

## Beyond materials: how work and skills shape the future of reuse in Sweden's industrial ecosystems

Jurate Miliute-Plepiene<sup>a,\*</sup> , Jeaneth Johansson<sup>b,c</sup> , Johan M. Sanne<sup>a,b</sup> , Mikael Karlsson<sup>d</sup> 

<sup>a</sup> IVL- Swedish Environmental Research Institute, Nordenskiöldsgatan 24, Valhallavägen 81, 114 28, Stockholm, Sweden

<sup>b</sup> Department of Social Sciences, Technology and Arts, Luleå University of Technology, Universitetsvägen 1, 971 87, Luleå, Sweden

<sup>c</sup> School of Business, Innovation and Sustainability, Halmstad University, Box 823, SE-301 18, HALMSTAD, Sweden

<sup>d</sup> Department of Earth Sciences, Uppsala University, Villavägen 16, 752 36, Uppsala, Sweden

### ARTICLE INFO

Handling Editor: Dr B Tomás B. Ramos

#### Keywords:

Circular economy  
Reuse  
Industrial ecosystems  
Work life  
Labour  
Organizational change  
Enablers

### ABSTRACT

Circular economy has been framed internationally both as an environmental necessity and as a path to foster economic development, and a just transition. Yet, despite growing policy attention, the implications of circular strategies for work and organisation remain underexplored. This study addresses this gap by examining how scaling up reuse reshapes workplace practices and industrial ecosystems—dimensions often overlooked in circular economy research. The analysis draws on ten case studies in Sweden's textile and construction sectors, using semi-structured interviews, site visits, and grey literature. Building on socio-technical system theory, we extend industrial ecosystem theory by foregrounding labour capabilities and organisational transformation as central to circular transitions.

Our analysis shows that enabling and disabling conditions for reuse appear across all system levels. At the micro level, high labour intensity, limited training, and emerging OHS risks constrain scaling, while problem-solving skills, continuous learning, and inclusive workplaces improve engagement and job quality. At the meso level, organisational alignment and cross-sector collaboration are critical, with construction supported by platforms, unlike for textiles. At the macro level, supportive policies, economic incentives, digitalisation, and societal acceptance are vital for scaling reuse practices.

The study demonstrates that reuse cannot be scaled in isolation: it requires coordinated transformations across technological, organisational, and social domains. Historically rooted in social enterprises and public actors, reuse also remains closely tied to social goals such as inclusion and employment. Supporting these social functions while fostering private-sector innovation is essential for achieving a socially sustainable transition.

### 1. Introduction and literature review

The circular economy (CE) has been framed both as an environmental necessity and a path to enhance competitiveness, foster economic development, and reshape working life (Loorbach, 2007; Loorbach and Wijsman, 2013). These ambitions are clearly reflected in the EU policies such as the European Green Deal (EC, 2019), the CE Action Plan (EC, 2020a), the Clean Industrial Deal (EC, 2025), and the Just Transition Mechanism (EC, 2020b), which together also emphasise expectations for employment growth and socially fair transitions.

Despite this policy attention, research on CE's implications for work and organisation remains underexplored. Key working life dimensions -

e.g., work organization, skill needs, labour conditions, and occupational health and safety (OHS) - are still marginal in CE research, policy and practice (Bjerkjesjö, 2021; Inigo and Blok, 2019; Jaeger-Erben et al., 2021; Mies and Gold, 2021; Padilla-Rivera et al., 2020; Schröder, 2020) with a few exceptions such as Burger et al. (2019). The effects of circular strategies on working time have similarly received limited attention, even though extending product lifetimes can reduce labour demand in manufacturing while increasing the need for repair, reuse, and maintenance, reallocating work across the economy (Luzzati et al., 2022). Recent evidence on self-employed repair also shows that CE jobs can combine autonomy and meaning with income insecurity and administrative burdens, underscoring why job quality—not only job

\* Corresponding author.

E-mail addresses: [jurate.miliute@ivl.se](mailto:jurate.miliute@ivl.se) (J. Miliute-Plepiene), [Jeaneth.Johansson@ltu.se](mailto:Jeaneth.Johansson@ltu.se) (J. Johansson), [johan.m.sanne@ivl.se](mailto:johan.m.sanne@ivl.se), [johan.sanne@ltu.se](mailto:johan.sanne@ltu.se) (J.M. Sanne), [mikael.karlsson@geo.uu.se](mailto:mikael.karlsson@geo.uu.se) (M. Karlsson).

<https://doi.org/10.1016/j.cpl.2025.100110>

Received 25 May 2025; Received in revised form 5 September 2025; Accepted 2 November 2025

Available online 4 November 2025

2666-7916/© 2025 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

quantity—matters ((Rogers et al., 2024). A recent systematic review confirms this gap, noting that circular practices pose multiple working life challenges, from shifting labour markets and skill needs to new occupational risks or changed circumstances for OHS management and, sometimes, unsecure employment contracts (Sanne et al., 2025). Macro-level analyses confirm the job creation potential of CE, linking circular economy indicators to employment in the environmental goods and services sector (EGSS), but they stop at aggregate measures and cannot explain workplace practices, skills, or job quality in reuse (Sulich and Sołoducho-Pelc, 2022).

This gap reflects the dominant framing of CE as a techno-economic challenge, prioritizing focus on environmental and economic aspects such as material efficiency, business models, and industrial symbiosis over social and organizational issues (Inigo and Blok, 2019; Jaeger-Erben et al., 2021; Liu, 2024). Yet, if labour and work issues remain marginal in CE research, transition risk being socially unsustainable, weakening policy ambitions for a “just transition”. As UNEP (2008) has underlined: “green jobs ... also need to be good jobs that meet long standing demands and goals of the labour movement, i.e., adequate wages, safe working conditions, and worker rights, including the right to organize labour unions” (UNEP, 2008). Recent quantitative evidence shows that circular startups implementing circular strategies are also more likely to pursue work integration, either by hiring vulnerable groups or through partnerships with Work Integration Social Enterprises (WISEs) (Van Opstal and Borms, 2024). This reinforces the view that labour and inclusion are not peripheral outcomes but core elements of circular transitions. More recently, the OECD (2024) proposed that “Labour market inclusiveness in terms of promoting equality of opportunities and minimising long-term scars is essential”.

Within this debate, reuse is especially underrepresented in empirical studies (Harala et al., 2023; Ranta et al., 2018; Ranta et al., 2018). Existing research on reuse has primarily addressed environmental benefits (Abagnato et al., 2024; Badran et al., 2025; Harala et al., 2023; Sandin and Peters, 2018), business models (Ranta et al., 2018), or technological innovations (Badran et al., 2025; Iacovidou et al., 2018), with limited empirical insight into enablers, disablers for upscaling or how reuse is organised in practice or how it interconnects with labour conditions. Some studies on construction reuse (Knoth et al., 2022; Sigrid Nordby, 2019) examines drivers and barriers in relation to material flows and regulation, but omit skills, organisational forms, and job quality. In textiles, reuse has long relied on low-tech labour in public or non-profit contexts, while private initiatives remain fragmented but recently growing (Fjellander and Miliute-Plepiene, in press; Watson et al., 2019). In construction, despite high resource saving and climate mitigation potential, reuse remains limited, often overshadowed by downcycling. However, e.g. in Sweden, municipal and private actors are beginning to prioritise reuse, often linking it to labour market integration goals (Miliute-Plepiene et al., 2020).

The neglect of social aspects is partly historical. The reasons are not entirely clear, but both CE and industrial ecosystem CE research emerged in research and practice from strong scientific-engineering, quantitative and resource-economic origins, in which human, social and qualitative perspectives were been considered less important (Mies and Gold, 2021; Vermeulen, 2006; Zavos et al., 2024). This helps explain why labour, skills, and workplace transformation are often absent. Social scientists consequently call for paying more attention to the latter aspects, including Pansera et al. (2024) suggesting avenues for a framework for a just circular economy.

