



Bridging the gap between servitization and social innovation.

Maria Spadafora^{a,*}, Mario Rapaccini^b

^a Department of Mechanical and Industrial Engineering, University of Brescia, Brescia, Italy

^b Department of Industrial Engineering, University of Florence, Florence, Italy

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ABSTRACT

This paper explores the social implications of servitization and unveils the connections between servitization and social innovation. To substantiate these claims, the research elucidates three core concepts of social innovation, namely processes, instruments, and outcomes. The processual view of social innovation examines how societal changes unfold; the instrumental view focuses on tools and mechanisms driving these changes; and last the outcomes view analyses the resultant benefits. The paper reviews systematically the literature on the social impacts of servitization and, based on the mentioned views uses the literature findings to inductively develop three propositions and demonstrate that servitization can represent a form of social innovation, thus capable of profoundly reshaping industrial societies and contributing to progress and people's well-being. In sum, the paper shows the social implications and benefits related to servitization of manufacturing firms and suggests the research priorities in this domain for servitization scholars.

1. Introduction

Manufacturers show an increasing interest in servitization, i.e. the development of more service-oriented business in product-centric firms (Baines et al., 2009), as an opportunity for creating more economic, environmental and social value (Ávila-Robinson et al., 2022; Baines et al., 2020; Bustinza et al., 2024; Tongur and Engwall, 2014). Regarding economic value, the strategic and financial benefits that servitization can bring are well documented (Baines et al., 2017). In certain contexts, servitization has been shown to increase sales, profitability, competitiveness, customer satisfaction, and loyalty (Bustinza et al., 2018; Eggert et al., 2014; Lafuente and Vaillant, 2023; Saccani et al., 2014).

Regarding environmental benefits, there is evidence that the shift to use- and outcome-based integrated product-service offerings can facilitate the advent of circular economy paradigms (Tukker, 2015). Servited manufacturers offer End-of-Use services such as modernization and remanufacturing, that extend the life cycle of goods (Gelbmann and Hammerl, 2015; Parida et al., 2019). Manufacturing firms that combine green investment and servitization strategies can increase their competitiveness and profitability (Lafuente and Vaillant, 2023), as the resource savings from selling outcomes rather than goods can offset the costs associated with implementing sustainability measures (Kohtamäki et al., 2024). To indicate this intersection, that is environmental

sustainability and servitization, Chávez et al. (2021) have coined the term *sustainable servitization*. This is completely in line with the research dealing with product-service systems (PSS) (Tukker and Tischner, 2006). This literature highlights how the integration of products and services promotes economic growth and more sustainable resource management (Rabetino et al., 2018). Indeed, the PSS encourages a focus on the entire lifecycle of products, encompassing their design, production, use, and end-of-life (Evans et al., 2017; He et al., 2018; Rabetino et al., 2015). Specific types of PSS, such as take-back agreements, facilitate recycling and reuse (Tonelli et al., 2009) while sharing, pooling and collaborative use of products can lead to more efficient resource utilization and reduced environmental impact (Reim et al., 2015). Regarding the last aspect, i.e. the social implications of servitization, some studies claim that servitization can also increase people's well-being (Kazakova and Lee, 2022; Liedtke et al., 2015). Servitization has the potential to change production and consumption practices (Mitake et al., 2020; Zhang et al., 2021) and connect economic growth with social progress according to the concept of 'shared value' (Porter et al., 2011). Indeed, the shift from a product-dominated to a customer and service-oriented business implies profound changes to intangible goods such as values and beliefs (Kohtamäki et al., 2018), intellectual capital (Chou et al., 2015; Yang and Evans, 2019; Rapaccini et al., 2023), and consumption behaviours (Mylan, 2015). The hope is that these modifications will affect – in the long run – the consumerist approaches

* Corresponding author.

E-mail addresses: maria.spadafora@unibs.it (M. Spadafora), mario.rapaccini@unifi.it (M. Rapaccini).

of modern societies (Fernandes et al., 2020), reducing goods accumulation in favour of more participative and collective modes of consumption (Briceno and Stagl, 2006).

Despite these relevant premises, many aspects related to the connections between servitization and the broader concept of sustainability remain unexplored, and this offers relevant research opportunities (Baines et al., 2017). This article focuses specifically on the social implications of servitization, which is notably an under-researched topic that has not yet received proper attention (Engert et al., 2016; Kristensen and Remmen, 2019; Niu et al., 2021; Zhang et al., 2022). A reason for this can be attributed to the difficulties of evaluating social implications of complex and interdependent systems (Chou et al., 2015). Social impacts originate from myriads of interactions between stakeholders (Hutchins and Sutherland, 2008). To fill this gap, the paper adopts a literature review to systematically identify the social benefits associated with servitization. In doing so, this study unveils the linkages between servitization and social innovation. As well known, the concept of innovation has greatly evolved beyond the confines of technological, product, and process advancements (Christensen, 1997). Today firms play a key role in addressing and eventually solving the ethical and social challenges of modern societies (Stilgoe et al., 2013; George et al., 2016; Liu et al., 2023). Numerous research strands have recently emerged to explore this broad topic, such as democratizing innovation (von Hippel, 2005), frugal innovation (Radjou and Prabhu, 2014), inclusive innovation (Im and Sun, 2015), responsible innovation (Stilgoe et al., 2013), sustainable innovation (Varadarajan, 2014), and social innovation (Lee et al., 2019). Among the many, we have chosen this latter concept that has emerged as a strong possibility for social progress (Phills et al., 2008) and a way to respond to grand challenges such as poverty, restricted access to education, inequality and exclusion (Cajaiba-Santana, 2014).

Social innovation can be viewed as a *process* that instigates radical transformations from the social point of view, at the micro, meso, and macro levels (Drucker, 1987; Mumford, 2002; Oeij et al., 2019; Voorberg et al., 2015). At the micro level, the units of analysis correspond to the entities that are actively involved and impacted by these transformations, such as firms, local communities, associations, or individuals. Therefore, a strand of literature dealing with social innovation explores the cultural and organizational modifications to the capabilities and practices of these entities (Drucker, 1987; Jiang et al., 2016). At the meso level, the literature focuses on the mechanisms, rules, positions and relationships, through which the stakeholders of a particular ecosystem actively and openly participate, interact and collaborate to produce social changes (Cajaiba-Santana, 2014; Voorberg et al., 2015; Hartley, 2005; Osborne and Brown, 2011; Sorensen and Torfing, 2011; Chesbrough, 2003, 2006; Zott and Amit, 2010). Last, at the macro level, the focus is on long-term evolutions of purchasing and consumption behaviours, habits and practices of markets and societies (Kent and Dowling, 2013; Liedtke et al., 2015).

