

Meta-informações das revisões bibliográficas (2018)

1. Referência completa do artigo

ANNARELLI, A.; BATTISTELLA, C.; NONINO, F. Product service system: A conceptual framework from a systematic review. **Journal of Cleaner Production**, v. 139, p. 1011–1032, 2016.

2. Autores (um registro por autor)

Alessandro Annarelli

2.1. Tipo: professor / aluno (que tipo) / parceiro de empresa: Postdoctoral Research Fellow

2.2. Idade: 27

2.3. Anos pesquisando no assunto: ± 3 (since 2014)

2.4. Instituição: University of Udine, but he is from Free University of Bolzano-Bozen (Italy)

2.5. Índice-h: 2 (according to Scopus and Google Scholar)

- Colegas da mesma instituição: Yuri Borgianni (Free University of Bolzano-Bozen) / Alberto Felice De Toni (University of Udine)

2.6. Quantidade de artigos já publicados

- Google Scholar: 6 papers
- Scopus: 5 papers
- Researchgate: 6 (including articles (4), conference paper (2) and full-texts (1))

2.7. Outros artigos significativos (mais citados) sobre outros temas

The most cited papers in Scopus and Google Scholar (within 3 papers):

- Strategic and operational management of organizational resilience: Current state of research and future directions (17 – Scopus / 43 – Google Scholar)

2.8. Outros artigos significativos (mais citados) neste tema

NONE (the paper analyzed has been the most cited)

2.9. Co-autores recorrentes

Based on Scopus and Researchgate:

- Fabio Nonino (Sapienza University of Rome, Italy);
- Cinzia Battistella (University of Siena, Italy);
- Yuri Borgianni (Free University of Bozen-Bolzano, Italy).

Cinzia Battistella

2.10. Tipo: professor / aluno (que tipo) / parceiro de empresa: Associate professor

2.11. Idade: ± 36

2.12. Anos pesquisando no assunto: ± 2 (since 2016)

2.13. Instituição: University of Siena (Italy)

2.14. Índice-h: 10 (according to Scopus) / 12 (according to Google Scholar)

2.15.Colegas da mesma instituição: NONE

2.16.Quantidade de artigos já publicados

- Google Scholar: 26 papers
- Scopus: 30 papers
- Researchgate: 40 (including articles (26), chapter (3), conference paper (11) and full-texts (6))

2.17.Outros artigos significativos (mais citados) sobre outros temas

Three most cited papers in Scopus (within 28 papers):

- From design driven innovation to meaning strategy (56)
- A methodology of technological foresight: A proposal and field study (37)
- Methodology of business ecosystems network analysis: A case study in telecom italia future centre (28)

Three most cited papers in Google Scholar (within 25 papers):

- From design driven innovation to meaning strategy (117)
- Methodology of business ecosystems network analysis: A case study in telecom italia future centre (73)
- A methodology of technological foresight: A proposal and field study (68)

2.18.Outros artigos significativos (mais citados) neste tema

NONE (the paper analyzed has been the most cited)

2.19. Co-autores recorrentes

Based on Scopus:

- Fabio Nonino (Sapienza University of Rome, Italy);
- Alberto Felice De Toni (University of Udine, Italy);
- Alessandro Annarelli (University of Udine, Italy).

Based on Researchgate:

- Fabio Nonino (Sapienza University of Rome, Italy);
- Alberto Felice De Toni (University of Udine, Italy);
- Francesco Niglia (Research Director – Koyslab)
- Dimitri Gagliardi (The University of Manchester, United Kingdom)
- Alessandro Annarelli (University of Udine, Italy).

