

# Emerging partnerships between non-profit organizations and companies in reverse supply chains: enabling valorization of post-use textile

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## Abstract

**Purpose** – The European Union (EU) member states are obligated to implement the separate collection of textile waste by the year 2025. Nowadays, non-profit organizations (NPOs) are the largest collectors of post-use textiles. In support of upcoming changes, this study develops an understanding of barriers and drivers for establishing partnerships between NPOs and companies in reverse textile supply chains.

**Design/methodology/approach** – This study adopts the embedded single-case design. The main data source is semi-structured interviews with NPOs, companies and research institutes in Finland, identified through intensity case sampling. The drivers and barriers are categorized into seven categories: environmental, economic, social, institutional, technological and informational, supply chain and organizational categories.

**Findings** – This study elaborates on the barriers and drivers in a new context of textile valorization and prioritizes them. The study identifies the alignment of interests and goals, increased transparency and clarity of terminology and other main factors in establishing the partnership.

**Research limitations/implications** – Expanding the geographical boundaries of current research will capture the experiences of NPOs and companies in other contextual settings.

**Practical implications** – This study contributes to the existing knowledge with a broad picture of different barriers and drivers. The findings intend to support the integration of NPOs in reverse textile supply chains.

**Social implications** – The partnership can potentially minimize the export of post-use textiles to developing countries, thus reducing the negative environmental footprint and social impact of the textile industry.

**Originality/value** – The study looks at an emerging form of partnership between NPOs and companies in reverse supply chains for valorization of post-use textiles.

**Keywords** Post-use textile, Non-profit organization, Companies, Reverse supply chain, Textile valorization, Partnership, Reuse, Recycling

**Paper type** Research paper



## 1. Introduction

The fashion industry estimates that the amount of textile waste will increase by 60% between the years 2015 and 2030, producing a global footprint of 150 tons of textile waste (GFA and BCG, 2017). Fast fashion culture has cultivated a perception of replaceability and throwaway attitude among clothing consumers (Brydges, 2021). It has led to overconsumption and accumulation of post-use textiles in municipal solid waste (Birtwistle and Moore, 2007; Sandvik and Stubbs, 2019), acknowledged by the waste management (WM) companies (Dahlbo *et al.*, 2017). This increase is also notable within the overwhelmed second-hand clothing market and the growing export of used clothing to developing countries (Nørup *et al.*, 2019a, b; Brooks, 2015).

Fortunately, increased awareness of the environmental impact has been cultivating a global interest in valorization of post-use textiles (Nørup *et al.*, 2019a; Palm *et al.*, 2014). This study focuses on post-use (in some sources, post-consumer) textiles that originate from the consumer disposal, and not the production-side streams (Pensupa *et al.*, 2017). This study takes the perspective of untraditional, often overlooked actors in reverse textile supply chains – non-profit organizations (NPOs). Nowadays, NPOs are the largest collectors of post-use textiles worldwide (Pal, 2017). In the Nordic countries – the geographical context of this study – NPOs collect around 20% of all post-use textiles as direct voluntary donations (Dahlbo *et al.*, 2017; Palm *et al.*, 2014). NPOs aim to primarily collect reusable post-use textiles that can be sold in their charity stores (Pal, 2017). However, only a small portion of post-use textiles collected by NPOs finds its way to the second-hand market in the country of collection. As a result of quality assessment, large quantities of post-use textiles not suitable for domestic reuse as clothing join international export. Operating in this direction, the Nordic countries have grown their export of post-use textiles by 25% in the past three years (Nørup *et al.*, 2019b).

This situation is on the edge of rapid change. By the year 2025, all European Union (EU) member states are obligated to implement separate collection of textile waste (Directive, 2018/851). As a result, the Directive has brought other actors to textile collection. In support of this upcoming change, this study develops an understanding of the partnerships between NPOs and companies for textile valorization. The study aims to build on the knowledge about such partnerships, with a broad picture of the barriers and drivers in the context of reverse textile supply chains. Thus, this study follows the NPOs' attempts to partner with companies and aims to answer the following research questions:

- (1) *How do NPOs, companies and research institutes perceive the barriers and drivers in establishing a partnership for domestic valorization of post-use textiles?*
- (2) How can these barriers and drivers be prioritized among each other?

The study captures the perceptions of NPOs, companies and research institutes, and as a result, categorizes the barriers and drivers into seven categories: environmental, economic, social, institutional, technological and informational, supply chain and organizational. The following section provides a literature overview and introduces the umbrella framework chosen for the study.

## 2. Partnership for textile valorization

The upstream textile supply chain has been a dominant focus area in research over an extended period of time (Hvass, 2014). Reverse supply chains generally remained “the wrong way on a one-way street” (Rogers and Tibben-Lembke, 2001) until the beginning of the 2000s, when the discipline gained substantial attention, mainly focusing on manufacturing, automobile and electronic industries (Prajapati *et al.*, 2019). Interest toward textile waste has

increased only in recent years, strongly promoted by raising awareness of the environmental impact and legislation on separate collection of post-use textiles (Nørup *et al.*, 2019a; EU Directive, 2018/851).

Post-use textiles are often considered a single waste fraction (Nørup *et al.*, 2018); recent studies have proved this assumption wrong and identified three fractions: reusable, recyclable and non-recyclable textiles. In the Nordics, the largest part of post-use textiles ends up in solid municipal waste. This means that around 80% of textiles (despite the fraction) are incinerated with no possibility for reuse or material recovery (Norden, 2015; Nørup *et al.*, 2019b). NPOs collect most of the remaining post-use textiles; the rest is collected by small private collectors, initiatives of fashion retailers like H&M and Lindex, take-back and garment repair services, and clothing exchange between individuals (Dahlbo *et al.*, 2017; Brydges, 2021). The non-profit collectors sort and export textiles that cannot be reused in the country of collection. Export is an economically viable solution that provides a possibility for creating a material loop. For this reason, the non-profit collectors transport these textiles to the larger sorting centers in the Baltic countries where textiles are sorted into different fractions (Nørup *et al.*, 2019b). However, despite the economic benefits and valorization opportunities, there is a strong need for the development of domestic valorization practices. Firstly, textile export generates unnecessary emissions in transportation that reduce the overall environmental benefits of textile valorization. Secondly, a recyclable textile fraction will soon be demanded in the Nordic countries. Some recycling companies have previously reported insufficient availability of textiles for their recycling operations (Norden, 2015). In addition, the textile recycling plant, which is currently piloted in Finland, will require sufficient inflow of post-use textiles to keep its operations viable (LSJH, 2020). Thus, the domestic demand for recyclable post-use textiles will significantly increase.

The remainder of this section, firstly, takes a closer look at NPOs as an actor in reverse textile supply chains. Then, it provides an overview of the categories of barriers and drivers for establishing circular business.

