

## Barriers to the circular economy in textile industry: a case study of the Czech Republic

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### Summary

The European Union has committed to increasing the circularity of textiles in accordance with the Green Deal and the Strategy for Sustainable Textiles. This strategy brings about fundamental changes throughout the entire product lifecycle - from requirements for eco-design regarding repairability or recyclability, ensuring a functional textile collection network, as well as implementing digital labelling for example. However, the practical application of circular economy principles in the textile industry faces several challenges. This study aims to identify the barriers to circularity with holistic view and potential policy responses in the context of the Czech Republic through a combination of questionnaires and qualitative in-depth interviews with all stakeholders. The identified barriers include microeconomic, macroeconomic, technological, institutional, and data-related factors. In terms of the wider recommendations, the identified priorities include disincentives for unsustainable textile production and landfilling and an extended producer responsibility (EPR) scheme. The findings of this study can inform the development of national measures (for the Czech Republic as well as for other EU countries) and contribute to the achievement of the EU's circular economy goals for textiles.

**Keywords:** textile waste, circular economy, stakeholder analysis, data gaps, textile waste management, barriers for circularity

### Introduction

Textile waste often ends up in municipal waste systems, causing numerous environmental problems such as the release of harmful substances into soil and water, as well as greenhouse gas emissions that contribute to climate change, particularly if the waste is dumped<sup>1</sup>. Globally, an estimated 92 million tons of textile waste is produced each year, with approximately 16 million tons originating from EU countries. Based on current consumption rates and the short lifespan of textile products, it is predicted that this figure could increase to 148 million tons by 2030<sup>2</sup>. Municipal textile waste, which refers to all textile waste except for that generated during the production process, is a significant contributor to the overall amount of textile waste generated in Europe. The European Environment Agency has estimated that the average European disposes of approximately 11 kg of municipal textile waste per year, equivalent to around 5.8 million tons in total<sup>3</sup>. While around 38% of textiles launched on the EU market are recycled or sold for reuse, the remaining 62% is thought to form part of mixed municipal waste<sup>4</sup>.

According to Eurostat and the CSO, the Czech Republic is the seventh largest producer of textile waste in the EU, with an average of 12.36 kg per person in 2018<sup>5,6</sup>. Recycling textile waste instead of disposing of it through mixed municipal waste can bring many benefits. For example, recycling a tonne of polyester can save up to 80% of toxin release, 60% of energy use, and 40% of CO<sub>2</sub> emissions compared to using primary raw materials<sup>7</sup>. However, closed-loop recycling, where clothes are recycled into new clothing, is currently used for less than 1% of textile waste<sup>8</sup>. Apart from environmental benefits, recycling textile waste can also have economic advantages. This is often complicated by the fact that textile products are commonly not made of homogeneous materials and are composed of many different

materials, ranging from organic to polymeric fibers and other additives. Nevertheless, current technology does enable recycling in many cases. When textile waste is not recycled, the value embedded in the material, such as the labour and raw materials used to produce it, is lost, resulting in market failure. In a 2018 study by Staicu and Pop, it was estimated that underutilized textile and clothing products lead to an annual loss of over 500 million USD<sup>9</sup>. However, it is necessary to note in this section that although recycling is often associated with the circular economy, this research aims to map barriers throughout the entire circular economy domain, not just in recycling.

The overall life cycle of textile and clothing production includes several key stages: production of the synthetic fibres, fibre growth, yarn manufacturing, wet pre-treatment, dyeing, textile/clothing manufacturing, finishing and laundry, the washing and drying of clothes in the use phase, transportation within globally dispersed supply chain and mainly the disposal of products at the end of their life<sup>10</sup>. And it is the final phase of the textile production life cycle that attracts significant attention. Although textile waste represents less than 3% of European waste, its burden is gaining increasing prominence among national and international authorities<sup>11</sup>. For the Czech Republic, the latest data show that the production rate of textile waste in mixed municipal waste also reaches a rate of up to 6.16% (data from physical analyses of waste from 2016-2021)<sup>12</sup>. It is also due to the fact that the separate collection of textiles is still insufficient today, even though it could bring a whole range of benefits, including 1. a reduction of textile waste flows headed for incineration or landfill; 2. a reduction of the production or cultivation of primary fibres; and 3. a reduction of greenhouse gas emissions associated with end-of-life pathways such as incineration or landfilling<sup>13</sup>. Another problem comes after the (albeit still insufficient) textile collection. According to the latest data, only 8% of collected fibres is actually recycled on the global scale in 2020, with the highest percentage in the field of polyester (15%) and wool (6%), whereas cotton does not even reach 1%<sup>14</sup>.

In recent years, there has been increasing criticism of the textile industry due to its ever-increasing environmental impact. National politicians are beginning to emphasise the issue, and the European Union is also taking very concrete and binding steps, specifically in the area of implementing the principles of the circular economy. The initial efforts to introduce it into the strategic transformation of Europe already took place in 2008 when the EU sought to transition to a smart (in the sense of smart technologies), sustainable and inclusive EU. Recycling also played an important role here. It has been attributed the potential to maintain a healthy environment, create new jobs and develop the knowledge base<sup>15</sup>. Beyond recycling, however, the EU began to address the circular economy as part of the preparations for the circular economy legislative package presented by the European Commission in 2015<sup>16</sup>. Circularity is also in line with the long-term strategic vision of a “prosperous, modern, competitive and climate-neutral economy”, which the European Commission (EC) presented in 2018<sup>17</sup>.