Social innovation also unfolds in *instruments* that drive changes and solve complex challenges not yet met by governments and firms (Canestrino et al., 2015; Van der Have and Rubalcaba, 2016). According to this literature, these instruments respond to 'the failure of conventional solutions and established paradigms (Nicholls and Murdock, 2012, p.8). For instance, they include 'innovative activities and services that are motivated by the goal of meeting a social need' (Mulgan, 2006, p. 146) and constitute a means of helping the poor in developing markets' (Vassallo et al., 2019). According to this view, social innovation implies overcoming the concept of trade-offs between economic and social value (Stephan et al., 2019). This is in line with the concept of shared value proposed by Porter et al. (2011), whereby economic prosperity and growth are intrinsically related to the opportunity of social progress.

Last, innovation can be deemed social if it yields enduring *outcomes* that target the intricate needs of society (Voorberg et al., 2015). In this case, the emphasis is on those actions that enhance the quality of life and well-being of people and communities (Dawson and Daniel, 2010;

Manjon et al., 2022). Examples of these outcomes are better people's education, higher environmental quality, and longer life expectancy (Pol and Ville, 2009). Other studies concentrate on providing effective solutions to a wide range of social problems, such as marginalisation, inequality, and poverty (Moulaert et al., 2013).

According to these considerations, this paper conducts a systematic literature review on the social aspects of servitization. We use the mentioned views of social innovation as a lens to interpret and present the findings of our literature review. Drawing from these results, the paper speculates that servitization constitutes a form of social innovation. Firstly, because it implies radical transformations that can yield social benefits at micro, meso and macro levels. Secondly, it is an instrument of social innovation because it forces manufacturers to address and confront complex social challenges that otherwise would be out of their scope. Thirdly, servitization can produce outcomes that are significantly consistent with the benefits associated with social innovation practices. This theorization provides a novel contribution to the academic debate on the linkages between servitization and sustainability, and a new perspective on servitization as a tool to simultaneously address economic growth and the grand challenges of modern societies.

The paper is structured as follows: The next section illustrates the research methodology, i.e. a systematic literature review. Section 3 presents the findings from this review, while Section 4 theorizes why and how servitization can be considered a form of social innovation and an agent of social change. The paper ends by showing the originality, value, and contributions of this research together with some limitations and avenues for future study.

2. Research methodology

The aim of this study is both to fill the gap regarding the social dimension of servitization and to introduce a new rigorous conceptualisation in this field. These aims are expressed in the specific objective to theorise to what extent (why and how) servitization can be considered a form of social innovation. To this end, this paper employs a systematic literature review (SLR) (Tranfield et al., 2003), whose findings are then used to develop a novel theory and three propositions. SLR is an effective tool to clarify the knowledge stocks about a specific domain of literature (Davis et al., 2014), but it is also used to substantiate and validate new theories (Snyder, 2019; Tranfield et al., 2003). According to Cook et al. (1997), SLR differs from traditional review methods, as it adopts a replicable, scientific, and transparent process. Consequently, it allows the strict development of unbiased outcomes and reliable knowledge. SLR is also consistent with the peculiarities of the extent of research on servitization. Indeed, servitization literature spans across different scholars' communities (Rabetino et al., 2021), therefore reviews should be large to include all of them and rigorous enough to make it reliable (Baines et al., 2017). Among the many, this study adopts the three-step approach to SLR proposed by Tranfield et al. (2003). These are, namely a) *planning the review*; b) *conducting the review*, and c) *reporting and dissemination*. In the first step, authors search and evaluate the extent of the existing literature, and at the same time delimit the subject area and the topics under investigation. In the second step, they assess and identify what is relevant to the research objectives. Then, in the last stage, the results are analysed, interpreted, and discussed.

2.1. Planning the review

In this study, we refer to the concept of servitization as an organizational transformation in terms of processes, capabilities, and culture to create mutual value by shifting from selling products to selling Product-Service Systems (PSS) (Baines et al., 2009; Neely, 2008). From this perspective, PSS is the object of servitization, which is a system where the material component is intrinsically linked to the service component,

providing value in use to the customer (Baines et al., 2007; Lightfoot et al., 2013; Morelli, 2003). Therefore, considering the close correlation between these two concepts, the research strategy of this article includes both the keywords “servitization” and “product service system”. To retrieve relevant works and shed light on the connections between servitization and social innovation, we employed a broad-search strategy with the following keywords: (“social”) AND (“serviti*ation” OR “product-service system”). This choice is motivated by the fact that the social innovation framework proposed by Lee et al. (2019) is based on terms such as processes, instruments and outcomes, that are too generic and need significant ex-post interpretation. The search was conducted on the SCOPUS database, a comprehensive abstract and citation database of peer-reviewed literature, scientific journals, books, and conference proceedings. We opted for this search engine since it indexes literature from top-ranking publishers such as Elsevier, Springer, Taylor & Francis, Sage, Emerald, IEEE, and Cambridge University Press (Okorie et al., 2021), it is widely recognised as a leading source that offers extensive coverage in this research domain (Burnham, 2006; Grubic, 2014), and it has been extensively utilised in similar studies in the same field (Baines et al., 2009).

2.2. Conducting the review

Running our query resulted in the identification of 237 articles and review articles, published in scientific journals, being in their final publication stage, and written in English. Their titles and abstracts were screened based on their theme. All articles that revealed inconsistencies with the topic of this research were removed. Specifically, we removed works not contributing to the understanding of the convergence between servitization and social innovation. Additionally, if the reading of the abstracts revealed that multiple papers addressed specific aspects of the same subject similarly, we chose to exclude those published in journals with a minor SCImago Journal Rank (SJR). Following this stage, we identified 95 papers. Then, each article in this set was retrieved and accurately read to confirm its relevance. This process further excluded 11 articles. Some articles were by the same authors, discussing topics at different development stages. Some others addressed social issues only in marginal ways and were also discarded. Thus, the final dataset included 84 papers. Each article was meticulously recorded in an Excel database containing a concise summary and general publication details - title, author, number of citations, journal, and year of publication. Then, the authors collaborated in reading the full text to enucleate the paper’s objectives, methodology, key findings, contributions, and theoretical lens. Last, the contents of each article were mapped according to the framework described in Section 1. In this last process, the authors reached a consensus through discussion and multiple interactions. At this stage we also followed the snowballing process indicated by Thomé et al. (2016), to find any other critical sources that specifically explore analogies between social innovation and servitization, and that were not retrieved by our query. We examined meticulously the references of the articles in the sample, to identify studies that consistently appeared across multiple sources. This iterative process of tracing citations led us to uncover three seminal works, respectively from Mylan (2015), who discusses the transformation in consumption habits arising from the proliferation of servitization strategies, from Kohtamäki et al. (2018) who examines the practices at the micro level, and from Benitez et al. (2020), who explore the transformation required by servitization in terms of relational thinking. Below are the reasons these three papers were not retrieved by our query on the SCOPUS database.