### *2.1 Non-profit organizations as an actor in reverse textile supply chains*

NPOs take the central position in the collection of reusable post-use textiles. The primary aim of NPOs is to collect textiles that can be used again in their original condition or after little processing (Pal, 2017). In practice, they receive all fractions, which are sorted into different categories by textile reusability (Nørup *et al.*, 2019b). The categories might contain textiles not suitable for domestic reuse, textiles for rags or incineration (Brooks, 2013). The worn-out condition and defects such as stains, missing parts of decoration or functional elements prevent post-use textile reuse as clothing in the country of collection (Nørup *et al.*, 2019a).

NPOs have become an actor of reverse supply chains for post-use textile valorization. The attributes of such reverse supply chains are: (1) a system for collection that makes products available for further processing, (2) quality assessment, sorting by categories and repair if needed, as well as (3) market development for used products (Guide and Van Wassenhove, 2009; Jahre, 1995). Despite their role and developed practices in the collection and sorting of post-use textiles (Heikkilä *et al.*, 2019), the NPOs are seldom considered as actors for textile valorization. The primary interest motivating their involvement lies in monetary fund generation for social development work, and in some cases, in providing direct clothing donations (Sandberg *et al.*, 2018). From the textile industry perspective, NPOs are often seen as a possible market for overstock products, cause-related marketing partners or a third-party collector in post-retail initiatives of fashion retailers (Hvass, 2014). In return, NPOs receive access to resources and capabilities, therefore resulting in better collection and higher

reusability of textiles (Pal, 2017). Such collaboration efforts have left a footprint on the nature of NPOs, making them more alike to social for-profit enterprises (Maier *et al.*, 2016) in terms of business-like goals, level of service delivery and business terminology usage (Dart, 2004).

The demand for improved valorization practices is currently growing and will be further facilitated by the EU-level regulation (EU Directive, 2018/851). For this reason, it is important to advance our understanding of NPOs as actors in reverse textile supply chains and partnerships with companies for domestic textile valorization.

### *2.2 Barriers and drivers for establishing circular business*

In establishing the partnerships for textile valorization, NPOs and companies will potentially face certain constraints and positively affecting factors. Collaboration and sharing enable the distribution of responsibilities and risks among the partners and provide opportunities for the development of valorization solutions (Bocken *et al.*, 2019). At the same time, a partnership demands the coordination of resources and activities beyond a single organization in the supply chain, creating management complexity (Gripsrud *et al.*, 2006). To build a more holistic understanding of the barriers and drivers, the remainder of this section reviews the categories of barriers and drivers identified in the existing literature.

For this study, the framework of barriers and drivers developed by Tura *et al.* (2019) has been selected as an umbrella for the discussion. This framework has been selected because it provides a comprehensive summary of barriers and drivers identified in the previous literature and classifies them into large categories (Table 1). The umbrella framework captures the complexity of circular economy (CE), its systematic nature and both economic and non-economic perspectives of the circular business identified in the sustainable socio-technical change literature (Corvellec *et al.*, 2013; Blomsma and Brennan, 2017). Some of these barriers and drivers take their roots in the supply chain management (SCM) literature that address sustainable SCM, reverse and closed-loop SCM. For example, the social category of the framework captures well-established barriers and drivers such as the establishment of joint communication activities to mitigate complexity, socio-economic differences in buyer–supplier relationships and increased sustainability awareness (Busse *et al.*, 2016; Gripsrud *et al.*, 2006). The supply chain category of the framework addresses general SCM issues of transparency (Pagell and Wu, 2009), cooperation and integration in the supply chain and development of joint goals (Perry and Towers, 2013; Govindan and Bouzon, 2018). Depending on the context, these issues can become both supply chain barriers and drivers. The economic category, for example, emphasizes the importance of economic viability in sustainable SCM and cost pressure that the actors might experience as a barrier (Pagell and Wu, 2009; Busse *et al.*, 2016). Other general SCM barriers and drivers are found across categories such as regulatory pressure, technical constraints and innovation capabilities, as well as organizational culture and management orientation (Govindan and Bouzon, 2018; Pagell and Wu, 2009).

Addressing the nature of the research subject, the following aspects link the CE stream with the SCM literature. Firstly, closed-loop supply chains and supportive logistics function for collection, sorting and treatment are considered the main building blocks of CE (Lüdeke-Freund *et al.*, 2019; De Angelis, 2018). Secondly, a growing attention in the SCM literature has recently been given to waste valorization, slowing or closing the material loops (Lüdeke-Freund *et al.*, 2019). Such focus has highlighted issues of coordination and configuration of the supply chain for waste valorization and the adoption of an interorganizational perspective, which is emphasized in the CE literature (Ciulli *et al.*, 2020; Lüdeke-Freund *et al.*, 2019). It also addresses the novel types of relationships in supply chains, such as the partnership between traditional and untraditional actors for exchange of materials or products (Ciulli *et al.*, 2020; Guide and Van Wassenhove, 2009). The multi-disciplinary

Category	Drivers	Barriers
Environmental	Global trend to minimize negative environmental impact; resource scarcity	N/A
Economic	Cost savings; potential to create value from waste and production-side streams; potential for new service development	High initial investment costs; scarcity of raw material, assets or infrastructure; dominance of economic indicators in decision-making
Social	Increasing awareness of sustainability needs; increased external demand for sustainability; societal development projects supporting sustainable development	Region-specific and (local) cultures hamper the implementation of new solutions; conservativeness in business practices; lacking or uncertain customer needs
Institutional	Directing laws and EU regulation create demand for new solutions ISO standard development for solid recovered fuels	Region-specific laws and regulations against the CE solutions; conflict of interest and fluctuations in taxes and governmental subsidies – high future uncertainty
Technological and informational	Emerging process technologies support CE business; enhanced information sharing and management technologies support the creation of new services, increase transparency and enable more effective processes	Increased technical difficulty in handling CE material flows (lower homogeneity of raw material); lack of compatible technologies and high technological uncertainty; lack of practices and systems for collecting, sharing and utilising CE information
Supply chain	Increasing the transparency in the supply chain; increased availability of knowledge and technological resources through collaboration	Conflict of interest, values and modes of operations between different stakeholders; no clear responsibilities and ownership in CE projects; validating and verifying all environmental effects is a challenge for transparency and analytics
Organizational	Changed organizational structure, strategy and culture to support CE; development of skills and capabilities for CE; flexible decision-making and product/service development methods	Incapability with existing (linear) operations and development targets; conflicts with existing business culture; silo thinking and fear of risks

**Table 1.** Categories of barriers and drivers and examples by [Tura et al. \(2019\)](#)

research that captures noneconomic stakeholders, such as NPOs, produces insights on managing sustainability trade-offs and representing the perspectives of all supply chain actors ([Pagell and Shevchenko, 2014](#)).

The following part of this article introduces the umbrella framework and the barriers and drivers across seven categories ([Table 1](#)).