Fabio Nonino

2.20.Tipo: professor / aluno (que tipo) / parceiro de empresa: Associate professor

2.21.Idade: ±40

2.22.Anos pesquisando no assunto: ± 3 (since 2014)

2.23.Instituição: Sapienza University of Rome (Italy)

2.24.Índice-h: 13 (according to Scopus) / 16 (according to Google Scholar)

2.25.Colegas da mesma instituição: Giorgio Matteuci (Department of Computer, Automatic and Management Engineering)

2.26.Quantidade de artigos já publicados

- Google Scholar: 75 papers
- Scopus: 35 papers
- Researchgate: 102 (including articles (41), books (3), chapter (30), conference paper (28) and full-texts (16))

2.27. Outros artigos significativos (mais citados) sobre outros temas

Three most cited papers in Scopus (within 33 papers):

- Methodology of business ecosystems network analysis: A case study in telecom italia future centre (28)
- A model for assessing the coherence of companies knowledge strategy (27)
- The key roles in the informal organization: A network analysis perspective (26)

Three most cited papers in Google Scholar (within 73 papers):

- Methodology of business ecosystems network analysis: A case study in telecom italia future centre (73)
- Open innovation web-based platforms: The impact of different forms of motivation on collaboration (61)
- A performance measurement system for facility management: The case study of a medical service authority (53)

2.28. Outros artigos significativos (mais citados) neste tema

NONE (the paper analyzed has been the most cited)

2.29. Co-autores recorrentes

Based on Scopus:

- Cinzia Bastistela (University of Siena, Italy);
- Alberto Felice De Toni (University of Udine, Italy);
- Alessandro Annarelli (University of Udine, Italy).

Based on Researchgate:

- Alberto Felice De Toni (University of Udine, Italy);
- Cinzia Bastistela (University of Siena, Italy);
- Mojtaba Khorram Niaki (University of Tehran, Iran);
- Andrea Fornasier (University of Udine, Italy);
- Giorgio Matteuci (Sapienza University of Rome, Italy).

3. Estrutura do abstract (contextualização, gap/lacuna, objetivo, metodologia, resultados e conclusão)

- Contextualization: NONE
- Gap: Literature mainly agrees about PSS benefits, barriers, and partly also on drivers, but from the descriptive and thematic analysis what emerged is a lack of clarity about PSS and its main fields: it started as a topic closely connected with sustainability, but subsequently different fields have developed other terminologies and focuses of research, developing their own theoretical base and frameworks. Therefore, we have

found a lack of interconnection among fields and subject areas. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)

- Justification: A critical aspect in current literature is about the analysis/evaluation of Product Service System performance: economic and environmental analyses should be updated with new methodologies and new perspectives (i.e. privileging an ex post perspective rather than an ex ante one). Furthermore, these analyses should be integrated in a unique tool, which would be essential in providing a complete perspective on the PSS phenomenon and its effects. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)
- Objective: This paper sets out to contribute to a critical theory debate through the presentation and use of a framework for the categorization of literature linked to Product Service System (PSS). (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)
- Results: Moving from the analysis of literature we provide a conceptual structure depicting the current situation of literature dealing with the analysis of economic impact and environmental/social impact of Product Service System. Moreover, we provide a methodological structure, concerning methodologies and research purpose behind papers. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)
- Conclusion: Finally, we propose and discuss main future research directions, connected to the main current research streams: sustainability, Product Service System business models and collaborative consumption. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)

PS.: The abstract was structured following this order: objective, results, gap, justification, conclusion.

4. Palavras-chaves e se foram citadas no abstract (Y = Yes / N = No).

- Keywords: Product Service System (Y); Servitization (N); Post mass production paradigm (N); Industrial product service system (N); Functional sale (N); Systematic review (N)

5. Introdução e/ou revisão bibliográfica introdutória, afirmações / constatações (tipo) versus citações (essa lista pode ser longa, por isso coloquei em forma de tabela)

Afirmação / Constatação	Tipo (*1)	Referência (*2)
A business strategy based on Product Service System (PSS) establishes a value proposition focused on final users' needs rather than on the product [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Baines et al., 2007)
[...] allowing for an easier design of a need-fulfilment system with radically lower impacts, in terms of environmental and social benefit. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Mont, 2002)
In their work in 2003, Manzini and Vezzoli provided examples of organizations employing PSS offerings: this is the case of AMG offering a "solar heat service": "The consumer pays for receiving a service, comprehensive of final	C	(Manzini and Vezzoli, 2003)