Industrial ecosystem theory frames CE transitions as multi-level processes involving material flows, technological innovations, and regulatory frameworks across micro, meso, and macro levels (Parida et al., 2019; Su et al., 2013). While this perspective has advanced the understanding of resource efficiency and industrial symbiosis, it has – as CE research more broadly (Sanne et al., 2025)– largely overlooked the social and organisational dimensions of circular transitions—particularly changes in working life, labour conditions, and skills (Jaeger-Erben

et al., 2021; Schröder, 2020). Recent studies also more specifically highlight organisational routines, labour capabilities, and other workplace ecosystems<sup>1</sup> functions as critical enablers or barriers to scaling reuse, with growing recognition that internal work practices, employee skills, and ecosystem coordination are as vital as technological innovation (Abagnato et al., 2024; Harala et al., 2023; Straub et al., 2023). Recent evidence from circular manufacturing further underlines that transitions reshape skills and job profiles, requiring hybrid roles and systematic anticipation of competence needs (Beducci et al., 2024). Yet, how such dynamics unfold in reuse activities remains largely unexplored.

Building on these insights, we extend industrial ecosystem theory by integrating the concept of socio-technical systems, emphasising the co-evolution of material infrastructures, institutional frameworks, and human agency (Geels, 2005). Sustainable circular transitions require coordinated transformations in both material and energy flows and working life practices. We hypothesize, that scaling reuse demands investments not only in technologies and markets but also in the social dimension, particularly changes in work organisation, skills and employment models.

Against this background, this article aims to explore how enabling and disabling conditions for scaling reuse interacts with workplace practices, organizational models, and skill ecosystems in Sweden. The study is guided by the following research questions: (1) How are enabling and disabling conditions manifested in reuse practices in textiles and construction? (2) In what ways do they affect work organization, skills, and job quality? By placing working life and socio-technical change at the center of the analysis, the study not only provides new empirical insights but also extends industrial ecosystem theory and contributes to a more socially grounded understanding of circular transitions.

## 2. Materials and methods

### 2.1. Overview and research design

This study adopts a qualitative, multi-level case study approach, integrating primary and secondary data to explore workplace practices (micro), organisational structures (meso), and broader policy and societal contexts (macro). Such an approach responds to the current reliance on macro-level indicators (e.g., EGSS employment), which overlook reuse-specific labour processes (Sulich and Sołoducho-Pelc, 2022). The empirical strategy combined semi-structured interviews, site visits, and grey literature. A case study was selected because it enables in-depth extrapolation of complex interdependencies across multiple system levels (Yin, 2018). Qualitative approaches such as cases studies and interview are recognised as both prevalent and robust in current research (Thelwall and Nevill, 2021). Sweden was chosen as the case study due to its ambitious environmental policies, strong focus on labour protections, and long-standing tradition of civil-society reuse initiatives (Miliute-Plepiene et al., 2020), making it a strategic for examining the links between circular practices and working life.

### 2.2. Data collection

Primary data sources included ten semi-structured interviews and four site visits. Interview participants were employees, managers, and sector experts, selected through purposive sampling to ensure diversity across organizational types (municipal, non-profit, private sector) and roles (operational staff, management, sector experts). A stakeholder

<sup>1</sup> We use “workplace ecosystems” to denote how circular economy practices are organised through intra-firm routines (micro), inter-firm networks (meso), and broader macro-level conditions, highlighting workplaces’ embeddedness in wider systems.

analysis informed the selection of relevant companies and actors in the textile and construction sectors, ensuring inclusion of informants across different parts of the reuse value chain. Expert contacts such as the Swedish Construction Federation (*Byggförbundet*) and the Swedish Trade Federation (*Svensk Handel*) assisted in identifying suitable participants with active engagement in reuse-oriented activities.

Interviews were guided by an open-ended questionnaire focused on working life conditions, organisational practices, skill requirements, and barriers to reuse scaling (see [Appendix B](#) for the full interview guide). Each interview lasted approximately 60 min and was recorded with consent. Four-site visits complemented the interviews, providing direct observations of workplace structures, workflows.

All participants provided informed consent prior to participation. Confidentiality was ensured through anonymisation of transcripts and secure storage of recordings and notes. Interviews are cited anonymously as T (textile) or C (construction), e.g., T1, C3. A full list of interviewees and site visits is provided in [Appendix A](#).

Secondary data included reports, policy documents, sectoral grey literature, and prior studies on reuse practices in Sweden. These sources were used to contextualise findings at the macro level, particularly in relation to regulatory frameworks, economic incentives, and societal attitudes affecting reuse activities.

### 2.3. Analytical framework and coding

All interviews and observations were transcribed, resulting in a dataset of 322 pages. The material was analysed using a structured coding process grounded in industrial ecosystem theory. The analytical process followed four steps: 1) open coding of interview and observations; 2) thematic categorisation into broader patterns. 3) cross-case comparison between textile and construction sectors and 4) integration into an industrial ecosystem framework spanning micro, meso, and macro levels ([Fig. 1](#)). This process aligns with established thematic

analysis practices for systematically identifying and organising patterns in qualitative data ([Miles et al., 2014](#)).

Coding was primarily conducted by the first author, with cross-checking with co-authors to validate interpretations and reduce subjectivity. Data was triangulated through combining interviews, site visits, and literature to enhance the robustness of the analysis. The final step was guided by the framework developed by ([Rakhshan et al., 2020](#)), whose framework categorises drivers and barriers for construction reuse into six dimensions. It was adapted, resulting in five revised categories: workplace and organisational, economic, technological and infrastructural, policy and regulation, and society at large. Only themes relevant to the aim were retained. This approach ensured a systematic analysis aligned with the study’s multi-level perspective on circular transitions.

## 3. Results

### 3.1. Overview of reuse in Sweden

Reuse activities remain marginal within Sweden’s industrial ecosystems, despite growing policy attention. In 2022, approximately 2000 kg of non-hazardous waste per capita were generated (excluding mineral waste), while municipal and affiliated reuse actors accounted for only 8 kg/capita ([Swedish EPA, 2024, 2023](#)). Although private and informal reuse activities are not fully captured in official statistics, available data suggest that reuse operates on a very small scale. A sectoral comparison illustrates key differences in reuse dynamics. Textiles represent the most reused product category, although domestic reuse accounts for only around 1 % of total textile consumption ([Miliute-Plepiene and Fjellander, 2024](#)). Construction generates the second largest waste stream in Sweden, yet construction materials are among the least reused, representing less than 0.04 % of the 14.6 million tons of construction and demolition waste generated ([Swedish EPA, 2024, 2023](#)).

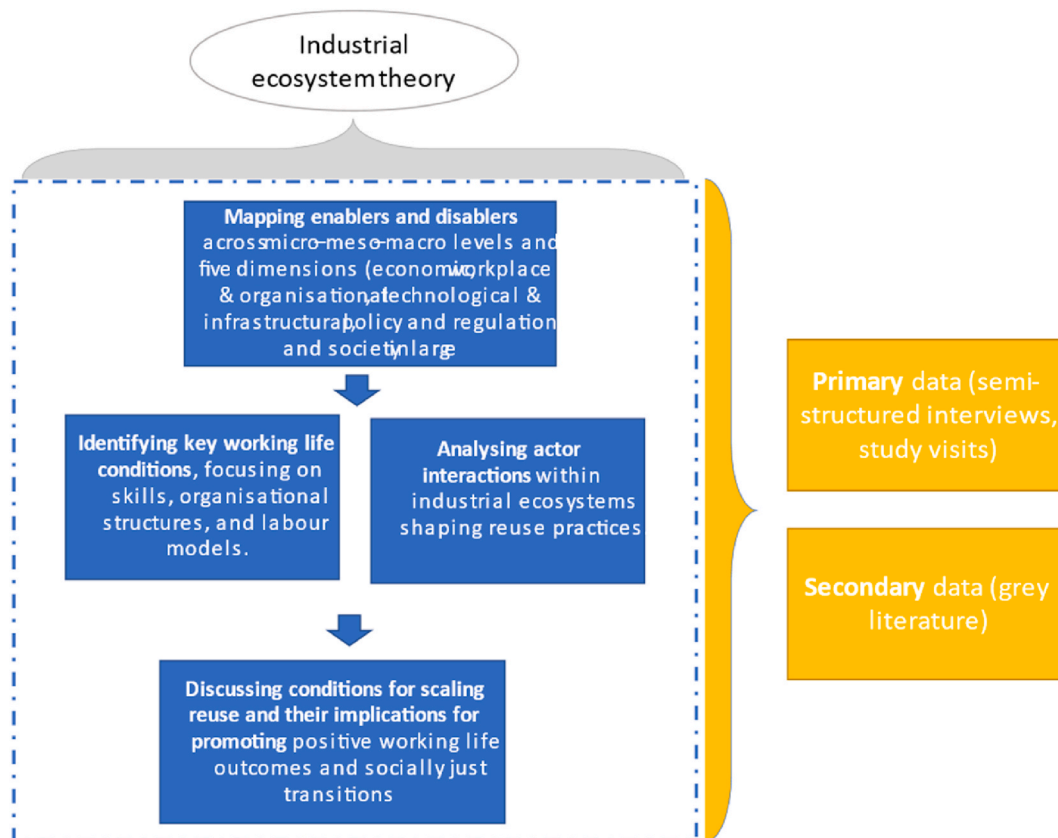


Fig. 1. Analytical framework and structure of the study.