CE appeals to industrial companies due to its incorporation of sustainability concerns and business growth, which is crucial given that we have exceeded our resource utilization beyond sustainable levels, resulting in various detrimental consequences<sup>18</sup>. As a consequence, in 2019, the topic of the circular economy also made its way into the new strategic framework for the development of Europe (European Green Deal), which presented a set of measures to achieve carbon neutrality in 2050. The European Green Deal thus becomes not only an important tool for overcoming the ecological crisis but also a set of measures aimed at helping the EU recover from the coronavirus crisis in 2020. According to the European Commission, the European Green Deal is a growth strategy that can help European economic recovery and at the same time solve the global climate emergency<sup>19</sup>. Therefore, in March 2020, the EC presented the Action Plan for the Circular Economy, in which the priority of the EU's direction to close the flow of textile materials is specifically described<sup>20</sup>. In its action plan for the circular economy, the EC also mentions connections with achieving carbon neutrality thanks to reducing the intensity of extraction of primary raw materials, increasing recycling or extending the life cycle. In March 2022, the EC anchored its position towards closing textile material flows and promoting recycling in the EU Strategy for Sustainable and Circular Textiles. In plenary sessions of the European Parliament, the topic has been highlighted as one of high relevance and it has been followed closely by the media, which points to the relevance of the topic. In addition to the criteria for eco-design, avoiding the destruction of unsold goods or solving the problem of microplastics, a significant part of the strategy is devoted to EPR and promoting the reuse and recycling of textile waste<sup>21</sup>. The European Commission thus has a plan to

closely monitor developments in the area of creation, composition and processing of textile waste. The Commission has also launched a dedicated study to propose binding targets for the preparation for reuse and recycling of textile waste as part of the revision of EU waste legislation planned for 2024<sup>22</sup>.

Following European directives, the government of the Czech Republic approved a new package of waste legislation in December 2019, the main objective of which is to increase waste sorting and recycling, limit landfilling and transpose and fulfil current EU legislation and goals in the area of waste. This legislative package contains a draft of the updated legislation on waste, legislation on packaging and the law on end-of-life products. It already contains specific proposals for instruments, such as mandatory separate collection points for textiles from 2025. The Waste Act and other mentioned laws were bindingly adopted in 2020 and entered into force on 1.1. 2021<sup>23</sup>. Partial elements of the Action Plan for the circular economy are beginning to be prescribed in Czech legislation as well. For example, according to Article 11(1) of the revised EU Directive 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste, which was published in the Official Journal of the EU on 14 June 2018, Member States are obliged to introduce sorted textile collection from 1 January 2025<sup>24</sup>.

Barriers to the transition to circularity are becoming the focus of research activities. Research studies indicate that common barriers in various sectors include a lack of incentives, specific regulations, and knowledge<sup>25</sup>. Specifically for the area of the end of the product life cycle, these are, for example: a) specific properties of materials and product characteristics, b) Unavailable technologies for recycling textiles, which are extremely heterogeneous materials containing a wide range of materials., c) environmental impacts of the current linear system, d) organisational context (given company or state), e) institutional problems at the level of industry and supply-customer chains, f) external driving forces, g) public interest / lack of interest, h) regulatory framework and overall economic demands of the transition<sup>26</sup>. Another study investigating barriers in circular supply chains in the textile industry has identified the following as the most significant: inadequate collection, sorting, and recycling practices, resistance to embracing the circular economy model, and difficulties in achieving uniformity and standardization. Furthermore, the lack of technical knowledge is recognized as the most influential factor, while challenges in product design are considered to have the most pronounced impact<sup>27</sup>. Specific study of barriers in textile innovation highlights six primary obstacles that necessitate attention: limited customer demand for recycled textile products, inadequate implementation of effective circular business models, difficulties in fostering collaborative innovation among supply chain partners, insufficient availability of high-quality recycled materials, and the presence of high costs and limited short-term economic benefits<sup>28</sup>.

As evident, each approach is specifically tailored to a particular sector or country, and to establish appropriate incentives and measures to overcome barriers, it is crucial to identify sector-specific barriers for individual countries. Revealing these barriers for the Czech Republic is the aim of this study. In the Czech context, there is currently a lack of research looking into the barriers to circularity within the textile sector as well as the material flows. The upcoming legislation in the area of the application of the circular economy in the textile industry and the low level of connection between key stakeholders was the reason for opening the discussion at the level of the Czech Republic in 2022. The consulting company Deloitte organised a round table, the results of which defined the basic barriers for circularity based on the discussion between the actors, which is mentioned throughout this paper and created the basis for subsequent discussions.

This discussion became the impetus for follow-up research, for which we chose two complementary methods. Firstly, a stakeholder-integrated research approach (STIR) combining focus groups discussions, qualitative questionnaires and semi-structured in-depth interviews was used to analyse the barriers to circularity, the perceptions of potential policy responses, and the situation as it is faced by stakeholders in the industry.

The main research questions of this paper are therefore: 1) What are the barriers to circularity faced by stakeholders in the textile industry in the Czech Republic? 2) What are the potential solutions/policy responses?

The rest of the paper is structured as follows: in the first part, the methodological and experimental procedure is explained. The following section discusses the results of the investigation of barriers faced by stakeholders in the industry as well as potential measures leading to the improvement of the current situation. The final section concludes.

## **Experimental part**

### **Overview of the method**

The study adopts a stakeholder-based approach (focus groups, qualitative questionnaire and semi-structured interviews) based on the STIR model. This method enables the use of stakeholder engagement in environmental research with the aim of developing results to support political and societal decisions and applications<sup>29</sup>. In interacting with stakeholders, various challenges identified in existing research include integrating the stakeholder inputs to the research and selecting the stakeholders, amongst others. This stakeholder-based approach is essential to ensuring that the findings reflect the reality that they face, particularly in situations like this where official data is insufficient. The continuous engagement thus supports the relevance and legitimacy of the outcomes.