result, from installation to the thermal-energy meters and the transportation of methane to the boilers. It also granted the maintenance of the equipment.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)		
Thanks to this, “firms will have an incentive to prolong the service life of products, [...] to make them as cost- and material-efficient as possible, and to re-use parts as far as possible after the end of the product's life” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Tukker, 2015)
Furthermore, product design and manufacturing can no longer be the only source of competitive advantage and differentiation (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(De Zan et al., 2015)
[...] product-service integrated solutions bring innovation potential, adding value to the total offering (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Roy and Cheruvu, 2009)
PSS is a research topic closely linked to business model innovation and sustainability: this is a sub-field of research attracting increasingly more interest from different streams (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	Boons and Lüdeke-Freund (2013)
Understanding how the transformation of business models happens, how “the journey to sustainability” happens, is a key topic attracting the attention of a rising number of scholars, though it is still at a conceptual level, not addressing “the question of the processes through which these new business models are developed by businesses and their managers.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	J	(Roome and Louche, 2015)
In business model literature (e.g. Battistella et al., 2012), in recent years, some interesting topics have emerged, proposing feasible ways to business innovation linked to sustainability concerns, like sharing economy (as recently reviewed by Cheng, 2016), and circular economy (Witjes and Lozano, 2016). As stated above, these topics are closely linked to PSS, and can be seen as a sub-field of PSS/servitization stream of research. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Battistella et al., 2012) (Cheng, 2016) (Witjes and Lozano, 2016)
Traditional manufacturing firms recognise that services in combination with products could	C	(Biotto et al., 2012)

provide higher profit [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)		
PSS is attracting more and more attention as the boundaries between product and service offerings becomes blurred: that is why it appears to be an optimal “strategic alternative for sustainable development of firms (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Park and Yoon, 2015)
[...] “the epochal shift from product-centred mass consumption to individual behaviours and highly personalized needs is now driving firms to rethink their industrial offerings.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	Morelli (2006)
For example, the HiCS (Highly Customized Solutions) research project developed a solution called Punto X: “a system of products, services and expertise, able to offer food solutions that are personalized to meet the needs of specific contexts- of-use. The personalisation is obtained thanks to the flexibility in the meal composition, the organization of distribution and delivery systems, and through service/consumer interfaces.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Krucken and Meroni, 2006)
PSS allows modern organizations to meet these new evolved needs, by also maintaining a clear focus on sustainability needs, which are always more pressing in organizations' core businesses (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Cook et al., 2006)
In this way it is possible to operate a shift in the offerings, securing competitiveness and sustainability at the same time (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Azarenko et al., 2009; Beuren et al., 2013).
Since its origins, PSS attracted the interest of design researchers, because of its nature as a socio-technical system: the term first appeared in 1960 and was coined by Emery and Trist “to describe systems that involve a complex interaction between humans, machines and the environmental aspects of the work system. The corollary of this definition is that all of these factors of people, machines and context need to be considered when developing such systems using Socio Technical Systems Design methods.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)	C	(Baxter and Sommerville, 2011)

<p>A Product Service System (PSS) is as a market proposition that extends the traditional functionality of a product by incorporating additional services (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)</p>	C	(Baines et al., 2007)
<p>Literature on PSSs began to emerge after the publication of the work by Goedkoop et al. in 1999, with seminal works like those by Mont (2002), Manzini et al. (2001) and Tukker (2004), and the significant literature review by Baines et al. in 2007. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	Mont (2002) Manzini et al. (2001) Tukker (2004)
<p>The number of publications about PSSs, as well as scholarly interest, has continued growing until the present, with considerable academic production, as evidenced also by the works of Tukker (2015), Beuren et al. (2013), and Reim et al. (2015). (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	Tukker (2015) Beuren et al. (2013) Reim et al. (2015)
<p>Before the appearance of the above-mentioned research explicitly dealing with PSS, literature was already dealing with a topic strictly linked with PSS: servitization. In fact, both these topics concern the concept of “adding value to their core corporate offerings through services” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	(Vandermerwe and Rada, 1988)
<p>The difference lies in the meaning behind these two terms and in the context in which they are used: although describing the same concept (i.e. “a marketable set of products and services”, Goedkoop et al., 1999), Product Service System is usually used when there is a major interest in the sustainability potentials of the offerings, while the term servitization is mostly used in a purely economic context. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	(Goedkoop et al., 1999)
<p>Moreover, during the years several terms have been created to indicate the same or similar notions: [...] hybrid product, hybrid value bundles and hybrid value creation. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	(Lifset, 2000)
<p>[...] industrial product service system [...](ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	(Meier et al., 2010a,b)
<p>[...] product service combinations, product-to-service, servicification [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)</p>	C	(European Commission, 2014)