Despite its niche position, reuse initiatives have evolved within both sectors. In the textile sector, charity organisations have long integrated reuse into their core social mission (T1-T4; TC5). In construction, municipal actors have established reuse initiatives not only to provide training and employment for people distanced from the labour market (e.g., C2), but more recently also to meet environmental goals, particularly waste prevention. Interest from private actors has also increased (T2; C1; C3; C4; T4). Pilot projects and emerging business models

indicate a gradual but growing interest in scaling reuse beyond traditional charity models. The following sections examine the key conditions that shape reuse activities.

### 3.2. Key conditions for scaling reuse

The case studies revealed several critical conditions influencing the scaling of reuse activities (see Appendix A for the case studies). These

**Table 1**

Enabling and disabling conditions for scaling reuse and their effects on workplace practices, organisational change and employment models across system levels (micro – company, meso – industry/value chain, macro – society). Conditions most relevant to work life are shown in bold.

Dimension	System level	Disablers	Enablers
1.Economic	<b>Micro</b>	<ul style="list-style-type: none"> <li>- <b>High labor-related operational costs</b> (T1; T2; T3; C1; T4; TC5; C1; C3; C4; C5)</li> <li>- Lack of storage and logistics infrastructure (C2; T1, TC5)</li> <li>- Strong competition from low-priced virgin materials (T1; T2; T3)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Use of workforce training to reduce labor costs</b> (C2; T1; T3)</li> <li>- <b>Use of automation to reduce labor costs</b> (C1)</li> <li>- VAT reductions for second-hand products and repairs (T2)</li> </ul>
	<b>Meso</b>	<ul style="list-style-type: none"> <li>- Difficulties competing with low-cost virgin production (T1; T2; T3)</li> <li>- Immature reuse market, with a lack of demand for reused products (T1; C3; C4; C5)</li> <li>- Incompatible cost structures in waste management hinder reuse (C1)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Knowledge-sharing hubs and initiatives</b></li> </ul>
2.Technological and infrastructural	<b>Micro</b>	<ul style="list-style-type: none"> <li>- <b>Material quality and flow depend on worker knowledge &amp; skills</b> (T3; C2)</li> <li>- <b>OHS risks from hazardous materials</b> (T1; C2)</li> <li>- Limited availability and accessibility of circular materials (T1; T3; C2)</li> <li>- Lack of space for on-site sorting and storage (TC5; C4; C5)</li> <li>- Consumer safety concerns with reused materials (C4)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Use of digital tools such as BIM and digital twins to support reuse</b> (C5)</li> <li>- <b>Emergence of digital marketplaces requiring new skills</b> (T1)</li> </ul>
	<b>Meso</b>	<ul style="list-style-type: none"> <li>- <b>Need for process and skills adaptation by other value chain actors</b> (C4; C3; C4)</li> <li>- Fit of material design with market trends (T1) and current quality requirements (C5)</li> <li>- <b>Some products unsuitable for reuse (dismantling issues, hazardous content, no market)</b> (T1; C2)</li> <li>- Lack of traceability and reporting systems (Fjellander and Miliute-Plepiene, in press)</li> </ul>	
3. Policy & Regulations	<b>Macro</b>	<ul style="list-style-type: none"> <li>- Challenging rules on waste classification (T2)</li> <li>- Weak or unclear producer responsibility for reuse (T2)</li> <li>- Inefficiencies in public procurement processes (C3; C4)</li> <li>- Lack of long-term political decisions and stable regulatory environment.</li> <li>- Conflicts between economic growth and sustainability goals.</li> <li>- Uncertainty around implementation of upcoming EU directives. (Fjellander and Miliute-Plepiene, in press)</li> </ul>	<ul style="list-style-type: none"> <li>- Better regulatory guidance distinguishing waste from secondary materials (T2)</li> <li>- EU and Swedish regulatory frameworks (design requirements, EPR, climate targets) (T2; C2; C4)</li> <li>- Increased consumer demand due to economic downturn (T1; C2)</li> <li>- Adjusting waste fee models to hold producers accountable for end-of-life costs (C1)</li> <li>- Identification of legal and institutional barriers to new business models (e.g., product-as-service)</li> <li>- <b>Economic instruments to make reuse more attractive (e.g., tax shifts from labour to resources)</b></li> <li>- VAT reductions on reused goods (Fjellander and Miliute-Plepiene, in press)</li> </ul>
4. Society in large	<b>Macro</b>	<ul style="list-style-type: none"> <li>- Low societal awareness and resistance to second-hand products (T1; T3; TC5; C2-4)</li> <li>- Lack for proper material source sorting (T1; T3; TC5; C2)</li> <li>- Low engagement from subcontractors (C3-4)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Providing education and increasing public awareness and trust</b> (T1)</li> </ul>
5.Workplace and organizational	<b>Micro</b>	<ul style="list-style-type: none"> <li>- <b>Need for less hierarchical and more collaborative environments</b> (C1)</li> <li>- <b>Challenges adapting to non-hierarchical management in traditional industries</b> (C1; C5)</li> <li>- <b>Lack of problem-solving and collaboration skills</b> (C1)</li> <li>- <b>Limited access to formal training</b> (C2; T1)</li> <li>- <b>Lack of established operations and skills</b> (C1; C2; C3; C4; C5; T2)</li> <li>- Lack of knowledge on quality, reusability, appropriate operations (C3-5)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Availability of digitalisation-related skills</b> (C1)</li> <li>- <b>Collaboration abilities, both internal and external</b> (C5; T4)</li> <li>- <b>Access to ongoing training opportunities</b> (T1; C2)</li> <li>- <b>Higher work satisfaction among workers engaged in circularity-focused tasks</b> (C1)</li> <li>- <b>Importance of gender equality and inclusion</b> (C2)</li> </ul>
	<b>Meso</b>	<ul style="list-style-type: none"> <li>- <b>Limited collaboration between internal and external actors</b> (T1; C5)</li> <li>- <b>Lack of collaboration at industry level for textiles</b> (T1)</li> <li>- <b>Emergence of new roles and activities, lack of skills</b> (T4; C3- C5)</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Availability of collaboration platforms for construction</b> (C5)</li> </ul>

conditions operate at three interconnected levels: 1) micro level: workplace structures, labour practices, and skills development; 2) meso level: organisational collaboration and ecosystem coordination and 3) macro level: policy frameworks, market incentives, and societal attitudes.

Table 1 summarises the main enablers and barriers identified, focusing on conditions that directly affect working life and organisational change.

### 3.2.1. Economic conditions

At the *micro level*, reuse often involves more manual- and time-intensive processes compared to linear models, contributing to higher operational costs (T1-4; C1; TC5; C3-5). In construction, reuse depends on manual dismantling, cleaning, and sorting, which can be more time consuming than conventional demolition methods (TC5; C1; C3-5). Items such as windows, doors, and sanitary porcelain cannot be efficiently managed by machines and require manual processing, while only a few product types (e.g., tiles) allow for partial automation (C1). As one respondent explained: “Installing a reused kitchen takes longer and costs more, despite the materials being cheaper or free. But with better processes, costs could decrease in the long run.” (C3). Similarly, for textiles, sorting by quality and market demand relies on tacit knowledge and is difficult to automate (T1). Such findings reflect a more general pattern in which circular models shift labour intensity away from standardized production toward time-consuming reuse and repair activities, with implications not only for operational costs but also for the distribution of working hours across the economy (Luzzati et al., 2022). This contributes to high labour costs and inefficiencies, partly explaining why only 12 % of separately collected textiles are reused domestically in Sweden, while the majority is exported to lower-cost markets (Miliute-Plepiene and Fjellander, 2024).