### **Stakeholder inputs**

The first input was thus a focus group which took place in Prague in November 2020 on the topic of the Sustainability of the textile industry and regulation of textile waste. The aim of the event was to start a discussion between the main stakeholders about what are the challenges in this industry today, what challenges and changes await us in the legislative treatment of textile waste, and also how the textile industry should be regulated, especially in relation to textile waste. The initiator of the focus group was a consulting team of lawyers from the Czech branch of Deloitte legal.

The outcome was a basic overview of the barriers present in the industry, which served as the backbone of the subsequent exploration of them in a more detailed way during the second phase consisting of a questionnaire and interviews.

The identified conclusions included the need to solidify and unify data and map textile waste flows (which was the main impulse for this study), as well as a discussion of barriers including low/no support for products from recycled materials, technological limitations (concerning the challenges of separating individual textile materials during the preparation phase for recycling), the absence of an extended producer responsibility policy system (EPR) and consumer behaviour. These recommendations formed the basis of the questionnaire which was distributed within the industry and of the interviews and consultations. The outcomes are presented later in this paper and further discussed and compared with the results of the focus group in the discussion section.

The stakeholder analysis section of the research was conducted following the schematic methodology of Lelea et al (2014)<sup>30</sup>, similarly as in Volk et al (2019)<sup>31</sup>. This included the following steps:

1. Selection of the thematic area: production, distribution, consumption, waste production, ways of use and disposal in the area of textile material flows.

2. The basic identification of actors through snowball sampling, whereby interviewees suggest further relevant stakeholders to get in touch with<sup>32</sup>. The initial identification of actors prioritised those with a link to the circular economy – for research purposes, we identified participation in working groups, platforms, conferences and other programs dedicated to the above-mentioned thematic areas of textile material flows (from production to disposal) as a link. We attempted to identify those who play key roles in the textile material flow cycle, across the entire lifecycle. This thus included a wide range of stakeholders included in activities such as production, collection, recycling or disposal system operation.

3. Formulation of a specific research question with relevance for stakeholders: a research questionnaire was created for the implementation of in-depth interviews.

4. Implementation of in-depth interviews: selection of key stakeholders and implementation of in-depth interviews with them (individual meetings, telephone interviews, online meetings) on thematic areas (see point 1.)

While selecting the stakeholders, maintaining the representativeness of different groups of participants who engage with different parts of the textile value chains was crucial. To ensure this, categories were set and while some are represented disproportionately more due to being referred to more often by previous participants, all categories were represented. The categorical distinctions were also largely set based on the categorisation used by the European Commission which then facilitates a comparison of the Czech results of this study with the international ones. In the summary report of the EU's public consultation on the EU Strategy for Sustainable Textiles<sup>33</sup>, this included: Brand/retailer of new textiles, clothing or footwear; Collection of used textiles and footwear for reuse (non-waste); Manufacturer of textiles, clothing or footwear; Processing/wholesale of collected used textiles and/or textile waste; Provider of textile services; Recycling/remake/redesign; Second-hand retail; Technology researcher or developer on textiles, clothing or footwear; Waste collection. In addition to these, we have adapted the categories in light of our previous research of the networks within the industry. To reflect it more accurately in the Czech context, we also included associations, networks and clusters, civil servants, NGOs and academic/research institutions.

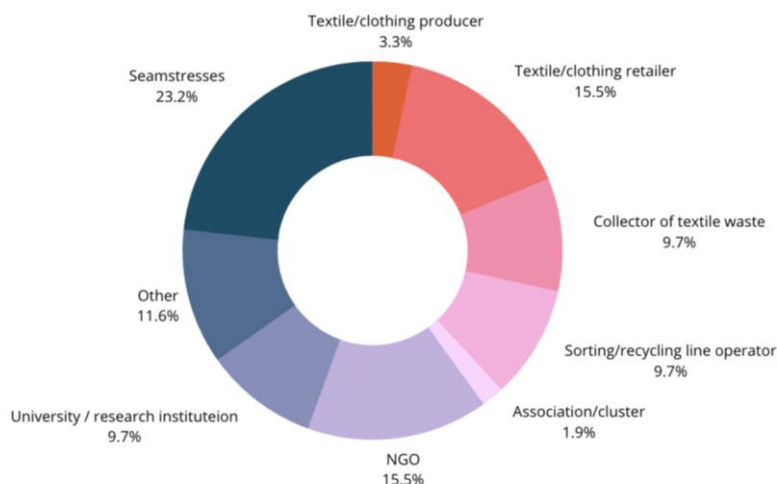
The basic analysis of the actors took place in the form of a literature search, the use of media monitoring with a focus on the combination of the keywords "circular economy" and "textile industry/textile", the selection of the main actors (according to the experience of organising thematic working groups) which provided an initial list of the most active actors based on practical experience.

A questionnaire was distributed to analyse the barriers faced in the Czech textile waste industry and the potential policy responses as part of wider research of Tereza Zoumpalova conducted at the University of Cambridge. For the questionnaire, 78 responses were collected, but some were not completely filled in, so 52 samples were used for the final analysis. Figure 1 below shows the breakdown of the respondents.

As the figure highlights, the respondents represent a large variety of stakeholders along different sections of the value chain within the textile industry. An attempt was made to contact various types of firms, including those not actively engaging in sustainable activities, but there is likely to be a selection bias with those engaging in sustainability being more likely to be known to the researchers and more likely to agree to take part in the research. 26.92% of the respondents operate nationally in the Czech Republic, 36.54% sub-nationally within the Czech Republic, 21.15% operate within the EU level and 15.38% work globally. Within the Czech Republic, all of the 14 regions were represented amongst the respondents.

The size of the respondents' organisations was also analysed, with categories being split based on OECD classifications, looking at employee numbers including external employees. Based on these definitions, the largest category represented was micro-enterprises (< 10 employees) at 37.25% of the respondents, then about a third in small enterprises (10-49 employees), 17.65% in medium-sized enterprises (50 - 249 employees) and 11.76% in large enterprises (250+ employees). Given that in the EU SMEs account for over half of GDP and form over 99% of businesses<sup>34</sup>, it was important for a variety of sizes to be represented in the research.