An awareness of the *environmental* impact and the importance of taking action to reduce the impact are seen as the root causes for sustainable initiatives in many of the studies ([Tura et al., 2019](#); [Prajapati et al., 2019](#); [Govindan and Bouzon, 2018](#); [Govindan and Hasanagic, 2018](#)). In addition to environmental sustainability, creating a more sustainable society and supporting economic growth are seen as well-understood benefits of CE ([Aminoff and Pihlajamaa, 2020](#); [De Angelis, 2018](#)). Some reverse supply chain studies classify environmental drivers into the category of *social or societal* drivers ([Govindan and Bouzon, 2018](#); [Prajapati et al., 2019](#)). CE studies, in their turn, tend to distinguish environmental and societal categories ([Govindan and Hasanagic, 2018](#); [Tura et al., 2019](#)). For example, [Tura et al. \(2019\)](#) consider the societal pressure on companies and authorities to find alternatives for traditional, linear business and awareness of sustainability needs as the drivers of societal origin.

The *economic* factors are indeed widely recognized but also often favored in decision-making (Aminoff and Pihlajamaa, 2020). Valorization has strong economic potential (Guide and Van Wassenhove, 2009; Govindan and Hasanagic, 2018). The economic drivers are associated with business growth, increase in margin and profits (Tura *et al.*, 2019) and obtaining value that has previously been uncaptured (Yang *et al.*, 2017). The economic barriers concern a lack of initial capital and investments (Govindan and Bouzon, 2018) and a long-term process of receiving a return on investments, which contradicts short-term profit objectives of companies (Aminoff and Pihlajamaa, 2020). The challenges also originate from the fact that CE development is driven by the existence of waste, but not by market demand (Aminoff and Pihlajamaa, 2020). The owners of waste experience a lack of incentives for finding a sustainable WM solution, inconsistent quality and quantity of waste, and lack of support between the supply chain members (Govindan and Bouzon, 2018). By contrast, *supply chain*-related drivers include possibilities for multi-disciplinarity and increased availability of resources and capabilities (Tura *et al.*, 2019; Jia *et al.*, 2020). The barriers include a conflict of interest and modes of operation between the supply chain actors, no clear responsibilities of the CE projects and challenges of validating all of the environmental effects of CE (Tura *et al.*, 2019).

As a part of the *institutional* category, legislative support is seen as a driver of equal importance along with societal awareness and financial aspects (Ranta *et al.*, 2018; Govindan and Hasanagic, 2018). Directing regulations and standard requirements create policy grounds and cultivate effective post-use textile handling (Tura *et al.*, 2019; Govindan and Bouzon, 2018; Ranta *et al.*, 2018; Dahlbo *et al.*, 2017). In their study, as one of the barriers, Ranta *et al.* (2018) highlight that current regulations offer little institutional support for reuse, rather placing an emphasis on the promotion of recycling. Thus, the institutional factors can include guidance and support from the policymakers as the drivers (Prajapati *et al.*, 2019; Jia *et al.*, 2020) and, in contrast, include complex and overlapping regulative mechanisms as the barriers (Tura *et al.*, 2019).

The *technological and informational* category addresses emerging process technologies, information sharing and management technologies (Tura *et al.*, 2019). The barriers concern technological capabilities and the process of handling reverse material flows (Brydges, 2021). Waste as the material is heterogeneous, which brings uncertainty and complexity to reverse supply chains and circular business (Tura *et al.*, 2019; Govindan and Bouzon, 2018; Aminoff and Pihlajamaa, 2020). On the other hand, the drivers emphasize practices for enhanced information sharing and adoption of emerging technology, as these practices enable increasingly efficient process options and transparency (Tura *et al.*, 2019). To make the reverse supply chain more attractive from the business perspective, the processes of product return management, technological issues and market development for recycled products should be bottleneck-free and well-integrated. A lack of used products of the right quality at the right place and time and lack on the market has an even stronger impact than constraints of the process technology (Guide and Van Wassenhove, 2009).

The category of technological and informational factors is strongly linked to the *organizational* category. The organizational drivers include skills and capability development, organizational structure, strategy and supportive culture (Tura *et al.*, 2019). The barriers originate from weak management support and a lack of shared understanding within the organization, as well as between the partners in the supply chain. Obtaining the knowledge of best practice in the reverse supply chains is difficult due to fear of risks and silo thinking in both internal and external contexts (Tura *et al.*, 2019; Govindan and Bouzon, 2018).

### 3. Methodology

The study is qualitative in nature and based on embedded single-case study research design as the strategy of inquiry. The case study is widely considered to be an appropriate strategy

for exploring such novel topics (Eisenhardt, 1989). Such research design also benefits the study with possibilities to capture sub-units of a single case and to develop an in-depth understanding of the phenomenon in a real-life context (Yin, 2009). The embedded units of analysis are the case organizations' perceptions in relation to the barriers and drivers in establishing the partnership.

The reverse supply chain for post-use textile valorization in Finland has been selected as a case for a number of reasons. Firstly, the country aims to implement the regulations on separate collection ahead of the official schedule, by the year 2023. Thus, WM companies are already running multiple tests on the post-use textile collection and sorting (LSJH, 2020). Secondly, NPOs and companies in Finland have already had a few attempts to establish partnerships for increasing domestic valorization of post-use textiles. For example, NPOs have had small-scale partnerships with private companies, which transform post-use textiles into non-woven industrial products or manufacture cleaning rags (Dahlbo *et al.*, 2017). In addition, NPOs have done small-scale pilots with municipal WM companies to understand consumer decision-making in post-use textile sorting.

We followed the advice of Eisenhardt (1989) and Miles *et al.* (2014), specifying that the samples selected for qualitative research should be purposeful and based on some theoretical criteria. Our purposeful case selection process involved two phases. First, we selected the NPOs. The main selection criterion for the NPOs was their attempts to partner for textile valorization with companies. The selected two case NPOs are both among the largest non-profit collectors in Finland. These types of cases are information-rich (Piekkari *et al.*, 2010), providing us with a lot to learn from. Next, we searched for the organizations that have relationships with the case NPOs. Table 2 presents the case organizations, explaining their core activities and informing about the data collection sources.

The sampling logic resembled the intensity case selection type (Patton, 2002); the relationships between the case organizations are further explained in Figure 1.