- Mylan (2015): the word social is not used in the abstract.
- Kohtamäki et al. (2018): it is a book chapter, and as previously mentioned, chapters were excluded during the identification phase.
- Benitez et al. (2020): the words social and servitization are not used in the abstract.

In conclusion, the criteria led to select 87 papers to address the objectives of this research. The following subsections show some descriptive results from conducting the review.

2.2.1. Review of time distribution

The articles in the reviewed sample were published between 2004 and 2023. Their distribution over the years clearly shows the rising interest in this subject (see Fig. 1). However, this interest has developed quite recently, and more than two-thirds of the selected papers were published after 2018. In addition, early research (e.g., published before 2016) addresses the social aspects as part of broader investigations of sustainability topics. Therefore, it is confirmed that the *per se* discussion about the social implications of servitization has received little attention, only in recent times.

2.2.2. Review of journal distribution

To determine how the knowledge stocks about the linkages between servitization and social impacts have flown among scholars, we also analysed how the selected papers are distributed across different journals. Most articles are published in two journals, i.e. the Journal of Cleaner Production (20%) and Sustainability (18%). These journals specifically welcome studies on sustainability topics. The rest is scattered across a myriad (38) of other journals, as shown in Table 1. The same table also shows the total number of citations received by the articles published by that journal, and the quality scores of the journal such as CiteScore, SCImago Journal Rank (SJR), and Source Normalized Impact per Paper (SNIP). All these data were retrieved from Scopus and computed in June 2023.

2.2.3. Review of citations

In terms of citations, the work of Boons et al. (2013) regarding sustainable development through radical and systemic innovations grounded in the business model concept, emerged as the most influential study, with the highest number of citations (633) (see Table 2). This paper focuses on developing a deeper understanding of how sustainable innovations can be created by introducing the concept of PSS. The second most cited paper (532 citations) is the study of Evans et al. (2017), which develops a comprehensive model to understand how business model innovations can enhance economic, environmental, and social performance. The paper of Martinez et al. (2010) came in next with 393. This study examines the critical challenges faced by UK manufacturing companies that shift to more service-oriented and sustainable businesses. The analysis of these articles highlights some common aspects. Indeed, most papers emphasize the importance of undertaking systemic and holistic transformations, through which the effects of the combined service- and sustainable-oriented innovations can be amplified and obtained.

2.2.4. Review of research methods

Table 3 shows the research methods used by the reviewed articles. In line with the claim that empirical and practical applications over theoretical discussions are still dominating the field of servitization (Kohtamäki et al., 2018), theoretical studies, reviews, and conceptual papers are still a minority in this sample (38%). Delving into this, we can split these conceptual papers into two sub-categories: a) those (21%) that conjecture over specific topics based on literature reviews and, b) those (17%) that speculate around certain arguments to develop novel interpretations.

The remaining articles (62%) adopt theory-driven empirical methods (Melnyk and Handfield, 1998). These can be further split into qualitative (89%) and quantitative (11%) approaches. The former group includes case-based research, focus groups, Delphi, action research, and ethnographies, while the latter mainly adopts simulation models and surveys. These figures are in line with Voss (2010), who asserts that case-based research is the most potent research tool for developing new theories, concepts, and insights in unexplored fields, as is the

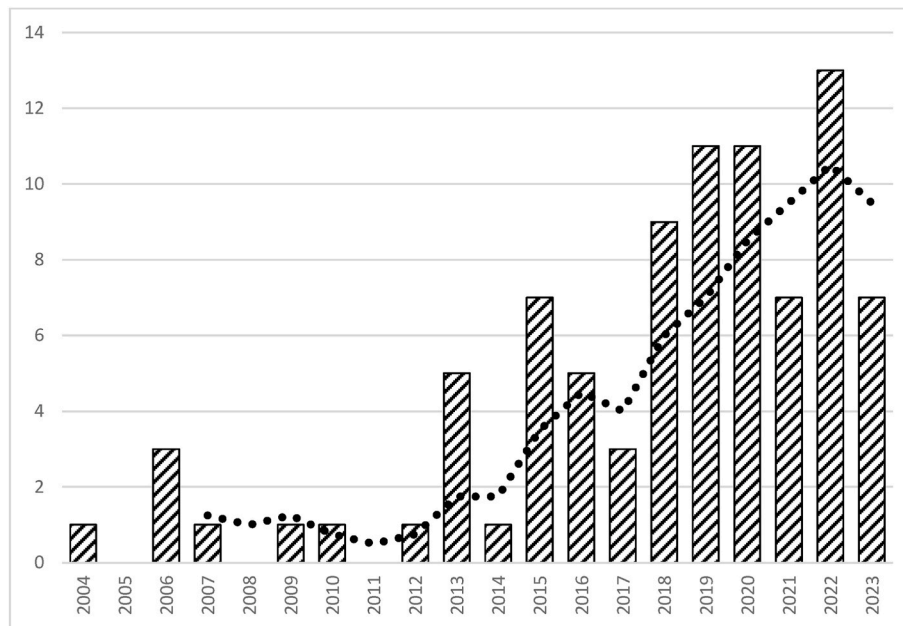


Fig. 1. Time distribution of scrutinized papers, with tendency line (moving average).

domain under investigation. In addition, it is said that multiple case-based research is more appropriate for theory-building than a single case study (Dubois and Gadde, 2014), as evidence gathered from multiple cases is deemed more compelling, robust, and substantiated (Yin, 2009).

2.2.5. Review of theoretical lenses

Nineteen out of the eighty-seven of the scrutinized papers adopt specific theoretical lenses to investigate the social aspects of servitization. Table 4 summarizes these lenses and justifies why they are used to explore the social impacts of servitization. The same table also shows which studies adopt the corresponding lenses.