Regarding the length of operation of the stakeholders within the textile industry, 44% responded that they have been active in it for over 10 years, suggesting that many have been in the industry for a long time. However, there are also many newer organisations amongst the respondents too, including 10% who only became active within the textile industry during the last year.



**Figure 1: Breakdown of the survey respondents**

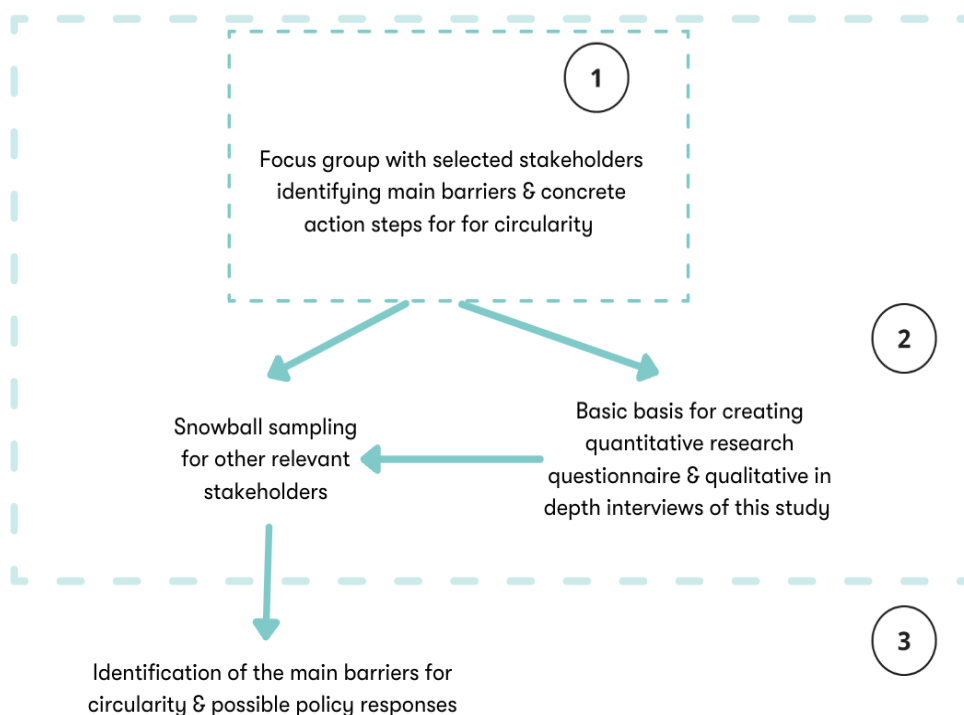
Following up on the questionnaires, 10 semi-structured in-depth interviews were carried out with individual actors according to the selected methodology of this work, and references to other organisations were obtained in the form of snowball sampling. Individual actors were classified into thematic areas/categories according to the specifics of their main activity (see Table 1). Ethical standards were strictly adhered to with interviewees signing consent forms, being informed of the study's purpose and the use of the outcomes, agreeing to being mentioned by name and being given the option of anonymity. The interviews were conducted with no third-party present and were not recorded.

**Table 1: List of interviewees, full names have been abbreviated to initials to preserve anonymity**

Name	Position, organisation
Libuše Fouňová	Clutex (cluster), manager
Mikuláš Hurta	Nilmore (circular fashion brand), founder & CEO
Lukáš Killar	Dimatex (textile collection and recycling), executive director
Stepan Vashkevich	Institute of Circular Economy (INCIEN), consultant
Radka Vaverková	Toray (yarn production), engineering technician, waste executive
Ladislava Zaklová	Sotex (association), executive officer
Jana Žůrková	RREUSE, Brussels-based think tank
Anonymous #1	Wholesale retailer of children's clothing, CEO
Anonymous #2	Large textile producer, project manager
Anonymous #3	SME clothing producer, CEO

The stakeholders were identified using a purposive sampling method. The selection was based on either being identified as particularly influential or representative of the different categories were subsequently invited for in-depth interviews, with a final total of 19 interviews conducted. This enabled verifying the takeaways from the questionnaire, clarifying some general comments and supplementing them with an in-depth discussion. Additional in-depth interviews were conducted to gain deeper insight into stakeholders' considerations and explanations of the questionnaire results. Interviewees were

selected using a purposive sampling method, representing the characteristics of different stakeholder groups in the industry and possessing relevant knowledge<sup>35</sup>. Snowball sampling was also used where some participants were recruited based on referrals from previous interviewees<sup>36</sup>. In total, 255 stakeholders were contacted and consulted throughout the process. Sampling was prioritised to represent a wide range of stakeholders, from yarn producers to large and small clothing companies (sustainability-focused and “conventional”) to recyclers, to represent the full life cycle and different perspectives. The snowball method naturally includes a bias as participants who are involved in recommending additional respondents tend to recommend those who share similar opinions or take part in similar activities. We attempted to mitigate this by verifying the positions of selected participants for the interview among multiple recommending individuals. The resulting matrix of selected actors is constructed with an aim for maximum proportionality throughout the entire life cycle, ensuring that all barriers are discussed in as much detail as possible.



Scope 1: default information from the focus group, Scope 2: own research framework, Scope 3: results

**Figure 2: Research method**

## **Results and discussion**

### **Barriers to circularity**

The results are analysed within a framework separating the barriers into three main categories: 1. legal and institutional barriers, 2. macroeconomic barriers, 3. microeconomic barriers. The questions followed the main takeaways from the initial roundtable where these barriers were raised. In addition, questions related to data and policy awareness were explored, which also link to the second phase of the study about the material flows. The stakeholders identified legal and institutional barriers as the most pressing, followed by macroeconomic and finally microeconomic ones. The levels of agreement were particularly high for statements about the lack of incentives for a sustainable textiles economy, low demand for recycled products, working conditions and high costs. The lack of information, data, awareness and cooperation was also identified as important.