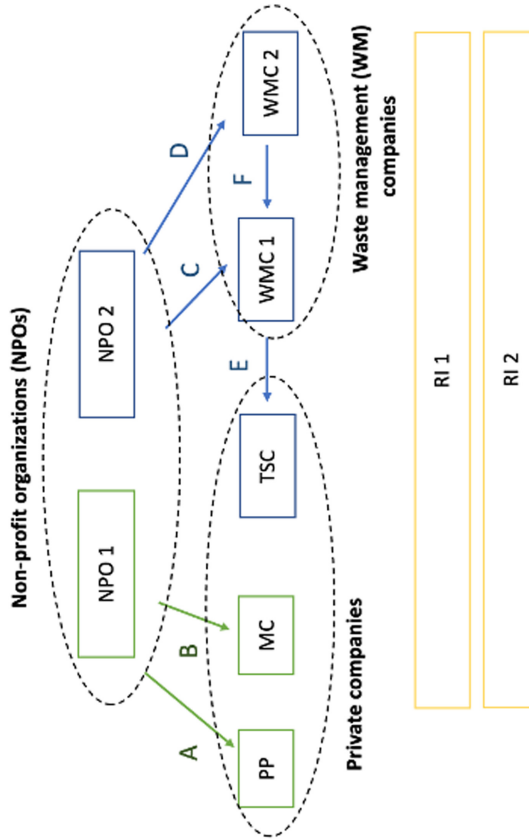
The primary data collection method was semi-structured interviews. The interviews were complemented with other data sources, such as company webpages, press releases and reports as well as webinar recordings and blog posts. The interviews followed a general thematic guide that included the following topics: the interviewee's profile and roles, current engagements and collaboration with other actors, their challenges and drivers. The interviews were recorded and transcribed verbatim. The transcribed data were coded by using NVivo.

The coding and analysis processes were iterative with discussions between two researchers and going back to the literature. This process started with getting to know the data, e.g. by reading all interview transcripts and additional secondary data. This phase included descriptive coding (Saldaña, 2016) and memos related to connections between different observations. Different secondary data sources presented in Table 2 were complementary in building a rich picture of the relationships between the case organizations. This process triggered the literature search that could explain emerging observations. The framework developed by Tura *et al.* (2019) was considered useful to advance the understanding of the partnership between NPOs and other organizations. In the second cycle of coding (Saldaña, 2016), we re-coded the whole dataset with the codes derived from the framework and contrasted the findings from our data to the literature on barriers and drivers.

The procedures for prioritization of barriers and drivers include drawing mind maps, writing analytic memos and linking the observations to each other (Saldaña, 2016). We reduced the data into matrix displays, e.g. by combining the vast array of material into an "at-a-glance" format that enables reflection, verification and conclusion drawing (Miles *et al.*, 2014). The prioritized barriers and drivers were then grouped and recorded in relation to a particular actor group (NPOs, WM companies or private companies) and their relationships with one another.

Type	Description/core activities	Primary and secondary data sources	
NPO (NPO 1)	An organization that provides a service for collecting used clothes as donations via containers, collecting 14.6 million kg of textile. The sales income forms the financing for the climate and global development actions. Member of various research and development (R&D) projects	One on-site interview, total 1 h Communication specialist Clothes collection manager Circular solutions specialist	Annual report, organization's official webpages
NPO (NPO 2)	An organization that accepts clothing donations in stores and via a small number of containers. Donated clothes sorted and sold at second-hand department stores; income is used for humanitarian relief work. Clothes are also sent to aid destinations around the world	Two on-site interviews (due to twofold organizational structure), total 2.5 h Director of second-hand chain, clothing aid program officer	Annual report, organization's official webpages
Charity private partnership (PP)	One of Europe's leading organizations for collecting, sorting and recycling used textiles (including down-cycling and solutions for retailers)	One online interview, total 1 h Head of corporate development	Organization's official webpages
Private MC	A Finnish company that manufactures new products from the textile industry's surplus, a member of the R&D project	Questions answered via email CEO	Organization's official webpages
Research institute 1 (RI 1)	Technical research center, one of the coordinators of the R&D project for building business from a CE of textiles	One online interview, total 1 h Research team leader	Research reports published online and related to the R&D project
Research institute 2 (RI 2)	A research institute, coordinating the R&D project for understanding opportunities and barriers to textile waste recycling	One online interview, total 1 h Senior research scientist, waste and CE	Research reports published online and related to the R&D project
Municipal WM company 1 (WMC 1)	A WM company involved in the project of the first domestic textile processing plant, a member of R&D projects	One online interview, total 1 h Operations manager Project manager Business development manager	Organization's press releases online, official webpages and online publications, including blog posts and webinars
Municipal WM company 2 (WMC 2)	A WM company, a member of R&D projects for finding solutions in textile collection and sorting	One online interview, total 1 h CE specialist	Organization's press releases, official webpages and online publications
Textile service company (TSC)	A limited liability company, owning a textile-processing facility	Online interview, total 45 min CEO, board chair	Organization's press releases

**Table 2.**  
Case organizations in  
the study



	Description of the relationship
A	PP purchases excessive textiles from NPO 1; NPO 1 provides textiles that are not qualified for charity second-hand stores or humanitarian clothing aid.
B	MC previously obtained woollen material from NPO 1, but collaboration has stopped.
C, D	NPO 2 and WMCs have piloted joint collection of post-use textiles in a Nordic country in order to understand whether the collection experiment of WMCs has an effect on the quality of textiles donated to NPO 2. All three organizations actively participate and have multiple linkages in R&D projects.
E	WMC 2 collects and pre-sorts textiles for WMC 1 with help of a third party.
F	WMC 1 is renting a part of textile processing plant where WMC 1 runs material-based sorting of post-use textiles.
-	RI 1 and RI 2 support the R&D projects in a Nordic country, in which mentioned case organizations NPO 2, MC, WMC 2 & 1 and TSC are also involved.

**Figure 1.**  
Relationships between case organizations in the study

Table 3 synthesizes all tactics for improving validity and reliability applied in the study. The quality of the research was improved by involving two researchers in the data collection and analysis, and using multiple data sources (Yin, 2009) as a part of the data triangulation. The tactics for enhancing the external validity include application of purposeful sampling with intensity sampling logic and finding the case companies across different sectors (non-profit, public and private). In addition, the researchers used a shared interview guide and jointly conducted the interview process, coding and data analyses. The results were discussed with the main contact persons to ensure the validity of the findings (Yin, 2009).

#### 4. Results

This section introduces identified barriers and drivers. The section follows the categorization of barriers and drivers adopted from Tura *et al.*'s (2019) framework (environmental, economic, social, institutional, technological and informational, supply chain and organizational categories). These main categories are further divided into sub-categories, which have been adapted to match the context of textile valorization. A summary of the barriers and drivers as well as interview quotes are provided in Tables 4 and 5. The new sub-categories that have emerged in the study are indicated as "NEW" in the tables. These categories are presented using the actor-based approach so that they emphasize which group(s) of actors is most or least affected by the particular barriers or drivers. The three main actor groups are: NPOs, municipal WM companies and private companies, as previously presented in Figure 1.

In the *environmental* category, both the private and municipal WM companies emphasized their desire to minimize the environmental impact as a *driver* for establishing the partnership for textile valorization. These actors believe that domestic recycling and incineration of post-use textiles are more environmentally friendly solutions than the export of these textiles abroad from the country of collection (as in the relationships B and F, Figure 1). On the other hand, only one case NPO (NPO 2) emphasized the importance of environmental objectives along with their charitable work; the environmental objectives have been driving their attempts for collaboration with the WM companies. NPO 1 emphasized that they are not particularly interested in such partnerships because the organization would like their charitable objectives to remain dominant over the environmental ones. No environmental *barriers* were identified.