At the *meso level*, reuse actors—such as municipal depots, Non-Governmental Organisations (NGOs), and small enterprises—face significant financial burdens tied to infrastructure, logistics, and storage. Costs rise particularly for bulky construction materials and seasonal textiles, where supply-demand mismatches cause inventory build-up (T1-3; C1; C3-4). While some actors mitigate labour costs by using state-funded employment programmes (e.g., T1; T3-4; TC5; C2; see more in Section 4.4.), this introduces a trade-off: onboarding and supervising trainees can slow operations and challenge scaling capacity. Prior studies have also identified this tension between social inclusion and operational efficiency, highlighting the difficulty of maintaining competence and organisational stability when staff turnover is high or skills development is under-resourced (Miliute-Plepiene et al., 2020).

At the *macro level*, reuse compete with low-cost linear production and even waste sector. Reuse actors also face material access issues, often competing with the waste sector, and incur high transport costs even for donated goods—sometimes rendering incineration or landfilling financially attractive (C1). In construction, one actor developed an own deposit-return system for façade bricks, paying per intact brick to incentivise careful dismantling and divert materials from landfill. Yet, interviewee still called for stronger national economic instruments (e.g., landfill taxes, reuse subsidies) to promote circular practices (C1). In textile sector, fast fashion undermines the competitiveness of second hand, through declining quality and falling prices in new production further erode profitability: (T1-3): “...for decades, the quality in new production has gradually decreased, which in turn leads to lower quality of the materials that are donated (...) and since the prices of new production have also gradually gone down, that pushes down the price we can charge on the second-hand market (...) fewer garments are reusable, and those that are reusable can only be sold at lower prices (...)” (T1).

### 3.2.2. Technological and infrastructural conditions

At the *micro level*, workers face contaminated and potentially hazardous materials—particularly in the construction sector, where older products such as windows containing toxic PCBs or tiles from industrial

sites pose health risks (C2) (Miliute-Plepiene et al., 2020). A key barrier is lack of technical knowledge about product safety, material quality, and handling procedures. In textiles, the challenge is more related to improper source sorting and moisture exposure, which compromise material quality and increase manual workloads (T1). In both sectors, workers’ own knowledge and skills significantly influence the efficiency of sorting, selection, and reuse (T3; C2).

At the *meso level*, reuse outcomes depend heavily on infrastructures and coordination of value chains. In textile collection, NGOs state that materials gathered at their own sites are generally of higher quality than those collected at municipal recycling centres (T1) (Miliute-Plepiene and Fjellander, 2024). Although household behaviour plays a role, material quality is also influenced by recycling centres staffing and whether personnel are sufficiently trained, e.g., in recognising reusable products-from reuse organisations (Fjellander and Miliute-Plepiene, in press). In construction, the situation is more complex. Materials may originate from both households and companies, but companies can potentially provide higher volumes of reusable products (C2) (Miliute-Plepiene et al., 2020). Still, reuse is often limited by demolition or renovation subcontractors, who are typically disengaged from reuse objectives and may lack both knowledge and incentives to preserve or reuse materials (C2-3). For reuse to scale, property owners, for instance, need to embed reuse requirements into procurement processes, but many lack the expertise to do so and struggle to find appropriate subcontractors (C3; C4).

Automation and digitalisation are seen as enablers, offering economic and safety benefits (C1). While some isolated automated or semi-automated processes exist in construction, such as tile cleaning or cutting methods (C1, C2). However, automation is still limited, particularly in textiles, where reuse relies heavily on manual work. For example, Sweden has introduced an innovative infrared-based method for sorting textiles (Bolinius et al., 2022), but this technology has limited application for reuse, since quality sorting depends not so much on material content but on product condition, brand, and fashion relevance—factors that still require manual assessment. Though not yet widely used, they were highlighted by some interviewees as tools that could reduce workload and support market expansion if aligned with circular practices.

### 3.2.3. Policies and regulatory landscape

Policies play a critical role in enabling or constraining the conditions for scaling reuse. Legislation on waste classification, procurement rules, extended producer responsibility (EPR), and fiscal frameworks—such as VAT and landfill fees—can either enable or constrain the expansion of reuse practices across sectors. Interviewees highlighted a pressing need for clearer definitions and consistent guidance, particularly for distinguishing between waste and secondary raw materials. Legal ambiguities directly affect the handling, transport, resale, and public procurement of reused products in construction and textiles (T2, C1, C4). Such uncertainties create administrative burdens and discourage organisations from investing in reuse systems. As one respondent noted: “There’s a lot of regulation that makes it too complicated—and then you just don’t do it.” (T2). Slow legislative development and fragmented policies—such as conflicting building standards or unclear responsibilities for hazardous material reporting—can undermine organisational confidence and delay internal changes needed to scale reuse. Interviewees also stressed the importance of fiscal incentives and public procurement as systemic levers for mainstreaming reuse. Suggestions included lowering VAT for reused and repaired goods, introducing or raising landfill and incineration taxes, and shifting tax burdens from labour to resource use (T2). Mandatory reuse criteria in procurement processes were seen as a particularly effective, yet underutilised, tool for stimulating demand and encouraging organisational investment (Fjellander and Miliute-Plepiene, in press).

### 3.2.4. Societal attitudes & cultural factors

Attitudes and cultural factors at the workplace, organisational, and societal levels critically affect reuse scalability by shaping public acceptance, material quality, and participation in circular practices. Several interviewees highlighted persistent stigma around second-hand products and a general lack of understanding of what can be reused (T1; T3; TC5; C2). Low-quality or inappropriate items are often left at recycling centres, increasing sorting workloads or making materials unusable. In construction, reuse is further limited by low engagement from households and subcontractors responsible for separating materials (C3-4). These upstream behaviours entail non-trivial “consumption work” for households (Hobson et al., 2021); when that work is absent or misdirected (e.g., poor sorting), reuse organisations inherit higher manual loads, re-sorting, and associated occupational health and safety risks. Education and outreach were seen as essential to improving source separation and shifting mindsets. As one interviewee noted: “The problem is not getting enough material, it’s getting the right kind of material.” (T1).

### 3.3. Actors interactions within industrial ecosystem

A deeper understanding of actor interactions within industrial ecosystems is crucial for identifying the systemic enablers and barriers to scaling reuse. Figs. 2 and 3 illustrate collaboration, knowledge exchange, and resource flows across micro, meso, and macro levels in the construction and textile sectors, respectively. Figures are based on two case studies from our empirical material—one from the construction sector (C2) and one from the textile sector (T1). These frameworks help analysing our case study findings within broader ecosystem dynamics.

In the construction case municipal initiatives interact with service administrations, waste management companies, construction and demolition contractors, and national knowledge-sharing platform. It shows the value and challenges of cross-sectoral cooperation (Fig. 2). The initiative was established not only to reduce waste but also to provide employment and training opportunities for individuals distant from the labour market. As one respondent stated: “We collaborate with

society and the municipality [...] but it’s also very time-consuming to find the right people to talk to.” (C2). This highlights both the value of multi-actor engagement and the coordination burden that it can impose—particularly when formal structures for cooperation are weak or absent. Support from other municipal entities, especially in relation to ergonomics and OHS, was seen as important (C2).

To address such knowledge gaps and strengthen system-wide collaboration, some municipalities in the study participate in CCBUILD, a national platform supporting reuse knowledge and material exchange in the construction sector. The value of such a knowledge-sharing platform was highlighted not only by municipal actors but also by other participants in our study, such as municipal and private real estate companies as well as private reuse companies (C1; C4). Supply-side collaboration was also raised as a challenge. Securing reusable materials depends heavily on strong ties with demolition contractors, but these relationships are often informal and fragile: “Sometimes we have to take the initiative to reach out to demolition firms [...] they rarely come to us.”

A different situation is observed in another case study on textile reuse, based on an NGO example (T1). Fig. 3 illustrates a more fragmented textile reuse ecosystem, with limited cross-sector collaboration. This visualisation underscores the gap in knowledge networks compared to construction, posing challenges for future scaling. While the organisation maintains strong cooperation with partner municipalities in terms of materials and knowledge sharing, it lacks broader collaboration with industry actors. In particular, there is a significant gap in knowledge exchange and cross-sectoral cooperation compared to the construction sector. As one interviewee noted: “In textiles, we lack a network like CCBUILD. We need collaboration to succeed.” (T1).

