

Extended responsibility through servitization in PSS: An exploratory study of used-clothing sector

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Abstract

Purpose – The global textile-fashion industry is resource inefficient thus requiring higher product- service systems (PSS) intervention. Further, insight of how PSS extends corporate responsibility is rather limited; knowledge of which may contribute towards increased PSS viability. The purpose of this paper is to explore how companies operating with used-clothing PSS extend their responsibilities through servitization.

Design/methodology/approach – An exploratory study of seven companies operating with various used-clothing PSS is conducted through semi-structured interviews and supplementary document studies.

Findings – Six dominant ways through which servitization drives responsibility in used-clothing PSS

are identified. These are through: value-adding services, product leverage, collaborative partnership, information transparency, awareness and platform-enabled networking. Two trade-offs exist in terms of their focus on physical process or digitalization, and developed by honing core competency or collaborative partnership. Further three differentiating attributes underlie these mechanisms for: raising awareness and/or improving transparency, collaboration in value creation and/or in promoting consumption, and product ownership and/or leverage.

Research limitations/implications – A wide range of used-clothing PSS exists each in its own way extending responsibility. In-depth studies are required to investigate the relationship between servitization and extended responsibility for diverse PSS-types and on type of responsibilities they address.

Practical implications – By identifying the key mechanisms or ways and their underlying characteristics companies can identify new servitization forms and ways to extend their responsibility, identify best practices and establish viability beyond the traditional measures, e.g. financial. **Originality/value** – So far no studies have investigated the role of servitization in PSS and how it extends corporate responsibility, especially in industries like textile-fashion, where both resource efficiency and responsibility is low.

Keywords Clothing, Servitization, Textile/clothing supply chains, PSS, Extended responsibility, Product-service system

Paper type Research paper

1. Introduction

Servitization is a growing phenomenon to improve resource efficiency, leading to positive environmental effects for the society (Mont and Tukker, 2006; Tukker, 2015). In this context, product-service systems (PSSs) are one of the most effective instruments to attain a resource-efficient circular economy (Tukker and Tischner, 2006; Tukker, 2004; EC, 2011). A major research stream has identified how these PSS create incentives for better resource utilization leading to improved sustainability (Vezzoli and

Manzini, 2008; Tukker and Tischner, 2006; Mont, 2002a). On one hand this generates new revenue stream, competitive advantage and consumer adoption (Baines et al., 2009), but also pressures increased organizational stewardship (Jayaraman and Luo, 2007) or “extended responsibilities” (Boström, 2015). Current industrial practices show that organizations could attempt to extend their responsibilities in a number of ways to close the loop, e.g. either by taking back used products from consumers, or by taking financial responsibilities to organize collection, reuse and disposal, or by taking informative measures to improve consumer awareness, etc. (Vezzoli et al., 2015). Even though it is this “service content” or servitization in the PSS that enables organizations to show extended responsibility (ER) towards closing the loop, so far little research have addressed the responsibility aspect beyond mere physical management and property rights of post-consumer wastes (Vezzoli et al., 2015).

The textile-fashion industry, in particular, unites a variety of the world’s most resource draining and environmentally stressing industries (Fletcher, 2008; DEFRA, 2008), thus calling for increased PSS intervention. Few researches have shown that servitization in used-clothing PSSs through renting, swapping, redesigning, repair, etc. provides a way to increase product longevity via reuse or collaborative consumption, thus providing alternative models to improve resource efficiency (see Armstrong et al., 2015; 2016; Niinimäki and Hassi, 2011). But in this context of textile-fashion, the scholarly discussion is rather limited as not many researches have highlighted PSS and servitization (Armstrong et al., 2015), not to mention of how these service aspects in PSS lead to higher responsibility undertaking. Further, their scope in used-clothing sector is complicated hence limited due to a wide range of servitization possibilities (Armstrong et al., 2015), difficulties in determining product ownership, etc., thus sparsely researched.

A detailed understanding, in this regard, would contribute to the knowledge of PSS implementation and in seeking viability beyond just financial, strategic and marketing outcomes (Baines et al., 2009), by illustrating its success in driving corporate responsibility. More specifically, this will help textile-fashion companies to identify potential ways through which they may extend their corporate responsibility beyond traditional boundaries, perhaps a way prove their viability. Thus the objective of the current study is addressed by posing two research questions (RQs):

RQ1. How do companies extend their responsibilities through servitization in used-clothing PSS?

RQ2. What are the underlying characteristics?

The structure of the paper reflects an explorative approach. The next sections provide a review of PSS and ER. Next, the case study method is presented followed by presentation of the findings, in Section 5. Section 6 illustrates the six explored ways of how servitization leads to ER, followed by identifying two trade-offs and three pairs of differentiating attributes underpinning them. Section 7 presents the conclusion, industry implications and scope for future research.