3. Analysis and reporting of the literature findings

This section uses the framework discussed in Section 1 as a lens to interpret and report the findings of our literature review. This reporting is structured in three arguments: processes, instruments, and outcomes.

3.1. Servitization as a process that produces social benefits at different levels

Servitization can be viewed as a process that can produce social benefits at micro, meso and macro levels (Warde, 2005; Røpke, 2009; Southerton et al., 2012; Spurling et al., 2013; Mylan, 2015). This stream of literature usually adopts practice theory as a lens, to debate and unveil the social benefits of servitization. In practice theory, the consumption of goods is viewed as a practice that arises from cultural conventions and shared meanings (Reckwitz, 2002; Sousa-Zomer and Miguel, 2016). Consumption practices are also affected by the interplay of tangible (i.e., objects, tools, and infrastructures) and intangible elements (i.e., knowledge and embodied skills) (Shove et al., 2012) of a market offering. The next three paragraphs delve further into these arguments.

At micro level, servitization can change the culture, the practices, and the capabilities of industrial firms. There is in fact agreement that the adoption of a service-business logic primarily entails a shift in corporate culture (Bellosi et al., 2023; Negash and Sarmiento, 2023). Services are in fact inherently focused on co-creating value with the customer (Vargo and Lusch, 2008), and this necessitates longer

relationships with the actors of the ecosystem (Li et al., 2020), new ways of communicating value, knowledge-sharing, flexibility, and innovation capability (Morales and Cunha, 2022). Transformations related to the growth of service business demand new corporate practices, not only for service management but also for handling and mitigating the tensions arising with the product business (Kohtamäki et al., 2018). Specific attention should be given to practices for adopting and implementing technologies that enable digital services (Ardolino et al., 2018). Moreover, there is a significant shift in practices related to the sayings, discourses, and narratives of the business (Kohtamäki et al., 2018; Luoto et al., 2017; Prakash and Ambedkar, 2022). As a result, servitization requires new managerial, technical, and operational skills for customer management, relationships within the ecosystem, identifying business needs and opportunities, and managing the digital technologies that enable smart services (Cimini et al., 2021; Li et al., 2020; Ulaga and Reinartz, 2011).

Servitization also produces effects on the meso level, at it notably affects the relationships, positions and rules of social systems. As highlighted by several studies, a fundamental principle for the success of the service business is the capability for value co-creation between the actors of the (social) ecosystem (Munoz Lopez et al., 2020). According to the service-dominant logic, this happens because of the interaction between operand and operant resources (Vargo and Lusch, 2008). Product firms that have shifted to a service business can be viewed as resource integrators and system orchestrators (Vargo and Lusch, 2008). Relationships and positions of traditional supply chains are consequently redefined based on value proposition, characteristics, and operational mode of the product-service system (Morelli, 2006). Considering all the actors that, along with the provider, are active in the value co-creation process facilitates the identification and alignment of mutual interests, also in terms of societal needs (Negash et al., 2021; Shimomura et al., 2018; Yip et al., 2019). The relevance of servitization as a resource integrator is particularly significant within cross-sector partnerships (CSPs), which are collaborations involving organizations from the business, governmental, and nonprofit sectors (Vogel et al., 2022). These partnerships have the potential to generate a significant social impact as they aim to address large-scale economic, environmental, and social issues that cannot be resolved within the boundaries of a single sector (Andrews and Entwistle, 2010; Clarke and Crane, 2018). The introduction of service-based business models can enable and enhance the

Table 1
Distribution of articles in journals and citations.

Journal name	Articles no.	Articles %	Citations no.	Citations %	CiteScore	SJR	SNIP
Jo. of Cleaner Production	18	20,7	2076	40,2	18,5	1,98	2,38
Sustainability (Switzerland)	16	18,3	95	1,8	5,8	0,66	1,20
Sustainable Production and Consumption	4	4,6	22	0,4	8,1	2,03	2,01
Int. Jo. of Production Economics	3	3,4	345	6,7	19,3	3,03	2,92
Jo. of Manufacturing Technology Management	3	3,4	445	8,6	15,7	2,08	2,29
Proceedings of the Institution of Mechanical Engineers Part B: Jo. of Engineering Manufacture	3	3,4	71	1,4	5,7	0,63	1,30
Technovation	3	3,4	97	1,9	12,3	2,41	3,43
CIRP Jo. of Manufacturing Science and Technology	2	2,3	24	0,5	5,9	1,07	1,67
Int. Jo. of Production Research	2	2,3	143	2,8	18,1	2,98	2,88
Jo. of Industrial Ecology	2	2,3	51	1,0	13	1,84	1,87
Jo. of Service Management	2	2,3	116	2,2	16,6	2,88	2,59
Benchmarking	1	1,1	6	0,1	9,7	1,19	1,84
Business Strategy and the Environment	1	1,1	532	10,3	17,8	2,87	2,75
California Management Review	1	1,1	126	2,4	21,6	4,17	3,19
Clean Technologies and Environmental Policy	1	1,1	30	0,6	7,6	0,86	1,22
Ecological Economics	1	1,1	83	1,6	11	1,90	1,97
EMJ - Engineering Management Jo.	1	1,1	7	0,1	4,6	0,63	1,37
Environment, Development and Sustainability	1	1,1	4	0,1	7,2	0,84	1,29
European Countryside	1	1,1	3	0,1	2,5	0,37	0,84
Frontiers in Environmental Science	1	1,1	1	0,0	4,7	1,01	1,48
Heliyon	1	1,1	0	0,0	4	0,61	1,27
IET Collaborative Intelligent Manufacturing	1	1,1	4	0,1	2,8	0,85	0,98
Industrial Marketing Management	1	1,1	122	2,4	13,8	2,66	2,42
Int. Jo. of Environmental Science and Technology	1	1,1	52	1,0	6,4	0,60	1,07
Int. Jo. of Life Cycle Assessment	1	1,1	18	0,3	9,4	1,14	1,40
Int. Jo. of Operations and Production Management	1	1,1	30	0,6	10,8	2,62	1,93
Int. Jo. of Sustainable Engineering	1	1,1	10	0,2	5,5	0,56	0,93
Jo. of Advances in Management Research	1	1,1	1	0,0	6	0,67	1,35
Jo. of Business Research	1	1,1	17	0,3	16	2,90	3,24
Jo. of Computational Design and Engineering	1	1,1	50	1,0	8,7	0,85	1,89
Leather and Footwear Jo.	1	1,1	1	0,0	0,7	0,15	0,20
Manufacturing Letters	1	1,1	178	3,4	5	0,87	1,38
Processes	1	1,1	1	0,0	3,5	0,53	0,89
Resources	1	1,1	150	2,9	6,4	0,70	1,43
Robotics and Computer-Integrated Manufacturing	1	1,1	10	0,2	20,1	2,88	3,35
SAGE Open	1	1,1	7	0,1	3	0,46	1,00
Practices and Tools for Servitization (Book Chapter by Palgrave Mcmillan - Springer International Publishing).	1	1,1	58	1,1	–	–	–
Systems Research and Behavioral Science	1	1,1	35	0,7	4,6	0,58	1,17
Technological Forecasting and Social Change	1	1,1	11	0,2	17,2	2,64	3,01
TQM Jo.	1	1,1	26	0,5	6,7	0,73	1,41
<i>Total</i>	<i>87</i>	<i>100</i>	<i>5167</i>	<i>100</i>			