As the *economic driver* for establishing the partnerships, both the municipal WM companies and private companies see the potential in generating value from recyclable post-

Criterion	Tactics applied in the study
Objectivity/ confirmability	Aiming at higher clarity in the research design and case selection Explicit data collection process
Construct and internal validity	Data triangulation: Data collection by two researchers, data from secondary sources (webpages, press releases and webinars) Use of a framework in the coding and data analysis processes Context-rich data collection
External validity	The case companies from different sectors (non-profit, public and private) Purposeful sampling with intensity sampling logic capturing NPOs and companies with existing relationships Clear description of the study context of reverse textile supply chains and valorization of post-use textile
Reliability	Shared interview guide for the researchers and use of two researchers in the interviews, coding and data analyses Recording and transcription of interviews using the NVivo software

**Table 3.**  
Tactics for improving  
validity and reliability

**Table 4.**  
Observed drivers in  
establishing the  
partnership

Categories and sub-categories	Drivers by actor groups
<p><i>1. Environmental</i></p> <p>A. Global trend to minimize negative environmental impact</p>	<p>All actor groups</p> <p>Minimization of the environmental impact of post-use textile export                      "From the environmental point of view, it is more beneficial to burn textile for energy in a low-emission, local power plant than to transport it somewhere else with the emissions at the end of the journey," MC</p>
<p><i>2. Economic</i></p> <p>A. Potential to create value from waste</p>	<p>All actor groups NPOS</p> <p>(a) Uncaptured value of post-use textiles in solid mixed waste and pre-sorted disqualified textiles from NPOS                      "We have to do something because we figured out that in our mixed waste are textiles which have value," WMC 1                      "NPOs check them all – there is no spoiled material left that can ruin the recycling process. If someone has done sorting work, it should be considered," RI 2                      (b) Established models and leadership of NPOs for reusable textile business                      "I think there is a place for NPOs in the ecosystem, because other organizations cannot sell these reusable clothes as charities do – they simply do not have any channels for that," RI 1                      Potential for economic viability of sustainable solutions                      "I think we need to have it as a business for somebody in order for it to be viable. It is a very important thing," RI 1                      "We really have to find a commercial way of doing it... of course, WMC has to do it too but... they have tax financing behind them and governmental support. From our point of view, we have to be market-driven," TSC</p>
<p><i>3. Social</i></p> <p>A. Increasing awareness of sustainability needs</p>	<p>Municipal and private companies</p> <p>(a) Impact of charitable background on collection of reusable textiles                      "In-store collection brings clothes of higher quality because people are more committed to the charitable causes of our operations. The official targets are to grow fundraising and upcycle people who start their career as our employees," NPO 1                      (b) Shared understanding of "being in the same boat" and development challenges and opportunities of textile valorization                      "It is important to speak about the recycling industry and to understand what the needs are, what is going on with this part of the value chain," PP                      Joint projects for future development direction, information sharing and cooperation between the actors                      "We could get ideas from plastic processing roadmap... The companies evaluated the process saying it created a good spirit of cooperation," RI 2</p>
<p>B. Societal development projects</p>	<p>Municipal and private companies</p>

(continued)

Categories and sub-categories	Drivers by actor groups
<p><b>4. Institutional</b></p> <p><b>A. Directing laws and EU regulations create a demand for new solutions</b></p>	<p>(a) EU directive bringing new actors for textile valorization “Separate textile waste collection to be launched in Finland in 2023. New operators will have to come and deal with that waste fraction,” RI 1</p> <p>(b) EU directive on separate textile collection stabilizing the inflow of post-use textiles “The amount of incoming waste is not a problem. Especially if we think of the CE path of the EU and new regulations, which emphasize separate textile collection across the member states of the EU. We will see the amount of collected textile growing,” PP</p> <p>Engagement of higher-level stakeholders (government, ministry) positively impacting the research and development projects “They have gotten stakeholders from the higher level interested in the issue of plastic waste. So politically it was on a much higher level,” RI 1</p>
<p><b>B. Engagement of higher-level stakeholders (NEW)</b></p>	<p>WM companies WM and private companies</p>
<p><b>5. Technological and informational</b></p> <p><b>A. Emerging process technologies</b></p>	<p>Private companies</p> <p>“New fiber identifying technologies for detecting the fibre blends in post-use textiles “With the optical identification technology being developed, identification reliability of the fibrous materials contained in textiles will be improved,” PP</p> <p>Instructing and teaching both industry stakeholders and consumers about post-use textile collection and sorting “A very good level of consumer sorting would be that there are only textiles in the collection bin, so they do not put anything else,” WMC 1</p>
<p><b>B. Sharing information and instructing stakeholders</b></p>	<p>WM companies and NPOs</p>
<p><b>6. Supply chain</b></p> <p>Increased availability of knowledge and technological resources through collaboration</p>	<p>(a) Active collaboration for knowledge sharing and joint resources “Partnership is important with universities, scientists and research companies because of their know-how and opportunity to invest in the research projects,” PP</p> <p>“Hard to say if NPOs would lose some of textiles . . . We do collaboration with NPOs and we hope we can create a strong message together to consumers,” WMC 1</p> <p>(b) Knowledge and experience of NPOs in sorting post-use textiles “I think NPOs have done this for a very long time, organization X has collected last year about 1.5 million tons. It is about 3 kg of clothes per each Finnish citizen,” RI 1</p>
<p><b>7. Organizational</b></p> <p>Changed organizational structure, strategy and culture to support CE</p>	<p>Municipal and private companies</p> <p>Shared vision in terms of the nature, goals and targets of textile valorization “One big target is to close the loop . . . not the goal to produce more, but to be more efficient and aim at higher quality yarn,” PP</p>
<p>WM and private companies</p>	

Table 4.