2. Concepts

2.1 PSS business models and their scope in used-clothing sector

The unification of product and services is heralded as PSS. Contribution of PSS to sustainability is significant and lies in the disconnection of value from excess material consumption through disengagement with personal ownership and

alternative utilization options (Maxwell and van der Vorst, 2003; Mont, 2002a). Potentially alternative business concepts such as renting, redesigning, upgrading, etc. aim at reducing the reliability on natural resources and at the same time strive for improved product longevity. This makes the role of servitization (or other similar concepts like service-dominance, industrial PSS, etc.) in PSS business models very significant to accentuate sustainability, by extending the value of tangible products through intangible services (Mont, 2002a; Tukker and Tischner, 2006). In this context, PSSs have been identified along multiple categories: product-oriented (PO), integration-oriented (IO), use-oriented (UO) and results-oriented (RO) (Mont, 2002a; Tukker and Tischner, 2006; Tukker, 2004).

PO PSS is where product sales are maximized through additional services (Tukker, 2004). The property right is transferred to the customers and the provider is responsible for providing the agreed-upon services (Azarenko et al., 2009). The service is tied to a product and adds value either through maintenance, financing or taking back the products, etc., e.g. take-back agreements for household appliances (Sundin and Bras, 2005). If adding services seeks vertical integration (e.g. by adding retail, transportation services, etc.) then such PSS can be classified as IO (Neely, 2008). UO PSS is where the product is still at the centre of the service however the ownership remains with the service provider (Tukker, 2004). Hence the provider leases, rents, shares or pools the products and makes it available for the consumer (Armstrong et al., 2015), thus guaranteeing higher product usability for a certain period of time, e.g. leasing of office furniture (Besch, 2005), baby prams (Mont et al., 2006), etc. In RO PSS, the consumer and the provider determine a desired result to be obtained after an agreement; further the result or the capability is sold instead of the product. The main role for the products is to enhance the service and result, hence there is a clear need for decreasing the expenses caused by physical products through higher product utilization and reduced consumption (Tukker, 2015; Armstrong et al., 2015), e.g. cleaning services (Reim et al., 2015).

In clothing PSS, Armstrong et al. (2015) have highlighted such schemes, e.g. take-back, repair and redesign, renting, clothing swaps, etc. and their potential environmental effects through increased dematerialization and product longevity. More specifically, few recent studies have illustrated these clothing PSS business models and their effects, e.g. Janigo and Wu (2015) have asserted how repair and redesign services can stimulate higher product longevity, Pedersen and Netter (2015) have shown the effect of fashion libraries in Scandinavia by promoting collaborative consumption. Many industrial examples of adoption of servitization in used-clothing sector can also be found, e.g. fashion renters like Rent the Runway, take-back schemes arranged by fashion retailers and I: collect, Scandinavian fashion libraries like Resecond, Klädoteket, UK-based redesign platform like Wardrobe Surgery, etc. However, extant literature suggests that clothing PSSs have not always been proven viable due to lack of appropriate sustainable development strategies (Armstrong et al., 2015; Ceschin, 2013).

Besides, PSS being instrumental in driving towards a circular economy through resource efficiency (Tukker, 2015), Stahel (1994) points out that yet another integral aspect of circular economy is product-service “liability”, and is essential for extending both social and environmental responsibilities (Boström, 2015). This responsibility aspect broadens its scope beyond mere physical management of the product-service by addressing various other organizational actions, like fiscal incentives, responsibility for the costs, informative measures, etc. (Vezzoli et al., 2015).

2.2 ER

In line with the current trend towards both environmental and social sustainability, organizations are pressured to assume ER, either voluntarily or mandatory. Such responsibility portrays the willingness to consider the expectations from various stakeholders (e.g. customers, suppliers, shareholders, employers, staff, the government and other actors) to act in a certain desired way beyond one's own organizational borders (de Bakker and Nijhof, 2002).

From a supply chain perspective, ER has gained worldwide attention, in terms of growing sustainability standards and monitoring initiatives (see Boström (2015)), in practice as well as in theory. Specifically in reverse logistics (RL) and closed-loop supply chain contexts, such responsibilities have gained prominence in terms of exercising environmental regulations through extended producer responsibility (EPR) in several countries, aimed at taking back and recovering products after use to reduce waste disposals (Jayaraman and Luo, 2007). According to Lindhqvist (2000) and Tojo (2004), ER issued by EPR can be categorized and evaluated along five different perspectives, namely: liability, economic or financial responsibility (FR), physical responsibility (PR), informative responsibility (IR) and ownership (O).

Liability includes the responsibility for detecting environmental damages related to a specific product. The degree of liability is however limited by legislation and therefore depends on the different national and regional laws and does not lie directly in the hands of the value chain actors. For instance, only a few policy-driven liability schemes are currently existing in clothing, such as France's eco-TLC (Kelly, 2012). Next, economic or FR is used to describe an actor who fully or partly covers the costs of collecting, recycling or final disposal of the products and these costs could be paid either directly or through a special fee. On the other hand, PR refers to an actor taking part in the physical management of the products or the impacts of the products (Lindhqvist and Lidgren, 1990; Lindhqvist, 2000). Further, Lindhqvist (2000) defines IR as the multiple possibilities for an actor to supply information on the environmental properties and effects of its products and create awareness and understanding. Finally, if the actor retains the ownership (O) of its products over the entire lifecycle then it is automatically coupled to the environmental impacts of the products.