[...] post mass production paradigm [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)	C	(Tomiyaama, 1997)
[...] Functional sale [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)	C	(Sundin and Bras, 2005)
[...] and functional product [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)	C	Lindström et al., 2012)
[...] total care product [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)	C	(Alonso-Rasgado et al., 2004)
[...] and integrated solutions [...] (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)	C	(Davies, 2004)
PSS attracts interest from many disciplines. It is an interdisciplinary field, because it presents interesting and challenging characteristics for many re- searchers from different research areas. Business Management mostly investigates the bundling of products and services from a marketing perspective, while in the Engineering & Design field the focus is on designing, developing and delivering the PSS to the final user, together with a developing interest from the ICT and Information Systems disciplines, because of the increasingly close relationship between PSS and technology (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1012)	C	(Boehm and Thomas, 2013)

(*1) Tipos de afirmação / constatação: G (geral), C (contexto), J (justifica o artigo / pesquisa), L (**explicita a lacuna**). A constatação da lacuna é muito importante. Mas é difícil diferenciar J de L.; (*2) Inserir somente autor(es) e ano. A referência completa encontra-se no próprio artigo

6. Casos citados e principais características dos casos

- [...] this is the case of AMG offering a “solar heat service”: “The consumer pays for receiving a service, comprehensive of final result, from installation to the thermal-energy meters and the transportation of methane to the boilers. It also granted the maintenance of the equipment.” (Manzini and Vezzoli, 2003) (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)

- The HiCS (Highly Customized Solutions) research project developed a solution called Punto X: “a system of products, services and expertise, able to offer food solutions that are personalized to meet the needs of specific contexts- of-use. The personalisation is obtained thanks to the flexibility in the meal composition, the organization of distribution and delivery systems, and through service/consumer interfaces.” (Krucken and Meroni, 2006) (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)

- Other cases were only cited and they were not explained in details: “new phenomena like collaborative consumption (e.g. car-sharing, bike-sharing)” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011).

7. Questão da pesquisa, Foco (escopo) e Objetivos (geral primário e secundários)

- Research questions:

RQ1 What are the bases of the research on PSS?

RQ2 What are the outcomes of the research on PSS, intended as current and future research streams?

RQ3 What are the benefits and barriers of PSS?

RQ4 How can we critically define a content framework for the categorisation of literature linked to PSS? (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1013)

PS.: The research questions were presented in the subsection "Research aim"

- Main goal: The main objective of our literature-based research is to show possible conceptual and practical interrelations and to highlight the past and emerging research stemming from different fields and subject areas. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1011)

The purpose of this work is to understand the origins, the current state-of-the-art and the possible future research directions on PSS, in order to give an overview of the current knowledge, discover gaps in existing literature and identify interesting topics for further research. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1013). *PS.: the objective was presented in the subsection "Research aim"*.

- Specific goal: NONE

8. Qual o diferencial deste artigo (análise da revisão) com relação a outras revisões e/ou surveys? (segundo o autor, caso ele tenha citado). Avaliar uma por uma, caso o autor tenha feito isso. Pode montar uma tabela se for o caso.

NONE

But, based on the justification presented by the authors in the subsection "Research aim", I understood that the main difference regarding other publications is that the article presents an investigation of a **gap emerging concerning the analysis of economic and environmental/social impact of PSS to raise the interest in these crucial aspects.**

9. Metodologia

9.1. Descrição Geral: Nome do(s) método(s); se é qualitativo, quantitativo ou combinação de ambos

- Method: systematic review

- Characteristics: The authors employed three steps, which are planning the review; conducting the review; reporting and dissemination (based on descriptive analysis and thematic analysis).