effectiveness of CSPs by allowing greater and improved integration of complementary resources and competencies.

The literature highlights the importance of adopting a systemic perspective when developing servitization and claims for higher involvement of the counterparts directly from the early design stage (Tran and Park, 2014; Calabrese et al., 2018). This entails the transformation of the concept of the supply chain, i.e., the intra-company flow of materials in the production chain, into a supply network, where the focal point of relationships is the constant and reciprocal exchange of value, resources, and capabilities (Chou et al., 2015; Yang and Evans, 2019; Negash and Sarmiento, 2023). This gives rise to strategic partnerships and relationships with a long-term orientation (Kristensen and Remmen, 2019; Sacconi et al., 2014). The introduction of digital technologies within the offering of product-services strengthens this process of knowledge sharing and co-innovation (Cenamor et al., 2017; Jankovic-Zugic et al., 2023). Indeed, the use of IoT, cloud computing, and data analytics enable the development of digital platforms, through which the firm can connect and manage their installed base. They can use this platform to enable new capabilities from their business ecosystem, that need to be orchestrated to create value (Schroeder et al., 2020; Raddats et al., 2019). It follows that technological, social, and organizational aspects have to be considered not in isolation, but in their interplays, to develop trust among the players (Kohtamäki et al., 2013). This is the key to ensuring the collection of

data from connected products and to reducing customer's reluctance about the misuse of reserved data (Zheng et al., 2020; Ardolino et al., 2018).

Scholars underline also that digital servitization amplifies the transformation of firm interdependencies, contributing to further reshaping positions and balances in the supply network. Indeed, digitalization changes the power structure within the supply chain by enabling the entry of new actors, altering the value proposition, and shifting power dynamics among different actors in the ecosystem (Vendrell-Herrero et al., 2017). In this context some scholars use the social manufacturing paradigm to explain how the adoption of digital technologies such as cyber-physical systems, IoT and digital platforms transforms the role of industrial companies in providers of socialized production services, the more they provide on-demand production capacity to their ecosystems (Ding et al., 2016; Tao et al., 2017). To develop this paradigm, it is crucial to radically redefine the relationships with stakeholders, creating new tools and interfaces for collaboration, socialization, and production process customisation (Zhang et al., 2020).

The relevance of a systemic perspective emerges also about the need to shift to circular business models that are more focused on resource efficiency and, therefore, require higher demand collaboration from the stakeholders (Frishammar and Parida, 2019). Designing product-service systems with a systemic perspective also triggers reciprocal value

Table 2
Classification of the ten most-cited articles.

Authors and year	Title	No of citations
Boons et al., 2013	Sustainable innovation, business models and economic performance: An overview	633
Evans et al. (2017)	Business Model Innovation for Sustainability: Towards a Unified Perspective for Creation of Sustainable Business Models	532
Martinez et al. (2010)	Challenges in transforming manufacturing organizations into product-service providers	393
Morelli (2006)	Developing new product service systems (PSS): methodologies and operational tools	320
Vezzoli et al. (2015)	New design challenges to widely implement 'Sustainable Product-Service Systems'	229
Jiang et al. (2016)	Towards a cyber-physical-social-connected and service-oriented manufacturing paradigm: Social Manufacturing	178
Leismann et al. (2013)	Collaborative consumption: Towards a resource-saving consumption culture	150
Liedtke et al. (2015)	User-integrated innovation in Sustainable LivingLabs: An experimental infrastructure for researching and developing sustainable product service systems	134
Frishammar and Parida (2019)	Circular business model transformation: A roadmap for incumbent firms	126
Kohtamäki et al. (2013)	Making a profit with R&D services - The critical role of relational capital	122

Table 3
Research methods.

Research methods	Articles No.	Articles %
Qualitative multi-case based	23	26,4
Review papers	18	20,7
Conceptual papers	15	17,2
Qualitative single case-based	13	14,9
Other qualitative methods	10	11,5
Quantitative survey	3	3,4
Action research/Participatory Research	2	2,3
Simulation models	2	2,3
Other quantitative methods	1	1,1
<i>Total</i>	<i>87</i>	<i>100</i>

exchange (Evans et al., 2017, Negash and Sarmiento, 2023). In sum, consistent with these considerations, Negash and Sarmiento, 2023 identify the following drivers to produce social impact with a product-service offering.

- Commitment and participation of all the stakeholders in long-term value co-creation relationships.
- Knowledge generation and exchange; efforts should be devoted to creating, managing and exchanging new knowledge, in a way that the key capabilities of each actor are acknowledged and emphasized.
- Employees' care: ensuring the well-being of all participants is crucial in this context, and this requires the development of welfare policies that bring more equity, justice, safety, and health.

In particular, the last point fits with the literature that emphasizes the role of front-line personnel (Chou et al., 2015), which is crucial to achieving customer satisfaction. Therefore, a successful servitization also relies on the ability to ensure the well-being and loyalty of this personnel (Tseng et al., 2019a,b), and this too contributes to the foundational premise of this paper.

Last, servitization can affect social practices and consumer habits, thus acting at the macro level. Indeed, social practices continuously evolve, and firms can accelerate these changes (Mylan, 2015). There is consensus around the fact that a product-service offering can modify both demand and consumption habits over time (Liedtke et al., 2015; Mitake et al., 2020; Spaargaren, 2011), and promote more sustainable

Table 4
Theoretical lenses used to investigate the social aspects of servitization.