Another barrier relates to the weakness of industry-wide cooperation through associations for textiles. Even where associations exist, they remain relatively fragmented and lack influence—especially regarding upcoming EPR-legislation for textiles, as outlined in the revised EU Waste Directive. As textile reuse gains policy importance, the absence of strong, coordinated industry structures challenges systematic and knowledge-driven reuse scaling (T1).

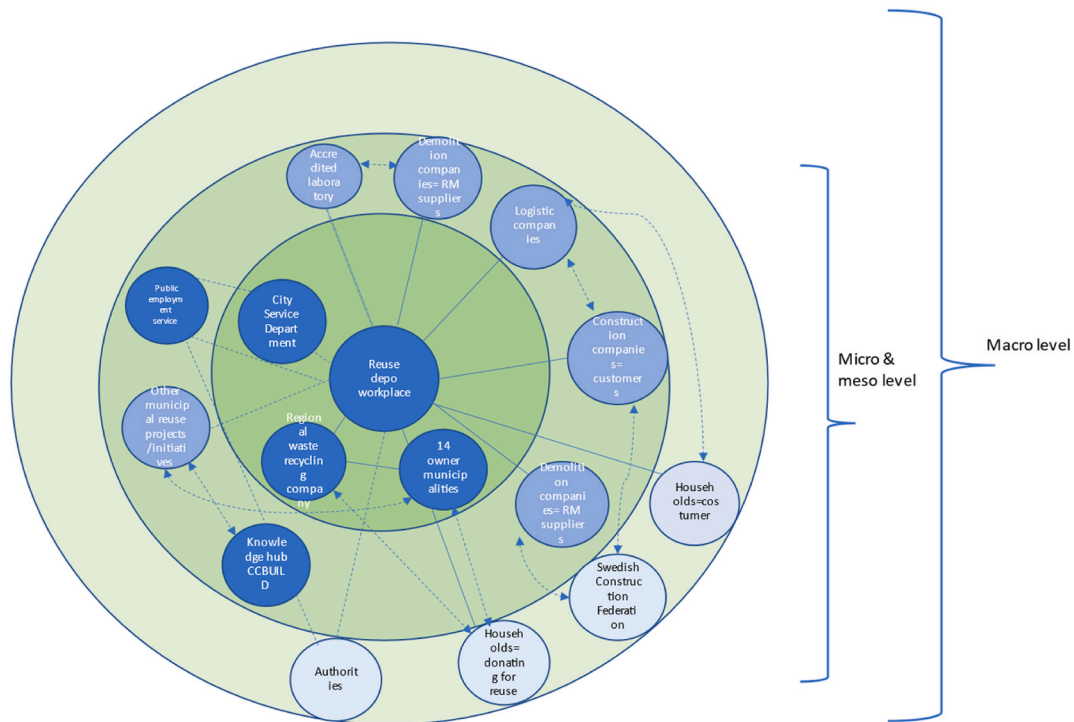


Fig. 2. Construction reuse as an industrial ecosystem: actors interactions across multi-levels - a case study of a municipal reuse depot (the framework adapted from (Harala et al., 2023)).



**Table 2**  
Skills and training need in reuse ecosystem.

Skills and/or training needs	Description	Areas
Problem-solving and adaptability	Ability to manage non-standard products, innovate in workflows, and adapt to uncertainty	Both sectors, all value chain, but less pronounced in when the activities become established (T4; C1)
Communication and teamwork	Ability to work collaboratively in less hierarchical and more diverse teams	Both sectors, all value chain (T1, T4; C1), but less pronounced in when the activities become established (C1)
Material and product knowledge	Understanding of material quality, product types, reuse potential (e.g., textiles, construction components)	Textile and construction reuse actors (T1, T3); dismantlers (C4) designing for circularity to end-of-life handling (T2)
Customer and sales orientation	Skills in presenting and marketing reused goods, understanding fashion and brand trends	Textile reuse actors (T1; T3-4)
Sorting and valuation	Ability to assess quality, trends, and resale potential, especially in textiles; includes working with a broad variety of products with varying conditions and lifespans	Textile sector (T1; T3)
Health and safety knowledge	Knowledge of risks from heavy lifting, dust, hazardous materials (e.g., asbestos)	Construction reuse (e.g., C2-3)

incarceration, and other forms of social vulnerability.

Municipal social workers assess each individual’s abilities and determine the most appropriate site and scheme for placement. These schemes vary in length and contractual form. Except for some of the individuals with disabilities, the aim is to increase employability, based on progression through different stages. All trainees receive compensation or wages; for schemes closer to regular employment, wages paid by the municipality are partially reimbursed by the Swedish Public Employment Service.

For each placement, social workers and site management agree on necessary individual adjustments. At each site, mentors provide daily supervision and support, including conflict resolution and expert assistance. This support is considered essential for inclusion and progress. Placements are followed up regularly. Overall, those in training often need continued support after termination of their scheme. However, the interviewees (T3; C2) argue that this is to be expected due to the challenges the trainees face.

At several sites, providing training for people far from the labour market is a core organisational purpose (T1, T3; C2). The tasks involved are typically simple and manual, such as sorting items based on visual instructions. For many trainees, the goal is not primarily to learn technical skills, but to build soft skills such as motivation, punctuality, social interaction, and basic language (Swedish) proficiency. Only a few participants move on to regular jobs in reuse. The circular activities at these sites tend to be limited in scope. Manual sorting and handling are labour-intensive but relatively easy to learn, and subsidies help make them financially viable.

### 3.4.2. Job quality, inclusion and well-being

Workplace transformation through reuse affects not only tasks but also job satisfaction, occupational risks, and workforce diversity.

The shift to a CE might introduce new OHS risks including exposure to hazardous materials, and insufficient training—especially in sectors like construction where older buildings may contain e.g., asbestos, PCB, or lead (Sanne et al., 2025). These broader concerns are mirrored in our case studies.

In the textile reuse cases (T1, T3, TC5), employees face exposure to

dust and potential biological contaminants due to improper source sorting by households. Management (T1) has responded with air purifiers, job rotation, and efforts to raise citizen awareness, yet upstream coordination remains a persistent challenge (T1). In construction reuse (C2), potentially hazardous materials—such as impregnated wood, which often is classified as hazardous waste—are deliberately avoided. This is due to both the impracticality of training short-term workers and the high disposal costs associated with unsold hazardous materials. For potentially contaminated materials like tiles from industrial sources, the company (C2) conducts laboratory testing before committing to larger-scale collection, aiming to avoid non-reusable or contaminated items. Ergonomic and physical risks are managed through workplace routines, designated safety staff, and support from municipal OHS specialists. Still, knowledge gaps persist even in municipalities: “Municipalities can play a role in supporting reuse [...] but they also need more knowledge themselves.” (C2).

Both sectors highlight that high staff turnover and fragmented responsibility constrain effective OHS management. These challenges align with findings by (Sanne et al., 2025), that emphasise the need for improved OHS management programs, training, and digital tools. Without such measures, OHS risks may become a significant barrier to scaling reuse—particularly in labour-intensive and risk-prone activities.

At the same time, scaling reuse practices appears to enhance job quality, foster inclusion, and contribute to worker well-being. Interviewees (C1; T4) reported increased work satisfaction, a stronger sense of purpose, and higher motivation among employees engaged in reuse. This was particularly evident in companies that had shifted from linear models toward reuse as business core. Employees expressed greater enthusiasm for tasks connected to environmental goals (C1; T4). These observations strengthen findings from earlier studies highlighting the benefits of reuse on job satisfaction and engagement (Harala et al., 2023). The literature also cautions that while repair and reuse jobs may strengthen meaning and community orientation, they can simultaneously become insecure or undervalued if not supported by adequate wages, social protections, and formal recognition within labour markets (Luzzati et al., 2022). Similar to findings on self-employed repair workers, our cases show that circular work—even when meaningful, can entail high stress and precarious conditions if not backed by institutional support. Circular transitions must therefore prioritise job quality as much as job creation (Rogers et al., 2024).

A notable shift in the socio-demographic profile of the workers was observed in reuse initiatives, particularly in the construction sector. While construction has traditionally been male dominated, reuse practices appear to attract a more diverse workforce, including more women, younger individuals, and people with foreign backgrounds (C1; C2). Several factors might contribute to this: higher environmental awareness among women and younger generations; economic accessibility of lower-paid manual jobs; and relevant skills in resource conservation often found among migrant workers (C1) (Miliute-Plepiene, 2020).