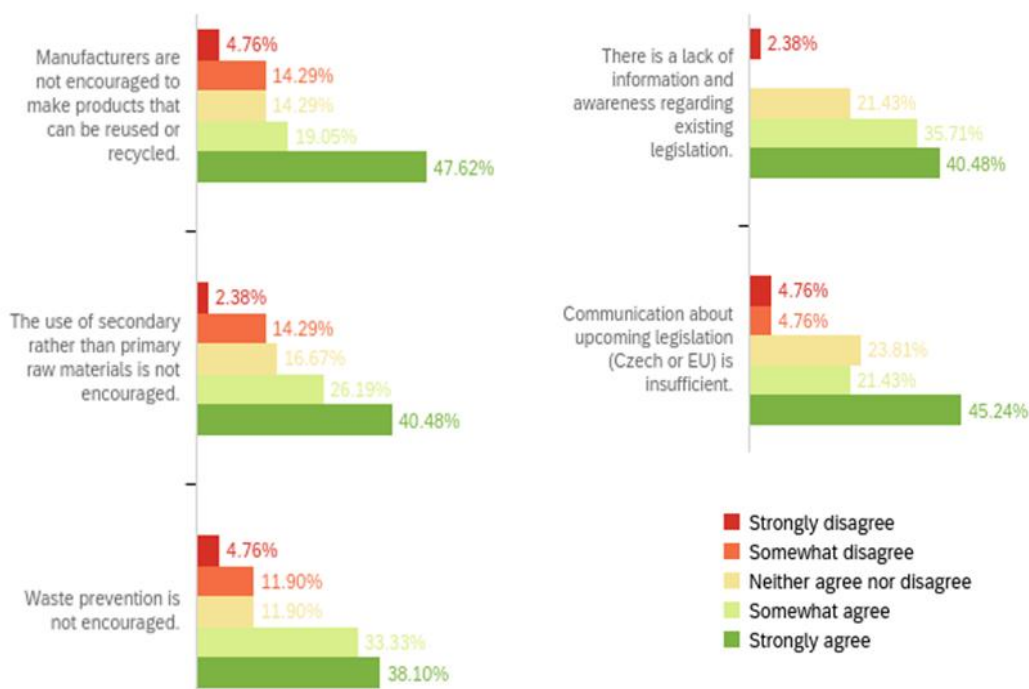
The barriers contribute to many organisations being sceptical about their ability to increase their textile recycling activities, which is very problematic given the environmental importance of the issue and the upcoming increased pressure from the EU. Moreover, many of the identified obstacles are beyond the competence of individual companies, which makes it difficult to solve them through private responses.

However, the key change is still brought about by basic and unsurprising steps: a) promoting and boosting separate collections of textiles and b) increasing the recycling of both natural and textile fibers<sup>13</sup>.

### Legal and institutional barriers

The following figure presents the results from the 52 questionnaires which were considered for the final analysis. These barriers reflect the gaps in the system due to which incentives for circularity are insufficient, which slows down progress and innovation.

The most concerning of these seemed to be the fact that the respondents felt like manufacturers are not encouraged to make products which can be reused/recycled, which also leads to a lot of the T&C being made in poor quality. Respondents also believe that “waste prevention is not encouraged”, leading to overconsumption and inefficient production processes, as well as unnecessary waste.