- Approach: qualitative and quantitative (statistical analysis)

9.2. Período de análise das referências (publicações desde que ano)

Initial: 2000 to 2016. Justification: NONE

After the time frame has been expanded in order to cover also previous highly relevant contributions based on citation analysis: 1988 to 2016.

9.3. Tamanho da amostra analisada

224 papers

9.4. Quantidade de referências citadas

145 references

9.5. Foram realizadas observações complementares?

The authors focused only on PSS and its main research fields (and sub-fields). They only included publications in English language.

9.6. Fontes da revisão (casos, periódicos específicos, e quais bases de dados). Quais as justificativas para escolher essas fontes.

- Cases: NONE

- Specific journals: NONE

- Database: Scopus. Justification: “because compared to other sources, as also evidenced by Tukker (2015), Scopus is a tool for electronic literature search, particularly good for works published after 1995, and it has a wide range of subjects and journals.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1013)

9.7. Estratégia para construção da string de busca

The authors only used the terms “product-service system” or “product service system” because they focused only on PSS and its main research fields (and sub-fields).

9.8. String de busca

“product-service system” or “product service system”

9.9. Filtros

- Literature search in Scopus online database in the field of Title, Abstract and Keywords. The authors considered only articles explicitly using the term “Product Service System” or indicating it as synonymous, together with the other terms as industrial product service system, product service combinations, product-to-service, servicification, post mass production paradigm, functional sale, functional product, total care product, integrated solutions, hybrid product, hybrid value bundles and hybrid value creation.

- Identification of selection/exclusion criteria (1. only papers in English with title, author, publication year, source; 2. only papers dealing exclusively with PSS. 3. exclusion: editorials, books review, books, conference papers);

- Reading of full text.

9.10. Técnica / método de análise utilizada

Descriptive analyses based on meta-analysis and statistical analysis;

Thematic analysis based on content analysis to examine in the detail the main topics, research fields and sub-fields.

The articles were coded according to two criteria:

“- Criterion 1: a coding criterion based on methodology and research purpose. According to the methodology employed, we distinguished papers in: Conceptual study, Literature review, Case study, Action research, Survey. According to the purpose: Description, Exploration, Theory building, Theory testing, Theory refinement.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1013)

“- Criteria 2: a content criterion. [...] we adopted a two-dimensional classification: the presence (or absence) of an economic analysis of PSS, and the presence (or absence) of an environmental/social analysis of PSS. [...]” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1013-1014)

9.11. Metodologia para definição de pesquisas futuras

NONE

But, in the “Future research directions” section of this paper, the authors presented that they grouped future directions indicated in the papers analyzed by categories of similarity and by year, in order to find out some topics showing a trend in PSS research.

10. Resultados

10.1. Quantidades resultantes antes e após cada filtro

- Before initial literature search: 342 papers;
- After selection based on title, abstracts and keywords: 246 papers;
- After full text analysis: 210 papers;
- After backward and forward search through citation analysis: 224 papers.

10.2. Definições (resultantes da análise ou mesmo adotadas como premissas no início da publicação)

The authors stated that literature lacked a deep insight into the evaluation of PSS economic and environmental/social impact.

10.3. Evolução da pesquisa / das publicações no assunto

The years with the highest numbers of articles published were 2012 and 2013.

Articles dealing with PSS show a rising trend. There was a relatively large number of papers published in 2006 due to some EU projects ending in that period and partly due to a special issue of the Journal of Cleaner Production. This journal also published a special issue in 2015 focused on Sustainable PSS.

The large number of papers published in 2012 could be related to a special issue of Computers in Industry that, as a result, some papers combining PSS and ICT were published. Regarding the subject areas, Business, Management and Accounting was the first per number of papers, followed by Engineering, Decision Science and Computer Science. Environmental Science was not the main subject area about PSS.

In the most recent papers, PSS linked to sustainability and environmental aspects are no longer the most influent aspects of the PSS research.

Recent focus on PSS research are in the strategic value of PSS connect to customer acceptance of PSS.