However, despite increased diversity in roles such second-hand products sales (C1), physically demanding reuse-tasks remain male-dominated. E.g., the municipal reuse depot reports receiving very few applications from women (C2). Yet their experience suggests that gender-balanced teams tend to improve the work environment and enhance overall efficiency: “We get very few women applying for reuse jobs. But when we do have mixed teams, it works better.” (C2). Addressing gender disparities in reuse-related labour models may therefore strengthen both inclusion and operational outcomes.

## 4. Discussion: implications for working life

Our findings underscore that scaling reuse is not only a material or economic challenge but also a profound socio-organisational one. The reconfiguration of working life in CE also involves a temporal dimension. Longer product lifetimes reduce the pressure for continuous mass production, while expanding demand for labour-intensive reuse, repair,

and maintenance. This redistribution of work raises the possibility of aligning CE transitions with societal goals such as reductions in average working hours and improved work–life balance, positioning circularity as part of a broader just transition (Luzzati et al., 2022). Reuse actors frequently participate in municipal or national employment programmes aimed at integrating long-term unemployed individuals, migrants, and, in some cases, persons with disabilities. These programmes, often organized through traineeship with coaching or mentorship models, reflect a socially embedded approach to reuse-aligning with industrial ecosystem theory’s emphasis on multi-level coordination between actors and infrastructure (Su et al., 2013) and socio-technical system transitions (Geels, 2005).

Particularly among municipal initiatives and NGOs, reuse activities remain rooted in social aims, with environmental objectives integrated only later. This trajectory echoes Jaeger-Erben et al. (2021), who argue that CE can reinforce social sustainability when linked to inclusion. The growing involvement of private actors in such partnerships is a promising signal for a just transition. Yet, structural constraints persist: high staff turnover reduces operational efficiency, and economic sustainability remains fragile, heavily reliant on continued public funding. Without more stable financial support, these socially oriented models risk marginalisation within a market-driven CE (Jaeger-Erben et al., 2021; Mies and Gold, 2021). This aligns with survey findings from Flemish startups, where work integration ambitions were strongly linked to the depth of circular strategy implementation. Collaborations with social enterprises were particularly attractive for labour-intensive activities such as logistics, repair, and redesign, suggesting that circular transitions often depend on socially embedded employment models (Van Opstal and Borms, 2024).

Automation and digitalisation presents both opportunity and risk. Our findings resonate with other studies highlighting digitalisation’s potential to improve efficiency (Afolabi, 2025; EEA, 2025; Harala et al., 2023) and contribute to better OHS management (Harala et al., 2023; Iacovidou et al., 2018; Van Opstal and Borms, 2024). Yet, these developments also raise skill thresholds, particularly regarding digital competence. This risks excluding precisely those groups that social programmes aim to integrate, exposing a core challenge within socio-technical system change: how to align technological innovation with principles of social inclusion and decent work (Geels, 2005; Sanne et al., 2025).

Skills development thus emerges as a critical enabler for scaling reuse within industrial ecosystems. The competencies required range from material handling, sorting, and valuation—to communication, safety, and customer engagement. While econometric models highlight how circular investments and innovation correlate with Green Job growth at the EU level (Sulich and Soloduch-Pelc, 2022), our cases reveal the concrete mechanisms—tacit skills, training pathways, and organisational routines—through which such investments may or may not become decent reuse jobs. Yet, these skills are often acquired informally, reflecting a lack of structured educational pathways. This contrasts with circular manufacturing, where structured frameworks for emerging skills and job profiles are beginning to be developed (Beducci et al., 2024). In reuse, by comparison, skill acquisition relies heavily on tacit knowledge, migrant backgrounds, and short-term training schemes, highlighting a gap in formal recognition and long-term competence building. In line with historical analyses showing the decline of repair traditions in Western Europe (Krebs and Weber, 2021), workers frequently bring skills shaped by cultural contexts where repair and reuse practices are more deeply embedded. To support stable and resilient reuse ecosystems, formal training programmes and recognised certification pathways will be essential. This also includes skills in logistics, marketing, sales, materials, problem-solving, mentoring, etc., aligning with previous findings on the skills needed in circular practices (Burger et al., 2019).

Taken together, these findings reinforce the study’s theoretical standpoint: that successful circular transitions demand coordinated

transformations across material, organisational, and social infrastructures (Geels, 2005; Jaeger-Erben et al., 2021; Su et al., 2013). Extending industrial ecosystem theory, our results highlight that human capabilities, labour market inclusion, and workplace transformation are central—not peripheral—to scaling reuse in a socially sustainable way. This reinforces our argument that circular transitions involve a restructuring of labour as much as a restructuring of material flows. They may generate jobs characterised by autonomy, skills, and meaningful work, but they also expose vulnerabilities in the form of insecure or low-quality employment. Whether such jobs become sustainable depends on the presence of labour market institutions and protections—for example training systems, wage-setting mechanisms, and occupational health and safety regulations. These are not peripheral add-ons but core mechanisms through which industrial ecosystems can evolve. Recognising them as integral to system change reframes labour not as a by-product of circularity, but as one of its central conditions.

## 5. Conclusions

Our analysis highlights three main insights. First; scaling reuse requires adaptable, collaborative workplace environments, departing from hierarchical structures. High labour intensity, limited formal training pathways, and emerging occupational risks are the main constraints at the micro level. Yet employees often report enhanced engagement and job satisfaction when involved in circular initiatives. Key enablers at this level include problem-solving capabilities, continuous learning, and inclusive work cultures.

Second, organisational capacity to scale reuse depends on internal alignment, cross-sector collaboration, and engagement in industrial networks that facilitate knowledge sharing and material exchange. A lack of collaboration—particularly in textiles—creates barriers to coordination while platforms such as CCBuild in construction demonstrate the potential of networked support structures.

Third, systemic change at the macro level requires supportive policy frameworks, economic incentives, and broader societal acceptance of second-hand goods. Building on EU-level evidence that Green Jobs emerge where circular investments and patents grow (Sulich and Soloduch-Pelc, 2022), our findings show that reuse requires complementary labour metrics and targeted instruments—such as recognition of reuse-related occupations, OHS training coverage, and VAT reforms—to translate investment into sustainable employment. In line with recent calls to integrate skills and job profiles into CE policy (Beducci et al., 2024), our results emphasise that scaling reuse demands coordinated investments in training systems and the establishment of new occupational roles such as dismantlers, reuse consultants, and circular logistics coordinators.

Our findings point to a need for implementing economic instruments (e.g., VAT reductions, landfill taxes), digitalisation support (e.g., BIM, digital twins), and clearer legal distinctions between waste and reusable materials. Societal engagement, particularly consumer acceptance of second-hand goods, is crucial for stabilising supply chains, especially in textiles.

Applying an industrial ecosystem lens, the study highlights that reuse cannot be scaled in isolation: it requires coordinated transformations across technological, organizational, and social domains. Aligning socio-technical structures with labour market institutions and industrial capabilities is essential. Historically rooted in social enterprises and public actors, reuse remains closely tied to social goals such as inclusion and employment. Supporting these social functions while private-sector innovation is essential for achieving a socially sustainable circular transition.

The study’s scope is limited by its focus on reuse actors and the absence of direct perspectives from policymakers, educational institutions, and technology providers. Future research should therefore explore how regulatory frameworks, skills policies, and digital infrastructures can be aligned with workplace transformation to support

circular transitions. In addition, examining other sectors such as the reuse of electronic and electrical equipment or furniture would provide a more comprehensive understanding of systemic dynamic.

We finally conclude that achieving a CE is ultimately not just a matter of materials or markets, but of people, skills, and institutions. Only by embedding social sustainability at the heart of circular transitions can reuse truly be scaled and sustained.

**CRedit authorship contribution statement**

**Jurate Miliute-Plepiene:** Writing – review & editing, Writing – original draft, Visualization, Validation, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Jeaneth Johansson:** Writing – review & editing, Writing – original draft, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Johan M. Sanne:** Writing – review & editing, Resources, Project administration, Investigation, Funding acquisition, Data curation. **Mikael Karlsson:** Writing – review & editing, Funding acquisition.