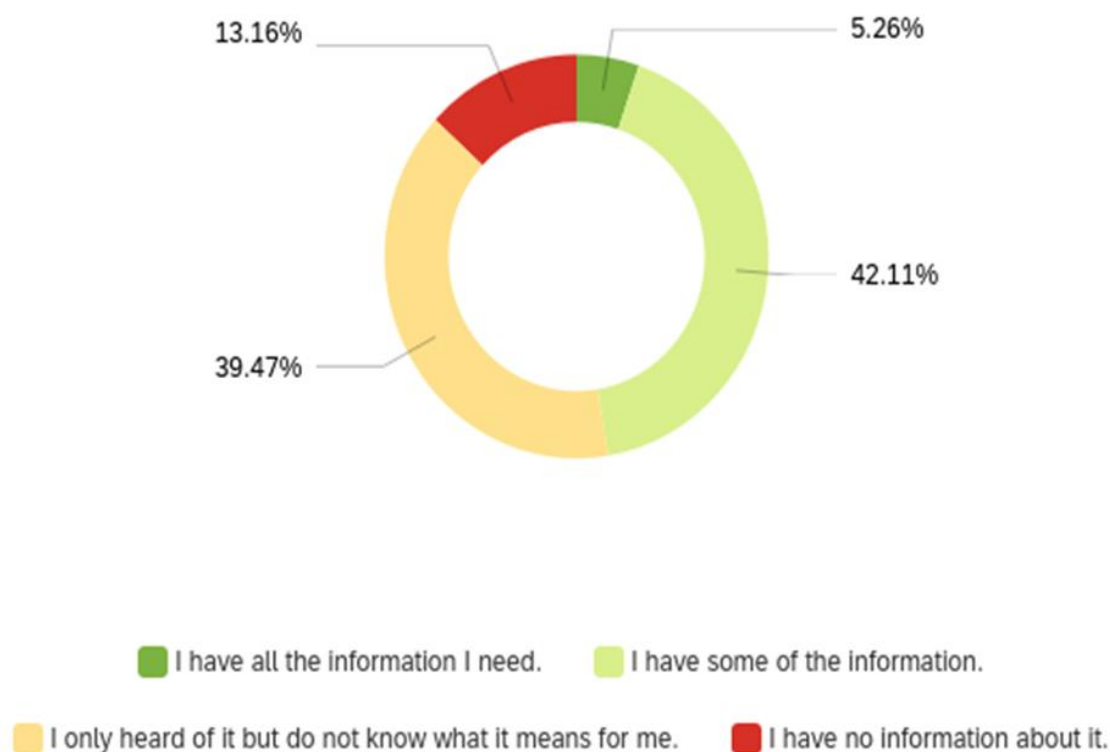


Source: own elaboration

Figure 3: Legal and institutional barriers

The respondents also felt that “there is a lack of information and awareness regarding existing legislation” and that “communication about upcoming legislation (Czech and/or EU) is insufficient”, which further increases uncertainty and might contribute to a lack of investment into the circularity of T&C. This also relates to how they feel about how informed they themselves are. In a question asking about whether the respondents have all the information they need about “changes to environmental policy at the EU level and the implications of the Green Deal”, over half admitted not knowing the implications that such changes will have on them, and only 5.26% reported that they felt like they have all the information they need.





**Figure 4: Awareness of environmental policy**

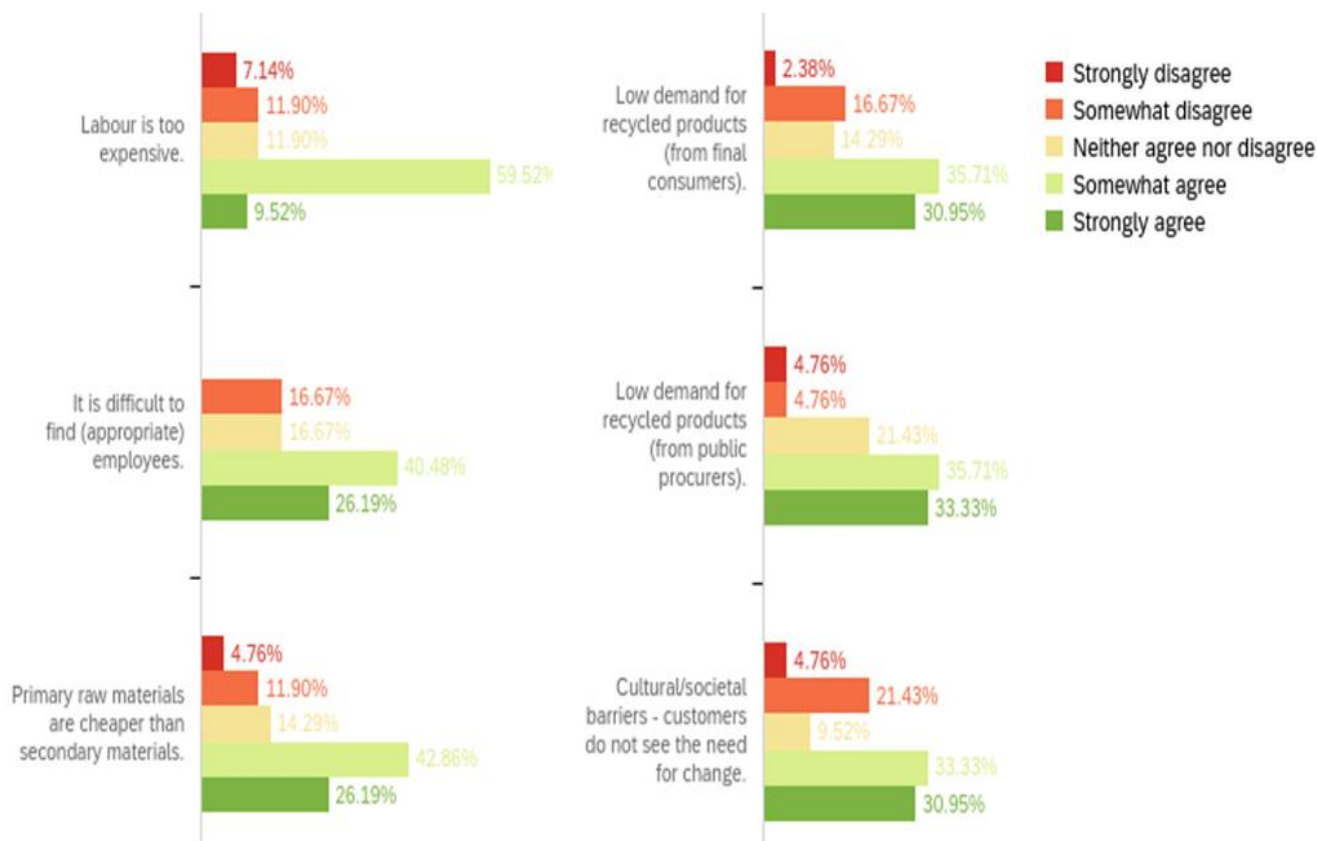
### **Macroeconomic barriers**

Following the legal and institutional challenges, the broad category of macroeconomic barriers was identified as the second most pressing by the respondents. These barriers include the unfavourable conditions of the labour market (the availability of labour and the wages) as well as the aggregate demand for recycled products as well as the prices of secondary materials on the market. The breakdown of the responses can be seen in Figure 5.

69.04% of respondents agreed that “labour is too expensive” and 66.67% agreed that “it is difficult to find (appropriate) employees”, which can also be related long-term low figures of unemployment in the Czech Republic which leads to the highest vacancy rates in the EU, with the problem being particularly pressing in some regions<sup>37</sup>. Given that textile recycling is highly labour intensive and requires a lot of manual work, the labour market problems pose a significant challenge.

A further market-wide issue is the price of primary raw materials in contrast with secondary materials. As secondary (recycled/reused) materials would be used as a substitute for primary raw materials, their price needs to be sufficiently low for an economic incentive to exist. However, given the higher costs of textile recycling and a lack of internalisation of the externalities associated with the production materials, at the moment the price signals in the market do not encourage a circular use of textile waste.