**Table 5.**  
Observed barriers in  
establishing the  
partnership

Categories and Sub-categories	Barriers by actor group
<i>1. Economic</i>	
A. Dominance of economic indicators in decision making	NFOs Cost-driven decision-making and its priority over environmental concerns "The talks ... about environmental protection and ... circular economy ... are not reflected in practice if it is cheaper to do activities that do not take the environment into account," MC
B. Scarcity of raw material, assets or infrastructure	Municipal and private companies (a) Lack of investments to scale up from project to commercial level of operations "The other challenge is investments to scale from project-based to commercial level especially in [terms of] the recycling approaches," PP (b) Sufficient quantity of textiles required for the textile processing line "The textile recycling plant would not just be for Finland, but Sweden and Norway, in order to get a bigger inflow of textile and keep profitable business," NPO 1 (c) Lack of infrastructure such as warehousing facilities "We do not have problems with low volumes. We have problems with space," WMC 1 Expensive logistics, collection and sorting of post-use textiles "Major challenges today...are the costs of the professional collection and sorting of used textile," PP
C. High logistics costs (NEW)	All actor groups Lack of market for products and materials made from recycled textiles "Many challenges and question marks. It's a lot of hard work ... to build the value chain, especially towards the outbound sales," TSC
D. Market for products from recycled post-use textiles (NEW)	Private companies Lacking awareness of the textile recycling industry needs, challenges and opportunities among various stakeholders "... a very realistic picture about the current situation - we know so little about textile recycling," PP
<i>2. Social</i>	
A. Lacking awareness of textile valorization	Municipal and private companies Lack of understanding of customers' technical requirements for post-use textiles as raw material for further recycling "We want to understand, how the raw material from the post-consumer waste should look like," PP
B. Lacking or uncertain customer needs	Private companies A need for a different mindset in managing post-use textiles compared to other waste fractions "The challenges have come as a surprise, as the collection of waste textiles requires a rather different mindset than other waste fractions," PP
C. Mindset (NEW)	Municipal and private companies Complexity in legislation mechanisms for partnership "We cannot take textiles straight from NPOs. It is silly because the textile stream is exactly the same. When a person decides to put it in NPOs collection, then it is [legally] a company waste, not household waste anymore. That is why we [WMC] cannot take it," WMC 1
<i>3. Institutional</i>	
A. Complexity in legislation mechanisms and terminology (NEW)	Municipal companies and NPOs Complexity in legislation mechanisms for partnership "We cannot take textiles straight from NPOs. It is silly because the textile stream is exactly the same. When a person decides to put it in NPOs collection, then it is [legally] a company waste, not household waste anymore. That is why we [WMC] cannot take it," WMC 1

*(continued)*

Categories and Sub-categories	Barriers by actor_group
<p>4. <i>Technological and informational</i></p> <p>A. Increased technical difficulty in handling reverse material flows</p>	<p>(a) Complexity of post-use textile as raw material "Post-consumer textile is a big blend of materials, chemicals and before we can recycle these goods to yarn, we have to identify fibers and chemicals, to remove all trims," PP</p> <p>(b) Inconsistency in quality and quantity of post-use textile inflow "We try to avoid situations where everybody sends us too many textiles this month and next month – do not send at all, to make sure we have a stable flow," WMC 1</p> <p>Lack of technological readiness for commercial scale, e.g. for fiber detection "If you would like to get higher quality [of raw material] you have to implement some technology or procedure. Today, it has not been implemented yet, just on the project base," PP</p> <p>An information gap between various stakeholders "Those companies, which would like to use [recycled] material, are not sure where to get these materials," RI 2</p>
<p>B. Lack of compatible technologies and high technological uncertainty</p>	<p>(a) Mismatching goals of different actors "The municipal waste collection companies... are ready that the NPOs would help them to collect end-of-life textiles, those that cannot be used as clothes and pick for themselves only the reusable clothes," RI 2</p> <p>"It was suggested that the charitable organizations... would also start separating textile waste in their sorting centres. As donors have been told for the last 30 years to donate only reusable clothing, it would confuse things and rise up significantly our sorting costs," NPO 2</p> <p>"We are trying to change their system, so they do collaboration with us and not sending textiles away from the country," WMC 1</p>
<p>C. Lack of practices and systems for collecting, sharing and utilizing CE information</p>	<p>(b) Instability of the NPOs' position threatened by new operators "Charities have good channels for clothes that they receive; in that sense they are quite safe for a while. If big operators are coming, which establish own value chains, they might be able in the future to push charity organizations from the field," RI 1</p> <p>Difficulties in achieving transparency for the entire reverse supply chain "We really want to show what is happening with the textiles," WMC 1</p>
<p>5. <i>Supply chain</i></p> <p>A. Conflict of interest, values and modes of operation between different stakeholders</p>	<p>(a) Fear of risks related to changing an existing mode of operation "It would confuse things and raise up our sorting costs," NPO 2</p> <p>(b) Differences in interpretation of the legislation mechanisms and definitions between the stakeholders "With the term 'discarded textiles' [translation from Finnish] we wanted to emphasize that it is not waste, but it contains textiles to be reused as clothes or material," WMC 1</p> <p>"We need only 'discarded textiles' [translation from Finnish] – so it is waste. Reusable again [as clothes] – should not be there," WMC 2</p>
<p>B. Growing demand for visibility and transparency (NEW)</p>	<p>(a) Fear of risks related to changing an existing mode of operation "It would confuse things and raise up our sorting costs," NPO 2</p> <p>(b) Differences in interpretation of the legislation mechanisms and definitions between the stakeholders "With the term 'discarded textiles' [translation from Finnish] we wanted to emphasize that it is not waste, but it contains textiles to be reused as clothes or material," WMC 1</p> <p>"We need only 'discarded textiles' [translation from Finnish] – so it is waste. Reusable again [as clothes] – should not be there," WMC 2</p>
<p>6. <i>Organizational</i></p> <p>Conflicts with existing business culture and increased management difficulty</p>	<p>(a) Fear of risks related to changing an existing mode of operation "It would confuse things and raise up our sorting costs," NPO 2</p> <p>(b) Differences in interpretation of the legislation mechanisms and definitions between the stakeholders "With the term 'discarded textiles' [translation from Finnish] we wanted to emphasize that it is not waste, but it contains textiles to be reused as clothes or material," WMC 1</p> <p>"We need only 'discarded textiles' [translation from Finnish] – so it is waste. Reusable again [as clothes] – should not be there," WMC 2</p>

Table 5.

use textiles. In the collaboration attempts between the NPOs and WM companies (relationships C and D), the WM companies were driven by the opportunity to valorize the textiles that the NPOs could not sell in the country of collection. In another attempt, the private manufacturing company (MC) was interested in the wool products that the NPO 1 could supply as the raw material for the company's production line (relationship B). In these types of relationships (B and A), NPO 1 was driven by a possibility to generate an additional revenue stream using textiles not suitable for their charity stores.

Among all these actor groups, only the NPOs have their own established models in reusable clothing business, driving their strong leadership in this area. The private companies are driven by and engaged in the partnership because of the potential of sustainable solutions for textile valorization to be economically viable. By contrast, a dominance of the economic indicators is an *economic barrier* for the NPOs in those cases where economic factors are prioritized over the environmental concerns in the decision-making process. This barrier prevents the NPOs from establishing domestic partnerships as an alternative to international export. Export activities bring NPOs additional monetary funds and support their objectives in fund generation for the global development work. Domestic partnerships with municipal WM companies (relationships C and D) might initially create additional logistics costs for the NPOs and distract them from the primary objective of fund generation.