RL or closed-loop initiatives undertaken by various brands, retailers and other actors, e.g. in the clothing network, involve product take-back, repairing, upgrading and many other activities to extend product stewardship (Kostecki, 1998), and falls under the broader scope of ER. Such industry-driven voluntary ER where various actors of the value chain are involved proactively, focusses on creating value from used clothes by adding services to the product (Hvass, 2014; Baines et al., 2009). However, this shifting of the responsibility towards the use phase of the product is not exclusively linked to original manufacturers or producers but may also include other actors, like charity organizations and service providers, within the used-clothing value chain.

3. Significance of PSS on ER

PSS highlights a transfer of risk, property rights and incentive from the customer to the upstream actors, thus shifting the responsibility of maintenance and availability (Azarenko et al., 2009). This signifies a transfer of ownership in some cases, while sometimes both type of responsibility undertaken and incentive could be different. However, extant PSS discussion is scarce when discussing responsibilities beyond physical management and product ownership. Existing discussion highlights stakeholder responsibilities in PO-PSSs mostly in terms of product management and

monitoring through post take-back arrangements (Tukker, 2004). In UO-PSS such responsibility of the property rights is kept by the provider through the entire lifecycle who executes the responsibility for the utilization conditions, e.g. timely installation, maintenance, upgradation, etc., during a given period of time (Azarenko et al., 2009). Further, Azarenko et al. (2009) highlight such PRs are undertaken by companies as a product life-cycle supporting activity for encountering product downtime difficulties like claims, product exchange due the critical failure, etc.

Another aspect emphasized by Liu et al. (2014) for successfully executing environmental responsibility (in integrated-PSS models) is the role of collaboration for performing RL activities for end-of-life product management. Such collaboration can take place among various supply chain actors, both business-to-business (B2B) and business-to-customer (B2C), e.g. the producer and its suppliers may learn from the customers on the functional and environmental needs, followed by the supplier providing necessary components to meet the environmental requirements, while the producer, in collaboration with the suppliers, designs and dispatches the product. In addition, the use of third-party providers for PSS delivery, such as leasing, sharing, pooling, as well as for managing-related RL activities can be observed in cases where there is a lack of in-house competences (Tukker, 2004).

Moreover, collaboration enhances the strategic role of networks, such as collaborative networked organizations (CNOs), to combine resources and create synergies and thus refine the service experience (Romero and Molina, 2011; Chiaroni et al., 2010). Romero and Molina (2011) further asserts that in such CNOs, the exchange of co-created knowledge and skills lead to the development of long-term relationships and provide equal and voluntary opportunities for every actor in the ecosystem. In a review work, Reim et al. (2015) have further highlighted the importance of networks at the tactical level for successful PSS implementation, stating the criticality lies in choosing the right type of partners, relationships and in securing sharing and coordination. Chesbrough (2003) equally argues that it is important to have the boundaries between the company and its external environment porous to let the flow of information and innovation both internally and externally, implying that the service provider does not have to deliver all the services on its own and could coordinate the support of internal and external services to the customer. Hence, higher the interaction between PSS and its environment, wider is its network and hence higher is the openness in the company's innovation process (Chiaroni et al., 2010). In used-clothing PSS, such collaborations and partnerships play a crucial role (Hvass, 2014), and can be perceived in many forms, e.g. with designers and brands to form strategic networks (Niinimäki and Hassi, 2011).

Another aspect highlighted is the goal of transforming such CNOs into platforms for opening up the boundaries and providing space where other businesses can thrive (Huang, Qu and Zhong, 2011; Saebi and Foss, 2015). Saebi and Foss (2015) have highlighted how network-based innovation incorporates external actors for improvement of knowledge implying that the organizations become part of an innovation ecosystem. In value network context, such platforms can be assimilated through information technology (IT) tools to integrate producers, suppliers and customers along various RL activities (Liu et al., 2014), thus resulting in "experience-centric networks" where the network of organizations interact and exchange information with customer communities (Romero and Molina, 2011). Mina et al. (2014) explain that the service innovators as a central component of such platform of interactions (e.g. web-based collaboration platforms) support both upstream and

downstream activities and are responsible for building the infrastructure to connect other stakeholders, third parties and consumers. In a way, this generates higher degrees of task coordination and shared information thus attempting to reduce information asymmetry (Reim et al., 2015).

From the above discussion it is evident that PSS research has not investigated the relationship between the inherent service aspects and various types of ER (except PR) explicitly, in closed-loop context. However only recently, evidences from industry practices and some EU-funded projects show that actors are involved in various other ways to support ER, e.g. through fiscal incentives, responsibility for the costs, informative measures, etc. For instance, Vezzoli et al. (2015) urge that informative measures directly steer towards development of sustainable-PSS by disseminating information and know-how of companies operational approaches to increase consumer awareness and to inform users about various environmentally and/or socio-ethically preferable solutions available in the market. Relatedly, Piscicelli et al. (2015) investigated collaborative consumption as a set of practices that engaged users in novel peer-to-peer (P2P) interactions, while Ceschin and Vezzoli (2010) have highlighted that raising consumers' awareness about the benefits brought by sustainable-PSS innovations may stimulate and support a shift towards consumption based on access and sharing rather than ownership. However, these responsibilities are urged to be governmental policy instruments (liability) rather than voluntary responsibilities undertaken by industry-wide actors.