Theoretical lens	Description	Relation to social impact	Main contributions
Service Dominant Logic (SDL) Vargo and Lusch (2008)	SDL postulates that value is co-created as value-in-use, through the application of specialised skills; products are merely mechanisms to deliver services, that are the only unit of exchange (service for services).	Servitization is how manufacturers put the focus on the mechanisms through which they can create value for their beneficiaries, as a consequence of the services delivered by their products. This unveils the interactions between social actors that occur to combine and integrate resources and competencies and produce social impacts.	Chen (2018); Zhang et al. (2022)
Social identity theory (Tajfel and Turner, 1979)	Defines how people identify themselves as part of the same social category, on the base of the attributes that classify each group.	Through servitization, the customer is an active part of the service experience, and value is co-created through a continuous flow of experiential activities. As a result, a new group/identity is created to which clients and providers jointly belong. This has positive effects on customer loyalty and brand reputation of the manufacturer.	Jang et al. (2021)
Stakeholder theory (Freeman et al., 2010)	Focuses on the role of the company as a producer of shared value. Firms must look for the satisfaction of their stakeholders, such as customers, workers, suppliers and local communities.	It emphasizes that internal and external stakeholders of product-service offerings are not mere audience but actors who actively interact for sharing resources and abilities.	Chou et al. (2015); Evans et al. (2017); Negash and Sarmiento, 2023
Sociotechnical Systems (STS) Trist (1981)	The capacity to integrate and optimizing all social and technical elements of a complex system (i.e. a firm, a supply chain) is key to the success of the business.	Digital servitization is based on the adoption of digital technologies. These technologies should be integrated into the social system of the company.	Schiavone et al. (2022); Overholm (2015); Cimini et al. (2021); Li et al. (2020); Zheng et al. (2020)
Social exchange theory (Emerson, 1976)	This theory shows how and why ecosystem actors interact with each others, and describes the corresponding value exchange. This is encouraged by reward mechanisms that	A service-based business is based on social values. A product-service offering that considers and integrates these elements is more attractive and drives	Cropanzano and Mitchell (2005); Dalenogare et al. (2023); Graça (2021); Wu et al. (2014); Benitez et al. (2020); Reim et al. (2015)

(continued on next page)

Table 4 (continued)

Theoretical lens	Description	Relation to social impact	Main contributions
	are intrinsic to the system. Furthermore, the theory highlights how interactions between economic actors are driven by social values such as trust, performance satisfaction, commitment, and reciprocity, more than by contractual bindings as in transaction cost theory.	differentiation and customer loyalty.	

consumption (Akenji and Chen, 2016; Retamal and Schandl, 2018). This can be the case with practices in both global and local communities (Fernandes et al., 2020). This change is facilitated by the fact that industrial firms can identify ex-ante what drives the customer's intentions and behaviours. In this case, the offered product-service system can better address social aspects that are of interest to people and communities (Santamaria et al., 2016; Spurling et al., 2013). In this regard, some authors emphasize the importance of considering the tangible elements of the offering, to unveil how these elements are experienced along the usage process. Goods and services need to be designed to stimulate the diffusion of the new practice, which should be preferable to the alternatives from the point of view of sustainability (Wever et al., 2008; Kuijer and Bakker, 2015). Sousa-Zomer and Miguel (2018), for instance, show the mechanisms through which a manufacturer of water-purification equipment discovers the meaning that the customers attribute to the new offerings, and these meanings become relevant inputs to the ideation phase. Another example is the study by Spurling et al. (2013) that focuses on mobility. To achieve more sustainable mobility solutions, this research suggests not limiting car sales – as it would negatively impact the world economy – but promoting the practices of car-sharing and challenging the deeply entrenched habits of privately owned cars (Kent and Dowling, 2013). The linkages between social practices and more sustainable consumption are consistent with the theory of society individualization (Hirsch, 1976), which posits that excessive consumerism originates from the gradual deterioration of social relationships. This in turn leads to the decline of participatory activities, competition in resource accumulation and rejection of mutual interdependence among individuals (Briceno and Stagl, 2006). Servitization can alter this dynamic, as it fosters interactions and collaborations among stakeholders. Product-service systems are also viewed as a collaborative consumption model (Leismann et al., 2013), especially if the focus is put on desirable outcomes. Advanced and outcome-based services require closer cooperation between providers and customers (Evans et al., 2007; Martinez et al., 2010). Other collaborative practices stimulated by servitization are communication (Krucken and Meroni, 2006), the development of relational capital (Kohtamäki et al., 2013), and the sharing of knowledge and resources (Shimomura et al., 2018).

3.2. Servitization as an instrument to address complex social challenges

Servitization is also a way to address complex social challenges that traditional product-centric businesses fail to address. For example, consider the issue related to ensuring prosperity and accessibility to goods to the growing world population. Traditional models based on value-in-exchange would bring unsustainable increases in resource consumption, primarily energy, water, and other raw materials (Akenji

and Chen, 2016; Retamal and Schandl, 2018). In this context, the spread of advanced services in industrial firms can direct this growing demand toward more sustainable uses of scant resources. A case example is presented by Vidickiene and Gedminaite-Raudone (2019), who address the issue related to isolation and poverty that particularly affect elderly people in rural areas. In this context, servitization could provide alternatives to the ineffective solutions that are traditionally based on aid and support from local governments. The mentioned work proposes a service-based solution whereby elders are engaged in carrying out rural activities on land purchased from small entrepreneurs, to respond to the increasing demand of city dwellers, who are more and more eager for direct involvement in countryside life. In this regard, the literature agrees that servitization can be an instrument of social innovation if social implications are considered from early design stages (Sarancic et al., 2022). This is the field of the literature that proposes specific approaches to account for social aspects in the design phase of integrated solutions, such as Design for Sustainability (Clark et al., 2009), Design for Social Sustainability (Corsini and Moultrie, 2021), and Value Sensitive Design (Tsunetomo et al., 2022). Design for Sustainability focuses on individual well-being and incorporates factors like fair work practices, community involvement, and social responsibility to guide product and service design. Design for Social Sustainability is centred on human wellbeing and flourishing of societies now and in the future. Value Sensitive Design is participative and considers the social needs and ethical values of stakeholders throughout all design stages. This approach is especially relevant for the design of smart services, in which some social values are of paramount importance. For instance, this is the case of developing a trusted relationship between the provider of digital services over fleets of connected equipment, and its customers. These latter are always reluctant to adopt IoT technologies with extensive data sharing, as this can potentially raise cybersecurity and privacy issues (Stahl and Wright, 2018).

