references cited by the papers of the researched sample. To make this network as clear as possible, it was applied a filter of at least 5 citations for citing article (red icons) and at least 5 citations for cited article (blue icons). Their content represent the theoretical basis of servitization (blue ones). One can observe four main clusters (see Figure 6), although only three are connected.

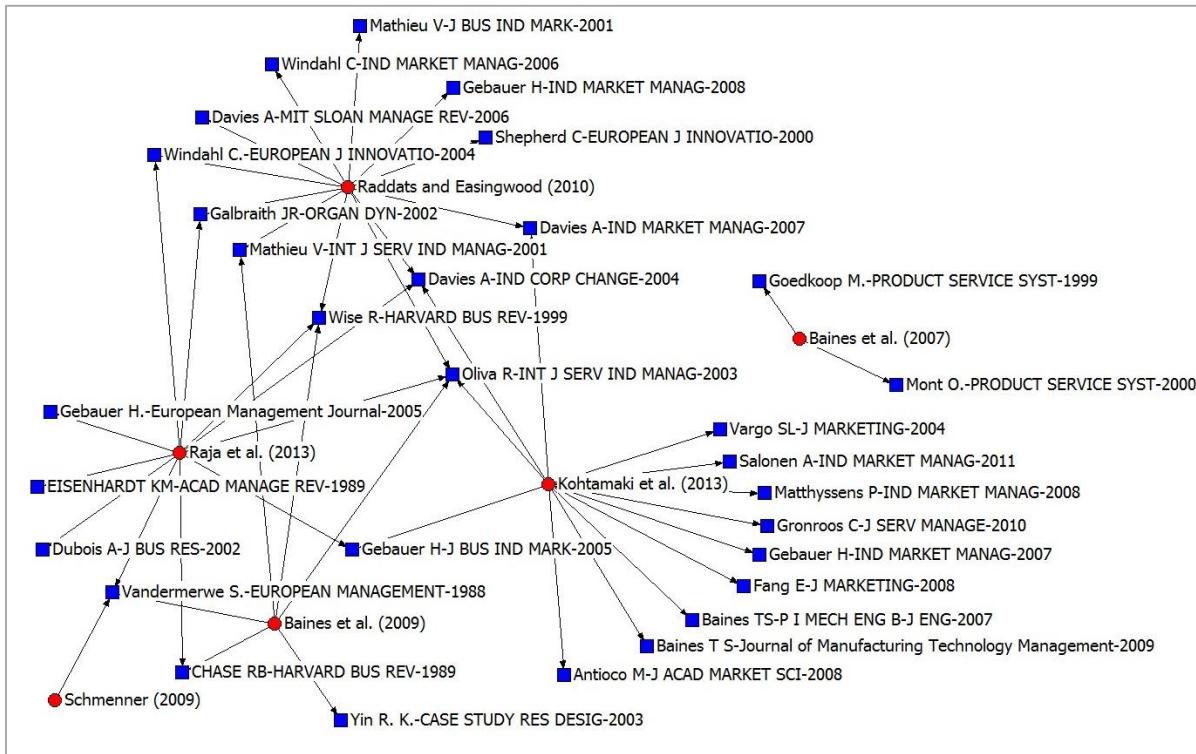


Figure 6: Network representing articles of the sample and the main references used.

* Note: The red symbols are sample belonging and the blue are outsiders references

Baines et al (2007) whose references are related to the concept and design of Product and Service Systems, such as the book of Goedkoop (1999), propose the concept of PSS and a method to analyze it and the extensive report to the Swedish Environmental Protection Agency of Mont (2000). This is the only cluster with intrinsic sustainability relationship.

Raddats and Easingwood (2010) classified as a paper that presents conclusions on customer relationships, brings the following references as presented in Figure 6: the provision of integrated solutions through innovative product and services combinations (Davies, 2004). The deployment of integrated solutions forward and backward (to the service), for three main levels of industry maturity: grow the front end, build the back end and refocus, based on different types of learning processes, capability-building activities and changes in organizational design (Davies et al., 2006). New complex pattern emersion from the combination of elements of systems selling and systems integration. (Davies et al., 2007).

Mathieu (2001b) proposes a typology definition relating services specificity and intensity of organizational service (tactic, strategic and cultural), enlightening the main results of each service strategies combination. Mathieu (2001a) also presents the importance of organizational tactic communication related to services strategies, supporting the product or the client.

The necessity of changes in linkages and communication to accomplish a coordinated effort to build integrated solutions (Windahl et al., 2004) and the importance of inter- and intra-firm relationships to enable and obstruct the development of integrated solutions (Windahl and Lakemond, 2006) are also referenced by Raddats and Easingwood (2010).

Gebauer (2008) identifies some service strategies and its correspondence with specific environment strategy by testing Western European firms, which somehow relates to the different

types of solutions strategies approached by Galbraith (2002). He defends that those solutions result on how customer-centric a company become, determining the overall implementation of organization types.