4. Methodology

In line with the research objective and postulated RQs, this paper adopts a qualitative exploratory study to gain significant insight on a relatively unexplored research area. Much research has so far been conducted on PSS implementation and EPR schemes separately, but no explicit research connects the two, thus advocating a theory-building perspective (Eisenhardt and Graebner, 2007). In this context, qualitative research conducted through in-depth interviews and document studies was chosen to build the cases thus suiting the explorative inquiry (Cresswell, 2007). Minor modification is introduced in the framework underpinning the ER concepts to suit the research context and purpose. Considering that there are no current legislations for producers or importers to take responsibilities in used-clothing sector (in the countries from which the cases have been selected), liability as a responsibility has not been further investigated.

4.1 Research design and case selection

In order to examine how servitization extends ER in specific and complex PSS settings, used-clothing PSS in this case, a multiple case study research design was chosen, most reasonable "to evaluate highly broad and complex initiatives" (Yin, 2009). By investigating several cases the logic of comparison applies, those when contrasted generate higher level of understanding of the phenomenon. Since the stated relationship is an emergent phenomenon, the comparison of identified cases could also reveal relevant patterns underpinning an emergent theory (Eisenhardt, 1989), which is why purposive, critical cases were chosen to cover representative examples (Table I). Desktop research based on secondary sources, like business reports and web articles revealed seven relevant, divergent yet representative cases. Each case exemplifies:

- (1) a dominant PSS along the product-service continuum (Clayton et al., 2012), and in the textile-fashion industry (Armstrong et al., 2015); and
- (2) offers distinct servitization in used-clothing sector.

Cases	Description of servitization schemes
Case 1: repair services	Offers free repair services through its repair stores and/or free DIY sewing kits. Further, communicates its repairing initiatives extensively over social media and its website
Case 2: collection and sorting services	Collect, sorts and repurposes used clothes. It also collaborates and shares information with retail partners to develop better collection schemes and raise consumer awareness towards benefits of donation. The clothes are not owned formally but are kept under complete leverage
Case 3: leasing/renting ^a	Rented baby clothes which included door-to-services. Each package contained about 15 clothes and could be rented at € 30. Return services were also offered at an additional price of € 9-10. Besides delivery and pick-up services, laundry and washing was also organized through third party
Case 4: fashion library	Borrows or buys clothes from designers and fashion brands to lend them to users against a membership fee paid every 3 or 6 months. It further organizes laundry and repair services through third parties, along with events and workshops to raise awareness towards collaborative consumption. The donated clothes are not owned formally but are kept under complete leverage
Case 5: redesign services via studio	Redesign services are conducted on the basis of co-created design choices and via workshops. The users retain the product ownership. Payment is made on the basis of agreed upon redesign outcome. DIY activities also impart redesign skills and knowledge towards slow fashion and sustainability to users
Case 6: swapping platform and online marketplace	Offers online platform-based sales and purchase services for used clothes. Receives a fee of 10% of the item price + € 0.50, per transaction. Further it offers its members social networking and communications to promote collaborative consumption and swapping through the creation of a platform-based community
Case 7: digital platform	Offers a decision-support service to users by providing key information of the nearest used clothes drop-off locations through GPS services. It also offers discount vouchers (in collaboration with its retail partners) on disposal

Note: ^aHas terminated its renting business

Table I.
Servitization in
used-clothing PSS

Case 1 is a Swedish fashion brand which engages with repair services of its own brand, representing PO-PSS. Case 2 is a Swiss collection and sorting company which engages with in-store take-back of used clothes at fashion retail partners' stores followed by several disposition activities, and can be classified as IO-PSS. Cases 3 and 4 are UO-PSS, while the former is a Finnish baby clothing retailer which leased its own brand; the latter is a Swedish fashion library which lends clothes against a membership fee. Cases 5-7 represent RO-PSS. Case 5 is a Swedish redesign studio which offers redesign services (design, material, facility and equipment). Case 6 is a German consumer-to-consumer (C2C) sales and swapping platform for fashion clothes – both online and offline, while Case 7 is a Swedish mobile application provider which offers a decision-support system to users by informing about the nearest drop-off locations and by offering discount vouchers.

4.2 Data collection and analysis

Data collection for constructing multiple cases was conducted through semi-structured interviews and document studies, namely written reports and websites (Yin, 2009).

The semi-structured interviews contributed towards developing a conceptual base on the topic as the respondents (with relevant business experience) shared rich descriptions of the phenomenon. The interviews aimed at gaining insights on the servitization schemes and responsibilities undertaken by each company case, hence the respondents were asked to describe relevant aspects, like activities undertaken, nature of collaborations and networking, type of informative measures, product rights and financial incentives, amongst other general questions. This was supplemented by relevant case data gathered from secondary sources, e.g. online reports, news articles and web materials.

All the respondents held top decision-making positions related to sustainability (e.g. sustainability manager, operations manager or owner/CEO) in their respective companies. Such strategic role and responsibility of the respondents justify their viable reflection on the present research topic. Further the answers provided by each respondent can be adjudged as unanimous representative of each case, with confidence that the intra-case differences in opinion on the observed phenomena would be sufficiently low.