3.3. Social outcomes of servitization

Previous literature agrees on the social outcomes of servitization. For example, some authors use the concept of sharing economy to explain the multiple social benefits, including fairer access to goods, reduced resource consumption, community bonding, increased engagement and social cohesion among involved parties, heightened local employment, and broader access to goods for low-income. Our findings suggest that servitization produces six kinds of social outcomes, impacting on: a) equity, inclusion and market democratisation; b) job creation, workers satisfaction and productivity; c) local communities; d) public health; e) customer satisfaction; and f) resilience and competitiveness of industrial businesses. Below we provide arguments for each categories.

- Servitization can favour a more equitable society, mitigating disparities and promoting social inclusion (Halme et al., 2004; Kazakova and Lee, 2022; Turienzo et al., 2022). Certain product-service systems that are offered in the form of either rental or pay-per-use contracts are affordable by a broader segment of the population, including marginalised and lower-income groups. Similarly, sharing, pooling, and renting models amplify the accessibility to higher quality products and the latest technologies for a vast consumer base (Clark et al., 2009; Liedtke et al., 2013; Costa Junior et al., 2019; Leismann et al., 2013; Vezzoli et al., 2015). It follows that favouring the spreading of a product-service systems economy can bring several advancements and market democratisation, particularly in developing countries (Lüdeke-Freund et al., 2019). According to this line of reasoning, servitization could also be a form of frugal innovation (Upadhyay and Puneekar, 2023), as it facilitates more efficient value-creation dynamics in resource-scarce environments (Santos et al., 2020).
- Research indicates that the more services become the backbone of an economy, the more new jobs are generated (Markfort et al., 2021; de

- la Calle et al., 2021). Compared to products, services are labour-intensive and typically demand greater investment in people's education and training (Gelbmann and Hammerl, 2015; Yang and Evans, 2019). This raises job satisfaction and motivation (Morino et al., 2020). It is also known that servitization and digitalization are just 'two sides of the same coin' (Day et al., 2004, p. 24). Therefore, the diffusion of smart product-service systems can greatly improve productivity (Spadafora et al., 2023) and working conditions (Gao et al., 2022). For instance, the use of advanced technologies in service delivery can reduce risks to workers' health and safety (Lanzilotti et al., 2022).
- c) Servitization can have a positive impact on local economies, especially in regions where firms have developed more sophisticated product-service offerings (Bal and Badurdeen, 2022; Xing et al., 2013). For instance, large industrial firms that have created centres for the delivery of digital services, remote monitoring and control, and predictive maintenance, have greatly contributed to the development of the digital sectors of those regions, attracting investments and talent, and favouring the constitution of digital startups (Emec et al., 2015; Moro et al., 2022). This suggests that servitization can be a powerful and pivotal mechanism for the development of local communities.
- d) Servitization encourages the adoption of net-zero production and consumption models and reduces environmental footprint, resource consumption, and waste generation (Tukker, 2015). A direct correlation exists between these aspects, and public health and quality of life (Tseng et al., 2019a,b; Laurenti et al., 2016). It is proven that in situations in which natural resources become more and more scarce, and the population grows, there is a natural shift in the focus of economic exchange, from product ownership to product outcomes and user satisfaction (Liedtke et al., 2013; Clark et al., 2009). If bundled with advanced services and outcome-based offerings, products become cost drivers and assets to be managed and optimised. Providers, hence, are motivated to extend the product lifespan, redistribute unused items, and recover and/or refurbish obsolete ones (Fernandes et al., 2020). Therefore, the integration of the circular economy paradigms in a servitization context can have profound societal implications (Du et al., 2022). Last, it is said that user training is crucial to ensure the appropriate product usage in those situations in which product ownership is not conferred (Jellil et al., 2018), and this leads to other positive social impacts on people.
- e) Servitization also implies tailoring offerings to the specific needs of individual customers, and this leads to higher customer satisfaction (Pallaro et al., 2017). This concept is further developed by other studies (Jiang and Ding, 2018; Prakash and Ambedkar, 2022) that emphasize how the customisation of product-service offerings caters directly to consumer demands and results in enhanced responsiveness. Building on this foundation, Xiao et al. (2023) demonstrate quantitatively how manufacturers can significantly boost customer satisfaction through the integration of products and services. Another factor that contributes to this achievement is the ability of developing strategic partnerships within the service network (Li and Choi, 2009).
- f) Digital servitization (Paschou et al., 2020) can enhance the resilience of industrial businesses against global economic crises (Rapaccini et al., 2023). The adoption of digital technologies such as IoT, Cloud Computing, Big Data Analytics, and Digital Twins, that can be seamlessly integrated to offer smart product-service solutions, can boost ecosystem resilience (Sofic et al., 2022). This is crucial for the robustness of industrial economies, that today struggle to tackle unpredictable events (Boons et al., 2013). For instance, the use of additive manufacturing can reduce the cost of spare parts production and management, leading to an increase in the competitiveness of manufacturing firms. Augmented Reality, on the other hand, can amplify field technician productivity and well-being (Aquino et al., 2023). The use of digital twin and simulation models can bring better

product performance and reduced downtime (Schweiger et al., 2022). Last, the adoption of predictive analytics and data science in service delivery can pinpoint inefficiencies and, therefore, lead to cost reduction, higher product quality, and faster market adaptation.

4. The linkages between servitization and social innovation

This article aims to demonstrate how and why servitization can constitute a form of social innovation. Consistent with this objective, we conducted a systematic literature review on the social dimension of servitization based on the three views of social innovation developed by Lee et al. (2019). In light of the analysed results, the authors of this article propose a new theory that explains the connection between servitization and social innovation through three propositions. Indeed, the construction of a new theory allows for addressing a 'why' question by explaining and emphasizing the nature of relationships through logically interconnected rationals (Kaplan, 2017; Sutton and Staw, 1995)

This section discusses and summarizes the findings presented in the previous section and develops some propositions that demonstrate why and how servitization constitutes a form of social innovation.