This creates further issues by translating into higher prices of final products from recycled materials, which limits the demand for them, leading consumers to opt for the less sustainable alternatives. Additionally, 64.28% of respondents also believe that cultural and societal issues play a key role in the relatively low uptake of circular textile. Currently the use of secondary materials is also not prioritised in public procurement tenders and procurers thus typically prioritise the offer with the lowest price rather than considering the environmental implications of it, unlike in some other countries where using a given percentage of recycled fibres is sometimes included in the public procurement requirements.



Source: own elaboration

**Figure 5: Macroeconomic barriers**

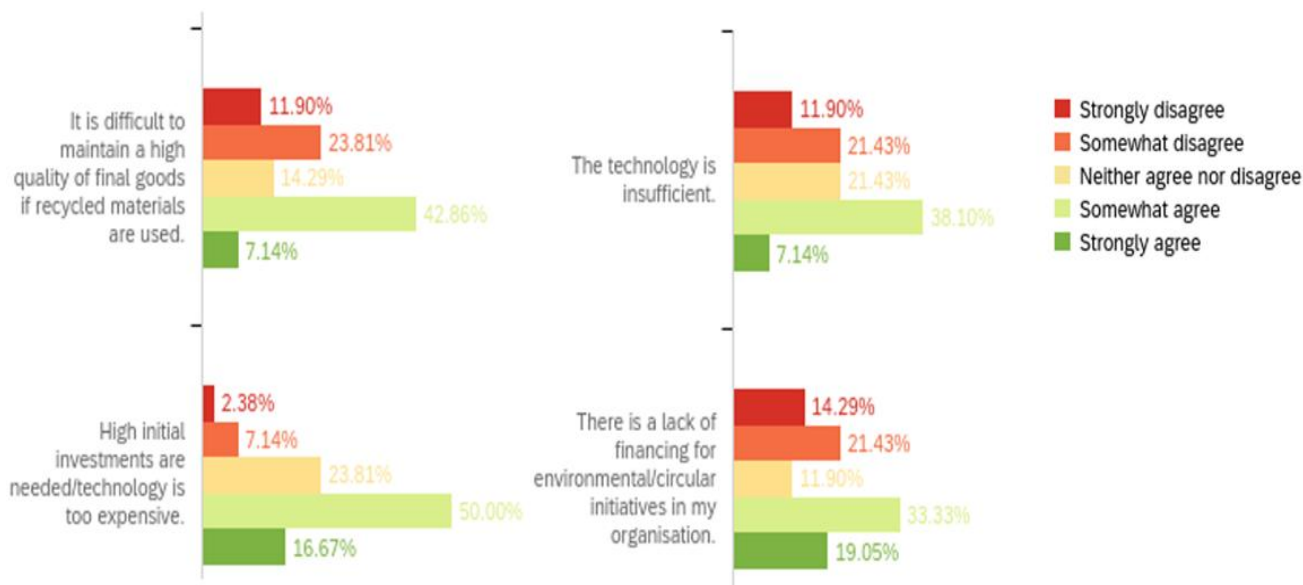
### **Microeconomic barriers**

Finally, microeconomic barriers are present. The specific barriers were related to the production processes, organisational challenges and technological limitations. The breakdown of the responses is presented in Figure 6.

Firstly, high initial investments and issues of scale were identified as a highly pressing issue. Respondents in in-depth interviews spoke about the lack of financial support available, which creates a large entry barrier into the market of textile waste processing. Moreover, the collection issue is encountered by many small firms and small municipalities, as recycling centres typically only accept textiles in tonnes.

Secondly, difficulty of maintaining a high quality was identified, with the problem being largely related to the low initial quality of fast fashion which makes reuse or recycling essentially impossible. The use of composite materials has also been mentioned as a difficulty due to the technical limitations of separating the different fibres while maintaining high quality, leading to the need for down-cycling.

Lastly, while 35.72% of respondents disagree that they lack funding for environmental initiatives within their organisation, 52.38% see this as an issue. Environmental management can pose extra costs and in some cases the organisations, firms or public bodies do not yet treat sustainability as a priority, and so a lack of financial and organisational support has been cited as a restriction to contributing to a circular economy of textiles.



Source: own elaboration

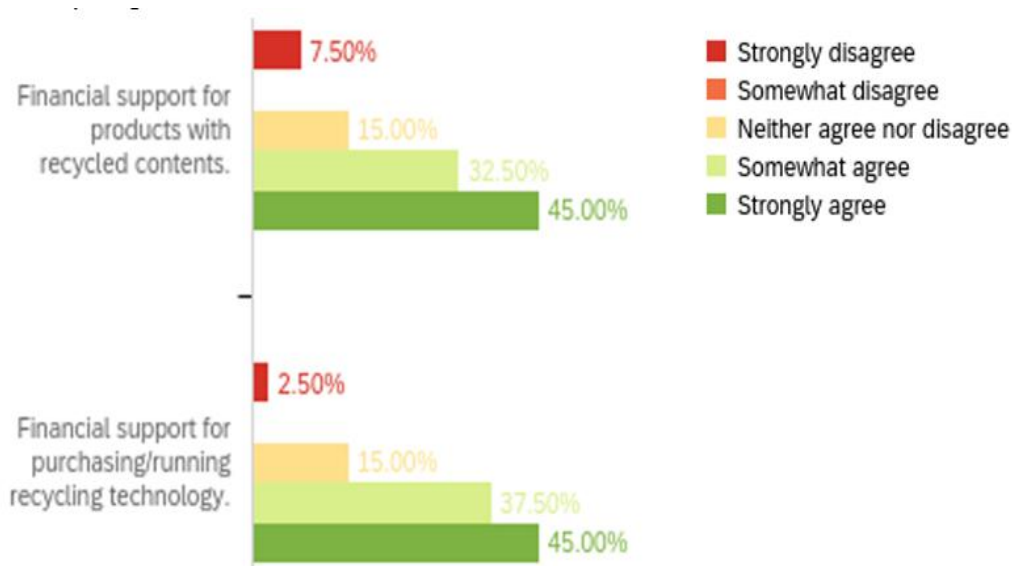
**Figure 6: Microeconomic barriers**

### ***Discussion of selected policy responses and solutions***

In the initial roundtable discussion, the two main recommendations were solidifying and unifying data and mapping the material flows (which is what this study attempted to address) and introducing support for products made from recycled materials. Such support can be designed more efficiently based on the knowledge of the legal, macroeconomic and microeconomic barriers explored in the questionnaires and interviews.