Out of the seven identified cases, five interviews were conducted real time, either face-to-face or online, while the remaining two were conducted offline through written correspondence to suit the convenience of the respondents. Despite the possibility of missing out on potentially important non-verbal cues, written interviews were chosen (when convenient), to accommodate hard schedules of respondents and also be resource efficient. Each interview lasted approximately 45-60 minutes and was conducted in English. All verbal interviews were audiotaped and transcribed with the help of transcribing software for analysis later.

Prior to the interview, an interview guide based on the conceptual framework was emailed to the respondents to provide them sufficient information regarding the topic and type of questions. This also provided sufficient scope to the interviewees to prepare data (if required) so that the interviews become resourceful with the right information. Two graduate students were employed to conduct the interviews along with, and were trained appropriately in relevant interviewing tools and processes.

Data analysis was conducted by following a thematic analysis procedure aimed at “pinpointing, examining, and recording patterns (or “themes”) within data” (Braun and Clarke, 2006) – relevant in exploratory research with an aim of developing emergent theory (Eisenhardt and Graebner, 2007, Eisenhardt, 1989). First, the transcriptions were coded with NVivo – a computer – assisted qualitative data analysis system, followed by deconstructing them along “themes”, deduced from the literature review, potentially explaining “how” various servitization schemes lead to ER in used-clothing PSSs. As stated above, these “themes” were created from patterns defining the value-adding services undertaken, nature of collaborations and networking, type of informative measures, product rights and financial incentives.

In the spirit of maintaining the research quality, a clear conceptual framework (underpinning servitization in PSS and ER, separately) was created to guide the empirical research and an interview guide to steer the interviews, thus connecting the outcomes of the research to the reviewed literature. External validity of the research is expected to be consistent considering the analytical generalizability of the “themes” derived from the data, finding support in both theory and industrial practice (Yin, 2009). Additionally clear rationales for the criteria of the critical case selection were stated and details about each case and the research context were given to make the sampling choice comprehensive for the reader (Gibbert et al., 2008), thus ensuring

construct validity. Moreover, all the interviews were recorded and transcribed to ensure data completeness. Furthermore, the “themes” underpinning the relationship between servitization and ER as derived in this research are not limited to the used-clothing industry, but can be generalized to other similar industries with an equivalent approach. Hence, external reliability is represented due to its capability to be generalized throughout a variety of social scenarios (Cho and Trent, 2006).

5. Findings

5.1 Servitization in used-clothing PSS

Various PSS types can be identified to be operating in the textile-fashion industry in the used-clothing sector. The cases discussed in this study are exemplary of these, and largely represents the major operating ones. Table I illustrates their schemes of servitization in detail.

5.2 Extending responsibilities through servitization in used-clothing PSS

5.2.1 Ownership and PR through servitization. The case companies reported to exercise PR and rights on the used clothes predominantly by exercising control over the value-adding RL services and/or by taking leverage over the product. Case 2 (PO-PSS), for instance, highlighted their complete leverage over all the value-adding operations, e.g. collection and disposition stages (sorting and recycling). It reported to organize its activities as a part of collection and disposition services by locating drop-off containers at multiple strategic points, thus exercising full PR in taking back the used clothes (in collaboration with retailers) and subsequently sorting and repurposing them. Case 4 (UO-PSS) similarly issues complete leverage over the used clothes donated, lent or bought from designers or clothing brands, followed by organizing the physical management through display, renting and necessary refurbishing (e.g. washing when required). Generally such responsibility is compensated by issuance of a membership fee as a rent from the user when borrowed.

In contrast, cases 1, 3 and 5 (PO, UO and RO, respectively) reported to exercise PR by offering and managing fewer value-adding services (e.g. repairing, remanufacturing, etc.) matching their business objective to support circularity and core competence. For example, cases 1 and 3 stated to organize minor repairing and mending of their own brand as an in-house activity. Case 1 reports “[...] sales advisors are very engaged and confident and [...] organize repairs as part of daily work in every store”, while case 3 highlighted “[...] if there was a tiny hole we repaired it and we never charged our customers any of this, [...], we had door to door service for both pick and return”. On a similar note, case 5 offered redesign services by organizing small spaces along with tools and materials free of cost to its users. However, cases 1 and 5 do not exercise leverage over the product and the product ownership is still retained by the wearer, whilst case 3 maintains the product’s ownership over multiple use lives.

In a slightly contrasting manner the digital platforms (cases 6 and 7 – RO-PSS) claim to exercise their PR, neither by owning nor physically getting in touch with the used clothes. Instead they control the IT systems necessary to deal with payment and communication for supporting users in various ways. Case 6 extends its PR by supporting users to put their used clothes on the swapping platform, to swap or sell them peer-to-peer, case 7 on the other hand offers a decision-support system to its users via a GPS-enabled digital application helping them with easy disposal of their old clothes and even receive discount vouchers in return.

5.2.2 FR through servitization. Some of the responding cases mainly reported to pay a third party to undertake FR to organize certain value-added services in the used-clothing chain, mainly for collection and subsequent disposition. Case 2, for instance, has created a global network through collaboration with retailers for installing their collection containers in the retailers' shops and pays a minor fee (in some cases) to the retailers to arrange the collection service. Further, all in-bound and out-bound logistics operations are arranged through third party (not specifically value-adding though).