Proposition 1. *Servitization is a form of social innovation as it implies radical transformations of firms (i.e. micro level), ecosystems (i.e. meso level), and consumption behaviours (i.e. macro level), that can produce numerous benefits from a social point of view.*

At the micro level, social innovation implicates cultural and organisational modification in entities such as manufacturing firms. Consistently to this statement, our work highlights how shifting from a product-oriented to a service-oriented approach requires greater focus on co-creating value with customers, making it necessary to adopt new capabilities and digital technologies, develop new practices and approaches to value communication, and foster relationships with customers (Kohtamäki et al., 2018; Li et al., 2020; Negash and Sarmiento, 2023). At the meso-level, social innovation implicates the transformation of rules, positions and relationships between the stakeholders of an ecosystem. Similarly, previous studies show that servitization alters the relationships in the business ecosystem (Chou et al., 2015; Yang and Evans, 2019). Constant value exchange and resource sharing become focal points, and this requires the setting up of strategic partnerships and long-term relations (Kristensen and Remmen, 2019; Sacconi et al., 2014). At the macro-level, social innovation implies an evolution in consumption behaviours, habits and societal practices. Consistently with this view, servitization literature underlines the dynamic relationship between evolving social practices and the role of industrial firms in driving change (Kent and Dowling, 2013). Product-service offerings can influence demand and consumption habits, promoting sustainable practices. Industrial firms, by understanding customer intentions and behaviours, can design product-service systems that address social aspects that are of interest to people and communities and encourage the adoption of sustainable practices (Kuijjer and Bakker, 2015; Sousa-Zomer and Miguel, 2018). Furthermore, servitization fosters interactions and collaborations among stakeholders contributing to altering the current consumerist model (Briceno and Stagl, 2006; Evans et al., 2007).

Proposition 2. *Servitization constitutes an instrument of social innovation.*

An instrument of social innovation addresses unresolved social concerns of post-industrial societies (Fuchs, 1979). This is totally in line with the PSS concept, that is the most visible outcome of servitization (Rapaccini, 2015). Indeed, PSS is seen as a way to solve societal challenges that product-centric markets fail to address. For example, use-oriented PSSs are a promising way to ensure prosperity and access to goods for the growing global population (Akenji and Chen, 2016). Similarly, the spreading of outcome-based PSSs in advanced economies is expected to increase the yield of scarce resources (Retamal and Schandl, 2018). Furthermore, scholars underline those approaches like

Design for Sustainability (D4S), Design for Social Sustainability, and Value Sensitive Design, which consider social aspects, can be effectively integrated from the very early stages of PSS design and engineering (Clark et al., 2009; Corsini and Moultrie, 2021; Tsunetomo et al., 2022).

Proposition 3. *Servitization can directly produce outcomes that are consistent with the social benefits of social innovation practices.*

Servitization produces an increase in people's well-being (Boons et al., 2013; Moreno et al., 2020). It has been demonstrated that servitization can increase the capacity of manufacturing firms to create, capture, and share economic value (Raz et al., 2017). This has notable implications for any firm's stakeholders, also from the social point of view. In addition, the literature agrees that a service-oriented offering can directly produce greater social benefits than those of a product-based offering. Last, servitization can notably stimulate job creation and better working conditions (Visnjic et al., 2017), as well as better quality of life, poverty alleviation, social inclusion, equity, and justice for local communities (Yang and Evans, 2019; Allen Hu et al., 2012).

5. Considerations and concluding remarks

Previous literature recognizes servitization as capable of creating economic, environmental, and social value (Kazakova and Lee, 2022; Liedtke et al., 2015). Anyway, there is a significant lack of research related to the social implications of servitization (Abramovici et al., 2014; Kristensen and Remmen, 2019; Merli et al., 2018). This is because compared with the economic or environmental benefits, the social dimension of sustainability is intrinsically difficult to assess (Chou et al., 2015; Doualle et al., 2015). Indeed, this is related to the relationships between a firm and its customers, employees, local communities, and suppliers (Halme et al., 2004; Sarancic et al., 2022). Previous research underlines that there is a lack of rigorous conceptualisations in this field (Kohtamäki et al., 2018). This paper fills this gap and provides a comprehensive picture of the social dimension of servitization, on the base of a systematic literature review (Dawson and Daniel, 2010; Manjon et al., 2022). This is the first contribution of this study. Furthermore, this article argues that servitization constitutes a form of social innovation. Based on the theoretical framework proposed by Lee et al. (2019), the paper identifies three views, namely processes (Mumford, 2002; Oeij et al., 2019; Voorberg et al., 2015), instruments (Canestrino et al., 2015; Van der Have and Rubalcaba, 2016) and outcomes (Moulaert et al., 2013), and uses these views to develop a theory about the linkages between servitization and social innovation.

5.1. Theoretical implications

Accordingly, this paper provides a novel contribution to the academic debate on the intersection between servitization and sustainability, with a particular focus on social aspects. Scholars working in this domain can therefore be inspired by this theorization to develop further research and evaluate - qualitative or quantitative - the numerous social benefits of PSS and servitization that this paper enumerates.

5.2. Practical implications

Last, the paper has also practical implications, as it provides managers and policymakers with a new perspective on servitization as a tool that can contribute to societal progress and address the grand challenges of modern societies.

5.3. Limitations

This study has some limitations. Firstly, the authors have employed as a framework the three views of social innovation developed by Lee et al. (2019). Nevertheless, there could be other models, perspectives, or

theoretical lenses through which to examine the social implications of a service-based business model. Furthermore, as highlighted in section 2.2.1, studies on the social dimension of servitization have been exponentially increasing in recent years. This implies that a repeated systematic literature review shortly may yield different or additional results compared to this study. Finally, to maintain quality standards, conference articles and publications in languages other than English were deliberately excluded. Nevertheless, the disregarded sources might offer valuable insights for further research on this topic.

5.4. Future research avenues

This study also claims to further research on this topic. For instance, the literature emphasizes the importance of considering social implications from PSS early design stages, so that servitization can effectively serve as an instrument for delivering social benefits. However, studies on Product-Service System (PSS) design and engineering practices, that take into account societal issues are still in their infancy and require additional research and in-depth investigation. Secondly, the literature regarding how servitization can modify consumption habits is scant, and there is a lack of studies that investigate how advanced services can promote more sustainable consumption and bring about a transformation of the current consumeristic culture. This is therefore another important opportunity for future research.

CRedit authorship contribution statement

Maria Spadafora: Writing – review & editing, Writing – original draft, Formal analysis, Data curation, Conceptualization. **Mario Rapaccini:** Writing – review & editing, Writing – original draft, Validation, Supervision, Methodology, Investigation, Formal analysis.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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