10.4.Comunidades / “tribos” / “igrejas”/ áreas de conhecimento / disciplinas identificadas

- Economists;
- Environmentalists;
- All-around;
- Designers.

10.5.Características de cada tribo (os atributos e/ou explicações são definidos pelo próprio artigo)

- Economists: providing only an economic assessment of PSS potential;
- Environmentalists: dealing exclusively with the environmental/ social analysis;
- All-around: providing both analyses;
- Designers: writing about neither the economic nor the environmental/social analysis.

10.6.Principais “achados” (*findings*)

General findings

The main publication media was Journal of Cleaner Production (with 52 papers), followed by Journal of Manufacturing Technology Management (with 15 papers) and International Journal of Production Research (with 14 papers).

Regarding the employed research methodologies, case studies and conceptual studies represented the great majority of papers. The main research purpose was theory building, followed by exploration and theory refinement.

113 papers did not report a definition of PSS. In those that presented definitions, the main aspects covered were: market proposition/customer needs; concept of system; effect on environment (the first definition that associates PSS and sustainability was given by Mont (2002)); networks and infrastructures, tangibility and intangibility, social aspects and partnership.

Definition of PSS

A definition proposed by the authors is: PSS is a business model focused toward the provision of a marketable set of products and services, designed to be economically, socially and environmentally sustainable, with the final aim of fulfilling customer's needs. (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1017)

Research streams

The main focuses of the papers were: sustainability (reuse and recycling, maintenance services and forms of leasing, sharing and/or pooling); strategy and design.

Two emerging research fields were business models and collaborative consumption.

Main topics

The main topics retrieved in the selected papers were: applications of PSS, characteristics of PSS, PSS development/design. Economic analysis and the social/environmental analysis of PSS (which are the related topics in the paper) were some of the less studied topics.

PSS benefits

There were no trends connected with time.

The main benefits are: reduction of environmental impact, differentiation, production efficiency, consumption efficiency and customer loyalty.

PSS barriers

The main benefits are: acceptance from customers, shift in companies' culture/resistance to change, acceptance from stakeholders, lack of technological info and know-how, lack of experience in service design and lack of skilled personnel in service development. An important barrier, related to the environmental issue, is the rebound effect.

PSS drives

The main drives are: building relationships with customers, extending existing offer, searching for Unique Selling Proposition (USP), discouraging newcomers, cooperating with authorities and reducing environmental costs.

Conceptual structure

The papers were distinguished in four categories:

- Economists: 26 papers. Trend from 2009 to 2012. Most of the papers are focused on the strategic value of PSS. The main topics are characteristics of PSS, PSS development/design and applications of PSS. In general, use a quantitative approach.
- Environmentalists: 25 papers. First paper: 2003. Most of the papers are focused on sustainability. The main topic is applications of PSS. In general, use a qualitative approach, and favor a pragmatic/empirical approach.
- All-around: 9 papers. There is a prevalence of the environmental/social dimension together with the focus on strategy. The most common topic is application of PSS. Almost all papers employ Life Cycle Analysis for economic and environmental analysis.
- Designers: 162 papers. The main focuses are on strategy and on design. The recurrent topic is PSS development/design, followed by applications of PSS and characteristics of PSS. The authors concluded that the development/design of PSS contrasts with economic/social/environmental analysis.

The aspect that received little attention is the nature of PSS as a socio-technical system, which should be explored. Some authors considered that PSS does not constitute a new offering but can be viewed as a social innovation and a large-scale social-technical change.

10.7.Outros tópicos que não foram tratados aqui (sugestão para nova meta-informação ou resultados significativos)

NONE

10.8. Proposições de pesquisas futuras (geral)

- Researches in the topic “environmental/social dimensions” using new quantitative methodologies, capable of describing and evaluating also indirect effects on social and environmental dimension attributable to PSS;
- Researches covering all the three aspects of sustainability;
- Researches in the economic dimension and evaluation of PSS, mainly employing an empirical approach;
- Works focusing on the opportunities offered by the integration of economic/social/environmental analysis;
- Researches in the topic “PSS design and implementation”;
- Researches related to strategy, competitiveness and performance, incorporating the research streams about business models and collaborative consumption;
- Emerging sub-field: relationships and networks, followed by markets and customer (consumers’ perception of PSS and researches on B2C market).
- Application of survey methodologies and theory testing work;
- Two potential fields as main future research directions: business models (characteristics and tactics associated to business models) and collaborative consumption (studies about the interconnection between the economic and cultural model of collaborative consumption and use-oriented PSS potential).