Some of the refurbishing services are also organized by cases 3 and 4 by outsourcing these services and instead paying a fee to arrange them. Both 3 and 4 organize laundry services as well by paying third parties. Further case 4 also pays designers to conduct minor up-scale redesigns on its clothes.

5.2.3 IR through servitization. The responding cases reported to undertake IR in varied ways. Cases 1 and 2 highlighted taking IR by sharing information about their sustainability efforts and practices, associated with closing-the-loop activities very transparently over public media. For instance, case 1 communicates its practices on repairing activities very transparently through its website, social media and own shops by claiming "[...] it increases our transparency in production and company affairs. We disclose our repair information, e.g. documentation of repair toolkit, repair kit booklet and DIY instructions. We are working with a goal to increase the amount of jeans we actually get back, telling people about it and making sure it works, [...] we always have the customers choose what they want to do and how they want their jeans".

Case 2 further administers constant information exchange with its global industrial partners (retailers and producers) proclaiming that it leads to "[...] an improvement of our service offering every day [...] because learning about each other creates space for new approaches [...], and by [...] understanding, where our partners want to go, makes it a whole lot easier to align the strategies [...]". Further by utilizing its comprehensive database, case 2 provides a viable tool for the exchange of know-how and expertise between its partners. Similarly, case 4 reports "[...] we want to benefit from each other, from both customers and corporations. Presently we co-develop our product assortment".

On a different note, cases 4 and 5 advocate and organize various events and workshops aiming at raising sustainability awareness of the customers/users, by either highlighting benefits of collaborative consumption (case 4), or by sharing and facilitating best practices (e.g. by sharing information on product redesignability as done by case 5). Case 4 claims "[...] we try to spread the word and despite of having this wardrobe we also conduct different events where we focus on environmental or sustainable fashion so we always try to remind people why we do this and how they can help".

In yet another case, IR is exercised by upholding and promoting different types of online community platforms (with both users and businesses). Case 6 claims to extend IR by "[...] creating long-lasting and valuable relationship with our members by building a strong community similar to a social networking service, providing communications between team and members, and allowing members to communicate directly via messages and in forums". Case 7, on a similar note, highlights how their digital app enables collaboration between companies and individual fashion users to work together towards a more sustainable consumption, as the users receive information on the nearest location where to dispose their old clothes, based upon a GPS system, along with relevant discount information and vouchers on dropping off their old clothes.

6. Discussion: explored themes and trade-offs

Above findings illustrate that servitization in used-clothing PSSs drives ER through six dominant mechanisms, resulting in two distinct trade-offs and three pairs of differentiating attributes underpinning these mechanisms (ways).

6.1 Mechanism 1: value-adding services for extending PR

In line with Liu et al. (2014), the studied cases highlight the role of RL in PSS for extending PR. Liu et al. (2014) have asserted the necessity of RL to meet triple-bottom line criteria through an integrated-PSS model, where producers conduct end-of-life product management services to take back the exhausted product for various resource reduction activities. The cases here similarly illustrate that those who exercise complete or partial control over the value-adding services (e.g. collection and various disposition stages) are able to render higher PR. Cases 1 and 5, as stated in Section 5.2.1, have developed core competence along a few value-added maintenance and revalorization services, like repairing and redesigning, respectively, to ensure higher resource efficiency and at the same time extend their responsibility as a corporate citizen (Jayaraman and Luo, 2007). Case 1 illustrates this further as its competent sales advisors show constant engagement and confidence in quick repair activities to help a lot of its long-time customers by giving a “new” life to their torn jeans. Such PR exercised through maintenance and repair is, however, automatically transferred in UO-PSS (Azarenko et al., 2009), seen in case 3, as the property rights are retained by them. After each use life, case 3 executes its PR by checking the clothes for mending minor tears (if any) and in sending them to the next user. In RO-PSSs (cases 6 and 7), the services rendered are not directly related to physical management of the clothes but is through ownership of the IT tools and web-platforms required to create and support the RL functions (Azarenko et al., 2009, Liu et al., 2014), essential for PR extension. Both the cases 6 and 7, in this regard, illustrate how the control and monitoring of the IT infrastructure – an online community/forum for swapping clothes in case 6, while a multi-sided digital application for helping users to know about the nearest disposal location in case 7 – contribute towards extending product longevity and circularity.

6.2 Mechanism 2: complete product leverage for extending PR

Compared to the dominant ownership paradigms in both PO- and UO-PSSs, the study revealed illustrative cases (cases 2 and 4) where the ownership structure is complex and hard to determine, and instead leverage over the used clothes is the key mechanism endorsed to realize ER via the offered services. In line with Pedersen and Netter (2015)’s research on fashion libraries, case 4 is able to circumvent the burden of ownership of the used clothes in their assortment which are mainly donated. Additionally people also have the possibility to share their wardrobe for a limited period of time. So instead of ownership, a complete leverage is issued over the fashion items. Similarly, the aspect of ownership is hard to identify for case 2 as well; instead this global sorting company executes complete leverage in managing the disposed clothes – collection, maintenance, disposition and distribution – thus undertaking full PR in managing take-backs, and as Reim et al. (2015) resonate “vertical integration [...] is crucial”. Case 3, on the other hand, is much more traditional in its UO-PSS, executing PR through leverage because of its ownership rights (Azarenko et al., 2009).