**Declaration of generative AI and AI-assisted technologies**

During the preparation of this work the authors used Chatgpt solely

**Appendix A. Description of interviews and study visits**

Interview No.	Study visit performed	Organization type	Main goal of circular activity	Processes involved
T1	1	NGO	Social, partly environmental	Core activity – reuse Collection for reuse, sorting, storing, valuation, transportation, selling secondary products
T2	0	Multinational retail company	Economical, partly environmental	Core activity – retail, but has small scale circular initiatives Design, collection of second-hand products at their stores, small circular initiatives
T3	1	NGO	Social	Core activity – reuse (placed in the municipality driven shopping mall for products collection and reuse) Textiles sorting, selling of secondary products
T4	1	A private real estate company that also offers space for environmentally related products, including reused items; the property owner determines the selection of products and companies.	Economical, partly environmental	Reuse and related environmental activities are run as an experimental project to explore future business opportunities
TC5	1	Municipal shopping mall for reuse as well as recycling centre	Environmental, partly social	Core activity – running the mall and recycling centre. Activities include collection of waste and secondary products, sorting, renting spaces for secondary retail shops, hosting workshops, educational events, and exhibitions
C1	0	Private retail company of reusable tiles	Economical, partly environmental	Collection, preparation for reuse, and selling reused tiles alongside new tiles
C2	1	Municipal entity for reuse	Social and environmental	Collection, sorting, storing, valuation, transportation, selling
C3	0	Housing company	Economic, social, environmental	Procurement, inventORIZATION, reuse, waste management
C4	0	Municipal housing company	Economic, social, environmental	Procurement, inventORIZATION, reuse, waste management
C5	0	NGO	Economic, environmental	Facilitation of reuse of construction products within the value chain

**Appendix B. Semi-structured interview guide**

*About your organisation – focus on recycling and reuse activities*

- What are the main purposes of your organisation’s work? Social/environmental/profit.
- What challenges arise from combining these purposes?
- Who governs and influences your organisation’s work? How does this affect operations?
- How long has the organisation existed?
- Which trade unions or employer organisations are you affiliated with? Do you have collective agreements?
- Tell us about your role in the organisation.
- How long have you worked in the organisation?
- What is your background?

to improve the manuscript’s readability and language, in accordance with the journal’s guidelines. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

**Funding sources**

This work was supported by Forte, grant number 2021-01764, 2021.

**Declaration of competing interest**

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

**Acknowledgements**

We thank the participating companies for their contributions and for facilitating site visits, and Forte (Swedish Research Council for Health, Working Life and Welfare).

- What are the biggest challenges in your work?

#### About your reuse and recycling activities

- Tell us about your reuse and recycling operations.
- Describe the reuse and recycling activities in your organisation.
- How many employees are engaged in reuse and recycling work?
- What are your “raw materials”?
- Who supplies these?
- Who are your customers? How do you sell?
- What tasks do your employees carry out?
- What key skills and competences are required by your staff?
- Was it difficult/easy to recruit staff with the right skills? Please give examples.
- Were/are training initiatives needed at company level? At municipal/national level? Which ones?
- Do suppliers or customers need specific knowledge/skills that hinder or support your work? If yes, which ones?

#### Challenges in your work

- What are the main barriers or opportunities you see in relation to:
  - o Reuse/recycling in your sector/niche
  - o Legislation on reuse/recycling, procurement, environmental law
  - o Working environment in your operations – ergonomics, psychosocial factors, chemicals
  - o Recruitment needs, skills needs, and skills development
  - o Equality and gender equality in the workplace and in the sector

#### Practices and strategies

- How do you work with skills supply and skills development? What challenges and opportunities do you see? Why have you chosen this approach?
- How do you work with occupational health and safety? Please give examples. Why have you chosen this approach?
- How are you affected by different laws and regulations (taxes, environmental legislation, rules, procurement)? Please give examples.
- How do you work with gender equality in the workplace? Please give examples. Why do you work in this way?

#### Data availability

Data will be made available on request.

#### References

- Abagnato, S., Rigamonti, L., Grosso, M., 2024. Life cycle assessment applications to reuse, recycling and circular practices for textiles: a review. *Waste Manag.* 182, 74–90. <https://doi.org/10.1016/j.wasman.2024.04.016>.
- Afolabi, J.A., 2025. Advancing the circular economy in Europe: the role of eco-innovation, economic complexity, and digitalization. *Technol. Soc.* 83, 103027. <https://doi.org/10.1016/j.techsoc.2025.103027>.
- Badran, S., Massoud, M.A., Stephan, R., Elbasuoni, S., Chalak, A., Abiad, M.G., 2025. Opportunities for circular economy in waste reuse: insights from social media data mining. *Resour. Conserv. Recycl.* 215, 108100. <https://doi.org/10.1016/j.resconrec.2024.108100>.
- Beducci, E., Acerbi, F., Pinzone, M., Taisch, M., 2024. Unleashing the role of skills and job profiles in circular manufacturing. *J. Clean. Prod.* 449, 141456. <https://doi.org/10.1016/j.jclepro.2024.141456>.
- Bjerkesjö, P., 2021. Grön Omställning Och Arbetsliv - Kunskapsläge Och Fortsattforskningsbehov.
- Bolinus, D.J., Albertsson, G.S., Nellström, M., Grahn Lydig, S., 2022. Siptex Swedish Innovation Platform for Textile Sorting - a Summary Report from the Final Stage of the Project (No. 978-91-7883-421-1 (ISBN)).
- Burger, M., Stavropoulos, S., Ramkumar, S., Dufourmont, J., Van Oort, F., 2019. The heterogeneous skill-base of circular economy employment. *Res. Pol.* 48, 248–261. <https://doi.org/10.1016/j.respol.2018.08.015>.
- EC, 2019. Clean Industrial Deal [WWW Document]. European Commission - European Commission. URL. [https://ec.europa.eu/commission/presscorner/detail/en/ip25\\_550](https://ec.europa.eu/commission/presscorner/detail/en/ip25_550). accessed 4.15.25.
- EC, 2020a. Circular economy action plan - European Commission [WWW Document]. [https://environment.ec.europa.eu/strategy/circular-economy-action-plan\\_en](https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en) accessed 4.15.25.
- EC, 2020b. The Just Transition Mechanism: Making Sure No One is Left Behind : the European Green Deal.
- EC, 2019. The European Green Deal - European Commission [WWW Document]. [http://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal\\_en](http://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en) accessed 4.15.25.
- EEA, 2025. Preventing Waste in Europe - Progress and Challenges, with a Focus on Food Waste.
- Fjellander, L., Miliute-Plepiene, J., 2025. Vad krävs för att skala upp återanvändning till norm? Useruse - Analys Av Förutsättningar För Aktörer Att Skala Upp Återanvändning. ISBN: 978-91-7883-767-0 (electronic). <https://urn.kb.se/resolve?urn=urn:nbn:se:ivl:diva-4771>.
- Geels, F.W., 2005. *Technological Transitions and System Innovations: a co-evolutionary and socio-technical Analysis*. Edward Elgar, Cheltenham, UK ; Northampton, MA.
- Harala, L., Alkki, L., Aarikka-Stenroos, L., Al-Najjar, A., Malmqvist, T., 2023. Industrial ecosystem renewal towards circularity to achieve the benefits of reuse - learning from circular construction. *J. Clean. Prod.* 389, 135885. <https://doi.org/10.1016/j.jclepro.2023.135885>.
- Hobson, K., Holmes, H., Welch, D., Wheeler, K., Wieser, H., 2021. Consumption work in the circular economy: a research agenda. *J. Clean. Prod.* 321, 128969. <https://doi.org/10.1016/j.jclepro.2021.128969>.
- Iacovidou, E., Purnell, P., Lim, M.K., 2018. The use of smart technologies in enabling construction components reuse: a viable method or a problem creating solution? *J. Environ. Manag. Sustain. waste wastewater manag.* 216, 214–223. <https://doi.org/10.1016/j.jenvman.2017.04.093>.
- Inigo, E.A., Blok, V., 2019. Strengthening the socio-ethical foundations of the circular economy: lessons from responsible research and innovation. *J. Clean. Prod.* 233, 280–291. <https://doi.org/10.1016/j.jclepro.2019.06.053>.
- Jaeger-Erben, M., Jensen, C., Hofmann, F., Zwiers, J., 2021. There is no sustainable circular economy without a circular society. *Resour. Conserv. Recycl.* 168, 105476. <https://doi.org/10.1016/j.resconrec.2021.105476>.
- Knoth, K., Fufa, S.M., Seilskjær, E., 2022. Barriers, success factors, and perspectives for the reuse of construction products in Norway. *J. Clean. Prod.* 337, 130494. <https://doi.org/10.1016/j.jclepro.2022.130494>.
- Krebs, S., Weber, H., 2021. Rethinking the history of repair: repair cultures and the “Lifespan” of things. In: Krebs, Stefan, Weber, Heike (Eds.), *Histories of Technology's Persistence: Repair, Reuse and Disposal*. Bielefeld 2021.
- Liu, K., 2024. Circular economy and the separated yet inseparable social dimension: views from European circular city experts. *Sustain. Prod. Consum.* 51, 474–483. <https://doi.org/10.1016/j.spc.2024.09.016>.
- Loorbach, D., 2007. Governance for sustainability. *Sustain. Sci. Pract. Pol.* 3, 1–4. <https://doi.org/10.1080/15487733.2007.11907996>.
- Loorbach, D., Wijsman, K., 2013. Business transition management: exploring a new role for business in sustainability transitions. *J. Clean. Prod.* 45, 20–28. <https://doi.org/10.1016/j.jclepro.2012.11.002>.
- Luzzati, T., Distefano, T., Ialenti, S., Andreoni, V., 2022. The circular economy and longer product lifetime: framing the effects on working time and waste. *J. Clean. Prod.* 380, 134836. <https://doi.org/10.1016/j.jclepro.2022.134836>.
- Mies, A., Gold, S., 2021. Mapping the social dimension of the circular economy. *J. Clean. Prod.* 321, 128960. <https://doi.org/10.1016/j.jclepro.2021.128960>.
- Miles, M.B., Huberman, A.M., Saldaña, J., 2014. *Qualitative Data Analysis: a Methods Sourcebook, third ed.* Sage, Los Angeles London New Delhi Singapore Washington DC.