Within the *social* category, the charitable background of NPOs is seen by all actor groups as a driver that enhances the NPOs' collection of reusable textiles. The charitable causes of NPOs' operations motivate textile donors to bring their used products to the NPOs collection and to maintain a simple sorting routine to assess the reusability of textiles. This *social driver* enhances the economic driver related to established models and leadership of NPOs in the reusable textile business. Another social driver is observed within the WM and private companies. These actor groups have a shared understanding of "being in the same boat" of textile valorization: having the willingness to reduce the environmental impact, to create value from textile waste and to reach business potential. For these reasons, all actor groups emphasized the role of joint research and development projects and "bringing the actors to the same table." These projects support actors in identifying future development directions, information sharing and increasing the "spirit of cooperation in their field." The WM and private companies explained that the joint projects help them mitigate *social barriers* such as lacking awareness of industry needs and the uncertain customer requirement to have post-use textiles as raw material. An inclusion of the NPOs in these discussions about the domestic collection system for post-use textiles has had its strategic importance. The NPOs have developed a "mindset" required for managing post-use textiles throughout the years of hands-on collection and sorting experience. Both the WM and private companies consider the need for a "different mindset" in relation to collection and sorting of other waste fractions as a social barrier. A good example is the sorting of vintage clothing. This sorting routine requires a deep understanding of current fashion trends and those of the past. These textiles are also sorted by different quality standards because in this case, small defects do not reduce the strong reusability potential of vintage clothing.

A need to implement the EU-level regulations on the separate collection of post-use textiles is a strong *institutional driver* by the municipal WM companies. The WM companies and research institutes believe that the EU Directive will bring new actors to the textile industry and stabilize the inflow of post-use textiles. As a result, it will lead to an advancement of existing valorization practices, development of new partnerships in the field and risk reduction associated with insufficient textile quantities needed for valorization systems to function. This institutional driver has also initiated the development of the national collection system for post-use textiles (e.g. the relationships E and F). The Directive has brought attention of higher-level stakeholders from the governmental institutions; based on the

previous experience, e.g. the research institutes (RI 1 and 2) believe it brings the issue of textile waste to a politically higher level of priority. On the other hand, all actor groups, especially NPOs and WM companies, have pointed at existing complexity in the legislative mechanisms as an *institutional barrier*, which create difficulties in establishing the partnerships between the organizations of different sectors (private, non-profit or public). For the partnership between the NPOs and municipal WM companies, the legislative mechanisms should provide more support for enabling an exchange of collected textiles between the actors (such as the relationships C and D).

In the *technological and informational* category, the WM and private companies indicated new technologies for detecting fiber blends as a *technological driver* for the development of valorization solutions and the partnership between these actor groups. As a strong *informational driver*, the WM companies and NPOs emphasized a positive impact of instructing the stakeholders (including all actor groups and consumers) about the collection and sorting practicalities. The WM and private companies admitted an increased difficulty in handling post-use textiles as a *technological barrier*. The companies emphasized the challenging process of textile preparation for mechanical or chemical recycling (recognizing fiber blends, removing decorations and functional elements) and inconsistency of textile inflows (both quality- and quantity-wise). This barrier is tightly connected with two other technological and informational barriers: a lack of technological readiness for commercial scale (e.g. in the technology for fiber detection) and an information gap between various stakeholders.

The *supply chain* category includes the barriers and drivers related to collaboration between the actors, their goals and motivations, modes of operation and interests in relation to textile valorization. Both the WM and private companies emphasized an increased availability of knowledge, technology and access to joint resources through collaboration as a *supply chain driver* for the partnerships. These actor groups also reflected on NPOs as a valuable source of insights on the post-use textile collection and sorting practices. As a strong *supply chain barrier*, the WM companies and NPOs pointed out the conflicts of interests and operation modes. The conflicts arise from mismatching interests and focus on different fractions of post-use textiles (e.g. suitability for reuse or recycling), different goals (fund generation and recycling) and instability of the non-profit collectors' position, threatened by the emerging national collection system. For example, the NPOs are not interested in the collection of recyclable post-use textiles as their collection system is driven by the fund generation objectives through textile reuse. The NPOs believe that if they start sorting the recyclable textiles in their sorting centers as well, it could confuse their donors and increase their logistics costs. In addition, an increasing demand for transparency and visibility is another supply chain barrier for the NPOs and WM companies. The WM companies want to be able to explain "what is really happening with textiles" to the citizens. In this case, the NPOs experience difficulties in achieving complete transparency for their entire supply chain, when it comes to international export.

As an important *organizational driver*, all actor groups emphasized a shared understanding of the major targets of textile valorization. The actors believe in the "big target" of closing the loop in the textile industry, prioritizing quality over quantity in their valorization solutions and establishing partnerships to achieve efficiency in post-use textile collection. As an *organizational barrier*, the NPOs addressed the fear of risks associated with a need to adapt or change their existing mode of operations in textile collection, sorting and redistribution. Another revealed organizational barrier is related to misinterpretations of terminology and legislation, specifically emphasized by the WM companies and NPOs. For example, the term "discarded textiles" [1] is interpreted differently by NPOs and WM companies. Aside from the terminology, the differences in interpretation were found in the discussions of legislative mechanisms when these were applied to the partnerships between the actors of different sectors (e.g. the NPOs and WM companies).