6.3 Mechanism 3: collaborative partnership for extending FR

Based on the findings in Section 5.2.2, the cases illustrate the importance of outsourcing value-added services to third parties while organizing their used-clothing network.

More specifically, collaborative B2B networks offer an extended service to different partners with the service at the centre of the PSS. The network partners benefit from mutual exchange (Ekström and Salomonsson, 2014) to compensate for lack of in-house competences (Hvass, 2014), as observed in cases 2 and 4. For instance, case 2 has developed close partnerships with retailers to locate its clothes drop-off containers in the retailers' facilities for strategic collection, while case 4 is largely supported by some retailers and design brands through donation of clothes for developing the fashion library, in both cases ensuring good supply of used clothes. This resonates with the emphasis on network as an important tactical area in PSS for companies who cannot perform all value-adding tasks independently and require support external stakeholders possessing specialized competences, through collaborative arrangements and outsourcing agreements with third parties (Baines et al., 2007; Reim et al., 2015). In practice, it is also common to use third-party providers for both PSS delivery and RL in B2B and B2C settings, such as leasing, sharing, etc. (Mont et al., 2006; Tukker, 2004), as can be seen in case 3 bearing the FR of paying a third-party logistics provider for delivery of the rental clothes both to and from its users, while case 2 organizing the transportation of the collected material accordingly. Collection boxes are picked up by these third-party logistics providers and are transported to the sorting facility of case 2, and in turn are paid on the basis of truck-load.

6.4 Mechanism 4: information transparency for extending IR

Efficient information sharing among various stakeholders and network partners, in both B2B and B2C settings, is a crucial aspect in PSS for reducing information asymmetry (Reim et al., 2015), and is essential for exercising IR in used-clothing PSS. Companies engaged with such transparent communication by, either sharing production and company affairs publicly (as in case 1) or through constant exchange of information with the business partners (as in case 2) managed to execute high level of IR by disclosing their practices and by informing about their undertaken responsibilities.

Compared to other fashion companies, case 1 shares higher level of information (on product repair information, DIY instructions, etc.) to reach considerable transparency outcomes, which results in higher traceability and sustainability (Egels-Zandén et al., 2015), which in turn improves the extent of interaction with its business partners and/or customers. As illustrated in Section 5.2.1, case 1's sales advisors are able to extract external knowledge (from the customers) and internalize it through their interaction in the repair shops, highlighting a degree of open innovation (Chesbrough, 2011a), in the repair service.

Furthermore, collaborative decision making enables better (in-store) collection through constant exchange of information among the partners (Reim et al., 2015) aimed at improving performance of used-clothing network. On a similar note, case 2 engages with retail partners by sharing experiential knowledge in terms of collection volume, frequency, and other demographics, resulting in strategically improving the service performance offered to the customers, as also highlighted by Azarenko et al. (2009) projecting better collection quality.

Such higher extent of transparency and information sharing results in closer interaction with both business partners and customers (Jayaraman et al., 2008), and is required to build a trusted relationship, which in turn improves the service quality and fulfils IR.

6.5 Mechanism 5: raising awareness for extending IR

Compared to existing studies highlighting the role of governmental policy instruments in raising consumer awareness (Ceschin and Vezzoli, 2010; Vezzoli et al., 2015), our

cases reveal the voluntary role taken by used-clothing industrial actors to exercise IR. Cases 4 and 5's advocacy of sustainability-related events and workshops, like swapping and redesign workshops, illustrates how a company can make an effort to inform users and consumers about the benefits brought by various aspects related to PSS and circular economy and thereby stimulate and support a shift towards sustainable consumption practices. Case 4's effort to organize swapping events indicates their effort to promote collaborative consumption and multiple use lives (Pedersen and Netter, 2015). Similarly, case 5's organization of redesign workshops illustrates the dissemination of redesign information and know-how as an effort to develop sustainable alternative to disposal and to develop consumer experience of collaborative redesign that could heighten awareness of redesign possibilities and a new outlook towards clothing (Janigo and Wu, 2015), in the future. Emerging service logic, in this context, also create scope for user involvement in co-creating the experience and service (see Chesbrough, 2011b for open service innovation).

6.6 Mechanism 6: platform-enabled networking for extending IR

As illustrated in Section 5.2.3, digital platforms serve as a tool to organize coordinated tasks and network the partners and users (Mina et al., 2014; Liu et al., 2014), and generate seamless multi-sided service experience. This results in services providing enabling platforms for customers (Manzini and Vezzoli, 2003), describing new type of stakeholder relationships and/or partnerships, as both cases 6 and 7 generated. The swapping platform (case 6) is open for any user to become a member, and every user can decide which items he or she wants to swap, sell or just give away, thus providing the users with the option to maintain a strong online community (through social networking) and the possibility to speak about the products (e.g. their fashion content, history, etc.) they care about. Such forums resembles "experience-centric networks" of user communities essential for value co-creation (Romero and Molina, 2011), to ensure higher information coordination to extend responsibility. This further generates scope for P2P interactions (Piscicelli et al., 2015), where users are engaged in either value co-creation (case 6) or collaborative consumption (in cases 4 and 6). Section 5.2.3 illustrates this through the instance of case 6's C2C communicative activities.