- Miliute-Plepiene, J., 2020. Increasing re-use of construction and demolition materials and products - measures for prevention of waste at Swedish recycling centres. IVL Svenska Miljöinstitutet.
- Miliute-Plepiene, J., Fjellander, L., 2024. How Many Extra Kilograms Do You Have in the Wardrobe?.
- Miliute-Plepiene, J., Maria Almasi, A., Hwargård, L., 2020. Återanvändning Av bygg- Och Rivningsmaterial Och Produkter i Kommuner. IVL Svenska Miljöinstitutet.
- OECD, 2024. Labour markets transitions in the greening economy: structural drivers and the role of policies (OECD economics department working papers no. 1803). OECD Economics Department Working Papers. <https://doi.org/10.1787/d8007e8f-en>.
- Padilla-Rivera, A., Russo-Garrido, S., Merveille, N., 2020. Addressing the social aspects of a circular economy: a systematic literature review. Sustainability 12, 7912. <https://doi.org/10.3390/su12197912>.
- Pansera, M., Barca, S., Martinez Alvarez, B., Leonardi, E., D'Alisa, G., Meira, T., Guillibert, P., 2024. Toward a just circular economy: conceptualizing environmental labor and gender justice in circularity studies. Sustain. Sci. Pract. Pol. 20, 2338592. <https://doi.org/10.1080/15487733.2024.2338592>.
- Parida, V., Burström, T., Visnjic, I., Wincent, J., 2019. Orchestrating industrial ecosystem in circular economy: a two-stage transformation model for large manufacturing companies. J. Bus. Res. 101, 715–725. <https://doi.org/10.1016/j.jbusres.2019.01.006>.
- Rakhshan, K., Morel, J.-C., Alaka, H., Charef, R., 2020. Components reuse in the building sector – a systematic review. Waste Manag. Res. 38, 347–370. <https://doi.org/10.1177/0734242X20910463>.
- Ranta, Valtteri, Aarikka-Stenroos, L., Mäkinen, S.J., 2018. Creating value in the circular economy: a structured multiple-case analysis of business models. J. Clean. Prod. 201, 988–1000. <https://doi.org/10.1016/j.jclepro.2018.08.072>.
- Ranta, V., Aarikka-Stenroos, L., Ritala, P., Mäkinen, S.J., 2018. Exploring institutional drivers and barriers of the circular economy: a cross-regional comparison of China, the US, and Europe. Resour. Conserv. Recycl. 135, 70–82. <https://doi.org/10.1016/j.resconrec.2017.08.017>.
- Rogers, H.A., Deutz, P., Ramos, T.B., Jonas, A.E.G., 2024. Quality of working life in the circular economy: the case of self-employment in the repair sector. Circ.Econ.Sust. 4, 1613–1630. <https://doi.org/10.1007/s43615-023-00343-5>.
- Sandin, G., Peters, G.M., 2018. Environmental impact of textile reuse and recycling – a review. J. Clean. Prod. 184, 353–365. <https://doi.org/10.1016/j.jclepro.2018.02.266>.
- Sanne, J., Johansson, Jeaneth, Miliute-Plepiene, Jurate, Karlsson, Mikael, 2025. Working life in the circular economy: taking stock and moving forward. Europ. J. Workplace Innovat. 9.
- Schröder, P., 2020. Promoting a Just Transition to an Inclusive Circular Economy. Chatham House – International Affairs Think Tank [WWW Document]. URL. <https://www.chathamhouse.org/2020/04/promoting-just-transition-inclusive-circular-economy>. accessed 4.30.25.
- Sigröd Nordby, A., 2019. Barriers and opportunities to reuse of building materials in the Norwegian construction sector. IOP Conf. Ser. Earth Environ. Sci. 225, 012061. <https://doi.org/10.1088/1755-1315/225/1/012061>.
- Straub, L., Hartley, K., Dyakonov, I., Gupta, H., Van Vuuren, D., Kirchherr, J., 2023. Employee skills for circular business model implementation: a taxonomy. J. Clean. Prod. 410, 137027. <https://doi.org/10.1016/j.jclepro.2023.137027>.
- Su, B., Heshmati, A., Geng, Y., Yu, X., 2013. A review of the circular economy in China: moving from rhetoric to implementation. J. Clean. Prod. 42, 215–227. <https://doi.org/10.1016/j.jclepro.2012.11.020>.
- Sulich, A., Soloducho-Pelc, L., 2022. The circular economy and the green jobs creation. Environ. Sci. Pollut. Res. 29, 14231–14247. <https://doi.org/10.1007/s11356-021-16562-y>.
- Swedish EPA, 2024. Avfall i Sverige 2022. Uppkomst och Behandling.
- Swedish EPA, 2023. Återanvändning av insamlade produkter [WWW Document]. <https://www.naturvardsverket.se/4b0398/contentassets/4171446b2ec94a299119aaa8b02866f2/statistikblad-ateranvandning-av-insamlade-produkter.pdf> accessed 4.10.25.
- Thelwall, M., Nevill, T., 2021. Is research with qualitative data more prevalent and impactful now? Interviews, case studies, focus groups and ethnographies. Libr. Inf. Sci. Res. 43, 101094. <https://doi.org/10.1016/j.lisr.2021.101094>.
- UNEP, U.N., 2008. Green Jobs: towards Sustainable Work in a Low-Carbon World. UNEP - UN Environment Programme (No. ISBN: 978-92-807-2940-5).
- Van Opstal, W., Borms, L., 2024. Work integration ambitions of startups in the circular economy. Ann. Public Coop. Econ. 95, 477–504. <https://doi.org/10.1111/apce.12431>.
- Vermeulen, W.J.V., 2006. The social dimension of industrial ecology: on the implications of the inherent nature of social phenomena. PIE 3, 574. <https://doi.org/10.1504/PIE.2006.012754>.
- Watson, D., Gylling, A.C., Elander, M., Miliute-Plepiene, J., Hansen, M.S., 2019. Inclusion of Nordic Textile and Fashion Work Within the UN One Planet Network. Nordic Council of Ministers. <https://doi.org/10.6027/NA2019-902>.
- Yin, R.K., 2018. Case Study Research and Applications: Design and Methods, sixth ed. SAGE, Los Angeles London New Delhi Singapore Washington DC Melbourne.
- Zavos, S., Lehtokunnas, T., Pyyhtinen, O., 2024. The (missing) social aspect of the circular economy: a review of social scientific articles. Sustain. Earth Rev. 7, 11. <https://doi.org/10.1186/s42055-024-00083-w>.