## 5. Discussion and conclusions

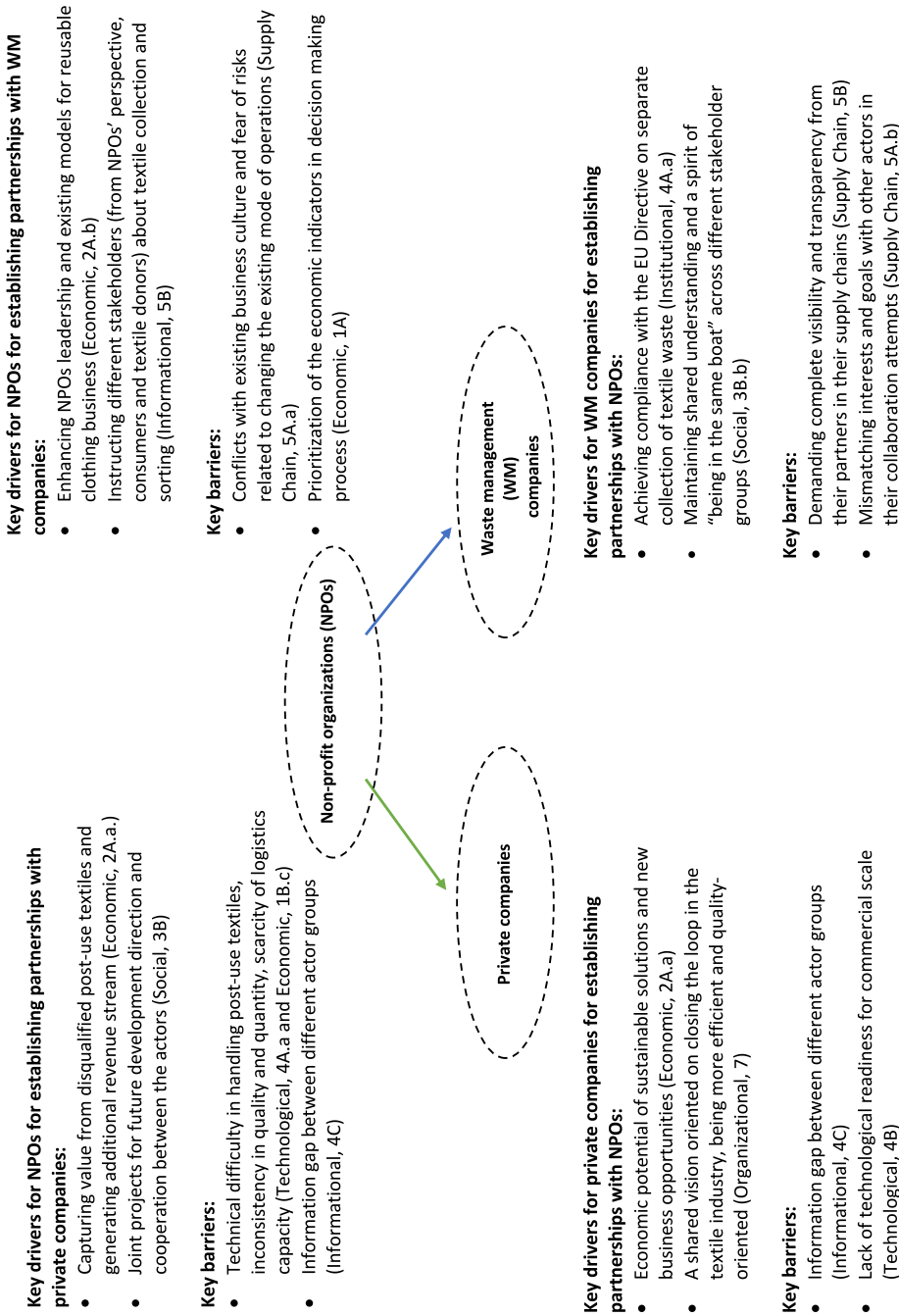
The results presented in the previous section illustrate the multitude of individual barriers and drivers, in several categories, that drive or hinder the partnerships for domestic textile valorization. Seeking contextual explanations has resulted in further prioritization of these barriers and drivers, as synthesized in [Figure 2](#). The codes in the figure (e.g. Economic, 2A.a) refer to the main category, sub-category and then to the barrier and driver by the actor group identified in the study, thus linking [Figure 2](#) to [Tables 4 and 5](#).

One of the main drivers for NPOs to partner with companies is the enhancement of their leadership in reusable textile clothing business. Thus, the NPOs were motivated by the opportunity to instruct the stakeholders (including the consumers) about the reusable textile collection in light of the implementation of the national collection system. In these attempts, the NPOs faced certain conflicts with the companies in terms of interests, goals and business culture. When establishing such partnerships, the NPOs found it difficult to maintain their operational focus on reusable textiles. The NPOs expressed a fear that clothing donors could misinterpret the NPOs' intentions to partner with WM companies if the NPOs would start the collection of all post-use textile fractions. For them, it may result in a lower quality of donations and an increase in their logistics costs. The WM companies emphasized a lack of transparency as one of the main barriers. Transparent domestic valorization is seen as a "selling point" due to an opportunity to openly inform consumers on the valorization outcomes. Obtaining visibility beyond their own organization would increase SCM complexity for the NPOs. However, a lack of transparency in the international export activities of NPOs reduces their attractiveness and may prevent their partnership with other actors seeking a reliable partner on the secondary clothing market. For the NPOs, increasing transparency would require two actions. NPOs should track their export flows of post-use textile beyond their own sorting facilities and calculate the environmental impact of logistics activities, including textile export.

In addition, the study also found some misinterpretations of terminology and legislative mechanisms across these actor groups. Clarifying the terminology is an important step toward more efficient collection of post-use textiles; as a result, the NPOs and companies can unlock the informational driver of sharing and instructing the stakeholders about the textile collection and sorting. For the NPOs in particular, it can potentially lead to an increase in the quality of donated textiles and, consequently, reduction of sorting costs and higher valorization outcomes. Despite these existing barriers, all actor groups were brought together to "one table" by the joint development projects. The companies especially valued a shared understanding of "being in the same boat" and the platform for a dialogue between the NPOs and companies developed through the joint projects.

This study has two main theoretical contributions. Firstly, the study identified a broad picture of different barriers and drivers for emerging partnerships between the NPOs and companies. This gave a structure to the complex and multisided challenge of establishing the partnership between the NPOs and companies. The study also highlighted a unique, two-fold role of NPOs. The NPOs' role is traditionally defined by their charitable background and social work. However, their role has evolved in the partnerships with the companies. The NPOs are becoming more alike to social for-profit enterprises with a unique social focus and non-financial outcomes of their business activities ([Maier et al., 2016](#)).

Secondly, the study has context sensitivity ([Lüdeke-Freund et al., 2019](#)), and it elaborates the drivers and barriers in the context of reverse supply chains for textile valorization. Previous studies ([Tura et al., 2019](#), [Lüdeke-Freund et al., 2019](#)) claim that these barriers and drivers are highly context-specific; thus, this study answered the call of [Tura et al. \(2019\)](#) for testing the framework in diverse settings. Taking an actor approach in this study allowed an understanding of how these barriers and drivers influence different actor groups, including NPOs, WM and private companies, to develop.



**Figure 2.**  
Main barriers and  
drivers for establishing  
the partnership  
between NPOs and  
companies

The results of this study have managerial and societal contributions as well. Understanding the main barriers is a critical step toward removing the obstacles pertaining to domestic textile valorization. For example, the actors will have to overcome the conflicts of interest and goals, close the information gap and solve technical difficulties while handling post-use textiles. Accordingly, the successful implementation of the partnerships for textile valorization is strongly motivated by the drivers. For instance, the study revealed the importance of high-level stakeholder engagement in the joint development projects and roadmaps and a shared understanding of “being in the same boat” of textile valorization. Going through all of the environmental, economic, social, supply chain, institutional, technological and organizational drivers and barriers systematically is a way to take the first step. On the societal level, this study produces new insights that can potentially minimize the export of post-use textiles to developing countries, thus reducing the negative environmental footprint and social impact of the industry on the other end of textile supply chains. The study results support the development of domestic textile valorization, which enhances the growth of sustainable solutions to close the loop in the textile industry.

Future research directions should tackle the supply chain aspects related, e.g. to the change in the operation mode and alignment of interest and goals of the textile collectors in the national collection system for post-use textiles. Another interesting research problem is related to misinterpretations and making actors “speak the same language” in their partnerships. Lastly, expanding the geographical boundaries of current research would capture the experience of NPOs and companies in other settings than in Finland.

#### Note

1. Translated from “poistotekstiili” in Finnish.

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