Further such digital collaboration platforms illustrate an increased scope of extending information coordination (Reim et al., 2015), by offering its users the opportunity to connect to a network of partners through the app; as case 7 does by promoting to its users by informing them of the nearest drop-off places and rewards (discount vouchers) offered by its retail partners on donation.

6.7 Trade-offs and differentiating attributes in the mechanisms

Based on the discussion in Sections 6.1-6.6, certain differentiating attributes and trade-offs underpinning the above-mentioned mechanisms could be further located. More specifically, these attributes and trade-offs illustrate that a "one-size-fit-all" approach in extending responsibility – a dominant assumption in previous research – is not exercised in the used-clothing PSSs, and further results in executing different types of ER. The cases allow us to locate two trade-offs underlying the mechanisms; these are: process-focussed vs digitalization-focussed, and competence vs collaboration. The first trade-off highlights whether the servitization is arranged and achieved by rendering value-adding RL services to the tangible goods, as could be seen in cases 1-5, or is achieved through digital services with higher relative importance of service, as

in cases 6 and 7. The trade-off is in line finding 3 in Baines et al. (2009), proposing various forms of servitization along the product-service continuum based upon the relative importance of product and services. The second trade-off asserts whether the service offerings are controlled and exercised by the firms themselves by honing their own core competency (vertically integrated in case 2) or is gained through collaborative partnership. Narrower definition of core competences and higher technological complexity often lead to increasing pressures to outsource services (Baines et al., 2009).

In addition, three pairs of differentiating attributes were identified underlying the mechanisms. These are for: raising awareness and/or improving transparency, collaborative value creation and/or in promoting collaborative consumption, and product ownership and/or leverage. The first pair highlights that the companies operating with used-clothing PSS mostly share information for two reasons, namely as a philanthropic gesture to raise consumer/user awareness towards sustainable practices and issues (as seen in cases 4 and 5) and/or to be transparent about sharing information on their own industrial practices and efforts towards sustainability as a matter of goodwill (as seen in cases 1 and 2), both indicated to enhance corporate citizenship (Jayaraman and Luo, 2007). The second pair highlights that collaboration in the used-clothing PSS can engage both B2B (mainly in case 2) and B2C (in cases 1, 5 and 7) partnerships, as well as P2P interactions (in cases 3, 4 and 6). While the B2B and B2C partnerships create scope for service co-creation and open-source (Niinimäki and Hassi, 2011), P2P interactions are the source of collaborative consumption (Pedersen and Netter, 2015). The third pair highlights the ownership aspect in executing property right – while ownership could be distinctly deciphered in traditional UO-PSS (e.g. in case 3), it can be hard to determine in most cases. Cases 2 and 4 instead issued complete leverage over the clothes while the other cases issued either partial or even “virtual” leverage.

7. Conclusion and implication

The purpose of this study was to explore on how companies operating in used-clothing sector extend their responsibilities through servitization in PSS. This sheds light on various corporate responsibilities (physical, financial, informative and ownership) that are taken in as an outcome of PSS implementation. First, overview of diverse servitization schemes is presented followed by reasoning how these extend corporate responsibilities in used-clothing PSS. This is further elaborated through a thematic analysis thus revealing six dominant ways or mechanisms: value-adding services and complete product leverage for extending PR, collaborative partnership for FR, and information transparency, raising awareness and platform-enabled networking for IR. While the roles played by value-added services and product leverage to extend PR through physical management of the used clothes have been discussed in previous literature, the roles undertaken by the other four mechanisms, even though can be observed in the industry, have hardly been captured in the scholarly discussion. The study also revealed two trade-offs underlying these mechanisms, in terms of their focus on either physical process or digitalization, and developed by honing either core competency or collaborative partnership. Further three differentiating attributes underpin these mechanisms. First, used-clothing PSS seek higher IR by raising sustainability awareness and/or higher information transparency. Second, they engage in collaborative value creation and/or in promoting collaborative consumption, and third, they execute ownership and/or leverage over the used clothes.

The industry landscape is however not static as new forms of servitization in used-clothing PSS and hence ways to extend responsibility can occur when companies are

implementing and developing their initiatives further. Moreover, identifying the key characteristics of these mechanisms can be seen as a source of identifying new servitization forms and ways to extend responsibility, identify patterns and establish best practices, proving essential for the industry practitioners. This can prove viability of PSS in clothing sector, in the long run, by establishing its performance measurement beyond just traditional measures defined by financial, strategic and marketing aspects (Baines et al., 2009), by covering the aspect of ER. At the same time, this illustrates that a “one-size-fit-all” approach cannot underlie all PSS and diverse ER types they seek to address.

The main limitation of this explorative study is in terms of limited data set to represent a wide range of used-clothing PSS each having its inherent complexity in terms of mechanism and attribute to underpin ER. Therefore further in-depth studies are required to extend the investigating the relationship between servitization and ER for each PSS type. At the same time, further research on each ER type, especially informative responsibilities, could provide more insights into how fashion companies’ share information or undergo digitalization.

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