Oliva and Kallenberg(2003) due to the wide approach of their work, connect 3 of the 4 clusters. The work brings evidences that to succeed with servitization, a manufacturer needs some distinct organizational principles, strategies, structures and processes to build capabilities to the transition from product customer to focus on service offering.

Tree other connection points are performed by the references of Davies (2004), already mentioned, Wise and Baumgartner (1999) that alerts about the necessity of integrating services into the business model to increase revenue and Gebauer and Friedli (2005) that identifies behavioral dimension of processes and their impact on the transition from products to services.

In another referenced work, Gebauer et al (2005) brings some explanation on financial failure of manufacturing companies when extending activities to service business. Gathered the paper Gebauer and Fleisch (2007) evolves the research by identifying how motivation influences investments and revenues in the service business.

Raja et al (2010); Schmenner (2009) and Baines et al (2009) are also connected by Vandermerwe and Rada (1989) that enlightens about business strategy, servitization transition and how to blend services into the overall strategies of the company. Chase and Garvin (1989) emphasize the need of identifying a focused set of customer needs to rapidly fill them; beginning with those services, or a single service model, the whole organization is good at.

Kohtamaki et al (2013) since this paper has quantitative evidences, their references are supposed to support the logical conceptual framework performed. For this, referenced work as Vargo and Lusch (2008), explain the mindsets behind the transition from goods-dominant logic to services-dominant logic (from the business-marketing literature). Salonen (2011) bringing insights about the distinction between products related services and integrated solutions.

Matthyssens and Vandenbempt (2008) researched about the step-by step migration paths to introducing service-based value concepts, by incremental rather than radical actions, which should be complemented with value chain clarifying to support multilevel industry and organizational alignment. Gronroos and Helle (2010) presents that the sharing of gains obtained by the creation of incremental value among customers is possible in the form of additional value for the business partners, through a price mechanism.

Fang et al (2008) is a quantitative study that proves that the impact of adding services to core products on firm value amplifies as industry turbulence increases but diminishes when the firm's core products are in high-growth industries. Anticoco et al (2008) also evolves the research towards qualitative assessment of service business orientations implementation. Again, there was a validation of the distinction between services in support of the client's actions and services in the support of the product.

As a parameter reference, Baines et al (2009a) brings a literature review on servitization, defining and synthesizing the most prominent aspects approached by the published papers until 2008.

CONCLUSIONS, LIMITATIONS AND FUTURE RESEARCH

This work intends to bring a systematic overview on the servitization literature including issues about sustainability and the internal discussion borders in this research group.

The literature review, combining bibliometric analysis and content provides an overview of the literature, extracting the main issues, gaps and trends. Although the word servitization dates from 1988 (Baines, 2009) the theme has been more intensively discussed in the last years.

The main country to publish on the subject was England with 32 papers. Among the main journals, the Journal of Engineering Manufacture (0,954) and International Journal of Operations & Production Management (1,736) published most on the area. The keywords network supported the categories of the Web of Science database, revealing the papers main theme have broader relation with competitive strategies of business, operations management related to multidisciplinary engineering, and performance indicators to operational research.

After reading the articles of the total sample (57 papers), the most relevant ones, in terms of citations index, where categorized as done by Lightfoot et al. (2013). Most of them dealt with competitive strategy. One cluster of the keywords network, only discussed in recent papers, refers to innovative solutions, business model innovation and technology approaches. This evidences a relatively new trend of research and an actual tendency of mixed approach of products and services integration solutions with innovative business model (Tongur and Engwall, 2014) as well as the necessity of creating new sources of revenue through technological evolution monitoring of operations to face intense competition (Lightfoot et al., 2011).

Regarding the article to reference network, it was evidenced some external references from the database articles sample, in order to mitigate the limitations of this research. Some of these approaches are the one specially conceptualized by Baines (2007) referring to Product-Service system, which constitute a separated cluster from the servitization community, and whose initial references where Mont (2000) and Goedkoop (1989). Sustainability, as defined in this work, is systematically mentioned by this researchers cluster inside the bigger servitization concept.

Other themes that emerged from the outsider references where the complexities, benefits and difficulties of integrated solutions (Chase and Garvin, 1989; Davies, 2004, 2006, 2007; Oliva and Kallenberg, 2003). Results of services strategies and organizational maturity combination (Mathieu 2001a, 2001b; Vandermerwe and Rada, 1989) and the use of aligned strategies as competitive key to integration (Galbraith, 2002; Gebauer, 2008) are also in these references, as well as the importance of internal and external relationships to develop integrated solutions (Windahl et al, 2004; Windahl and Lakemond, 2006).

Concerning to research limitation, it is important to mention that the research is restricted to the article sample and its references intending to mitigate this issue. As mentioned by other literature reviews on servitization, there are broader literature on the subject, but a chosen sample was mandatory to enable the conduction of this paper, with the perspective that the article sample is an acceptable representation of the population.

Despite the limitations, its systematic approach provides contributions for the academy, since this systematic compilation can be used for developing further research.

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