10.9. Contribuições (para academia / prática / ambas?)

- Implications for theory: “The added value of this review is in the structures proposed, which highlight interesting issues among PSS research domains, while providing a complete overview of literature from a different perspective, not employed in previous analyses; furthermore this contribution points out the past and emerging research fields coming from all the different fields and subject areas.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1025)
- Implications for practice: NONE

11. Conclusões

11.1. Trabalhos futuros (que o autor se propõe, diferente das proposições futuras)

NONE

11.2. Limitações

NONE

12. SUA ANÁLISE

12.1. Pontos fortes

The paper presents a literature review about PSS focused on the investigation of its economic and environmental/social impacts. A new definition of PSS is proposed integrating those two dimensions. Also, a graphical conceptual structure is defined, which presents the distinction of the papers analyzed in four categories.

The paper elucidates the difference between PSS and servitization: “Product Service System is usually used when there is a major interest in the sustainability potentials of the offerings, while the term servitization is mostly used in a purely economic context.” (ANNARELLI; BATTISTELLA; NONINO, 2016, p. 1013).

The paper is well-structured. It presents a table in Appendix 1 that shows the classification of each paper analyzed in accordance with its research purpose and methodology.

12.2. Pontos fracos

Based on the difference between PSS and servitization presented by the authors, the term servitization is used in an economic context, which is one of the focus of the investigation. However, this term was not used in the search string.

The research methodology is not well-detailed. The authors presented It is not clear how the authors selected the papers from the full reading of them.

The authors did not present in which bases they have proposed a “complete definition” of PSS.

The papers analyzed were separated in four categories. But, the authors did not present how they did that. It is confused to understand how the articles were separated in the “all-around” category.

The authors considered that cases of extra services added to the product offering is PSS. But, in my opinion, the cases of only adding extra services should not be considered as PSS.

12.3. Sugestões para melhoria do artigo

My suggestions are:

- Presenting the separation process of the papers according to the categories;
- Complementing the table of Appendix 1 with the categories, focus and main topics for each paper.

13. Figuras ou tabelas importantes (caso você queira copiar e citar nos tópicos anteriores)

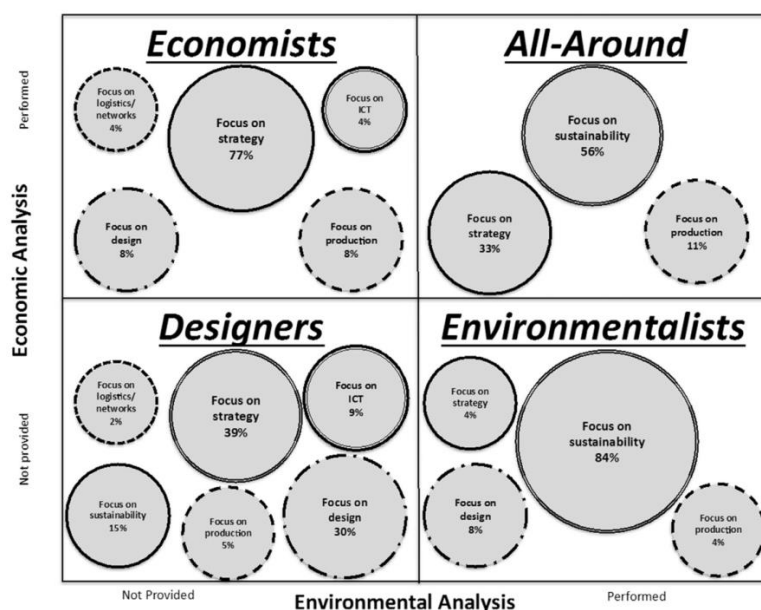


Fig. 7. Conceptual structure.