### **Economic incentives, financing and direct public provision**

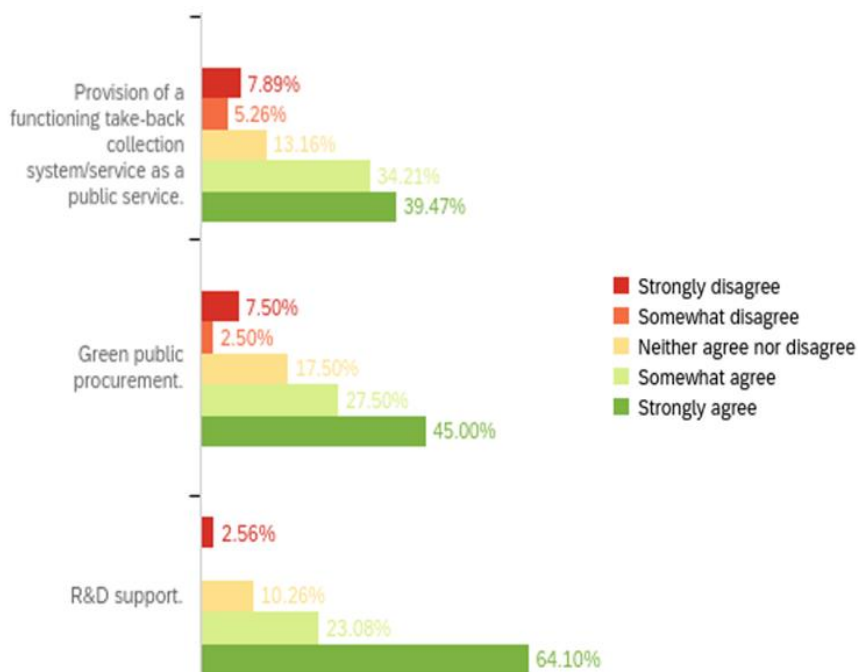
First, support for economic incentives was very high amongst respondents (as shown in the Figure 7 below), given the previously discussed economic barriers and the fact that textile recycling is not directly financially funded at the moment (leaving it to the private sphere and charities). Economic incentives could address the high costs (especially in regions where the service of textile recycling is not financially attractive), addressing the market failure related to the public service nature of waste treatment. Financial support could also potentially reduce the costs of final products from secondary materials, thus making them more attractive to buyers who would face price signals that (at least partly) internalise the externalities). This was supported by 82.5% of the respondents who believe that it would help address the restrictively high initial investments as well as the insufficient competitiveness next to primary materials. Additionally, recognising the high initial investment costs that were commonly cited by participants in the study, R&D support could be provided and taken up, which can come through various funds under the Green Deal as well as nationally. While economic incentives would, of course, come at a cost to the public budget, they might be crucial in supporting textile recycling in the earlier phases (such as investment into research or into expensive recycling technology), they would address the market failure and they could be financed through redirecting the revenue raised by other measures discussed in this paper, such as the extended producer responsibility (EPR) schemes, higher landfilling fees or forms of excise taxes.



Source: own elaboration

**Figure 7: Policy responses: Economic incentives**

Direct involvement and financing by the government should also be considered. The support for such policy responses is shown in Figure 8 below. There could be a publicly provided functioning take-back collection service. While this would address the under-provision by the private sector and charities that is currently observed, it might not be an efficient and desirable response as a relatively dense network of organisations involved in the system already exists, and so decentralisation of financing to a regional level as well as support to the private operators might be more efficient. This could also be targeted to improve infrastructure in areas which struggle more, and public provision might be more relevant where there is not a strong business case for the private sector to provide the service (for example if the quality or quantity of the textile gathered in the area is too low, as has been mentioned by some respondents).



Source: own elaboration

**Figure 8: Policy responses: Direct government financing and provision**

A more desirable way for the government to get involved directly would be through green public procurement (GPP)/circular procurement. This has been identified as one of the main strategies towards circularity in previous research<sup>38</sup>. Given that public procurement amounts to about 14% of the EU GDP with a value of around 600 billion CZK annually in the Czech Republic, it is a significant driver of demand<sup>39</sup>. These figures are for public procurement overall as it is not split up by category in the official data, but some of it would be directed towards goods such as police or army uniforms, hospital clothing such as scrubs, etc. 72.5% of respondents identified GPP as a desirable response, as shown in the previous figure. Green public procurement criteria are being introduced through the EU as well, but when it comes to implementing them for textiles, only about 18% of Member States meet the targets and most are far off from implementing them sufficiently based on the guidelines<sup>40</sup>. In the Czech Republic, some requirements on socially and environmentally responsible public procurement wherever possible have been passed through the amendment to Act No. 134/2016 Coll. on public procurement in 2020, but more ambitious and binding requirements could be adopted.

More ambitious requirements for contracts should be implemented through tools that enable procurers to apply specific requirements with the greatest possible impact. The current market situation is such that the demand for products containing recycled fibres often (according to discussions with respondents) results in a higher price, which is an undesirable effect. However, cost reduction could be distributed throughout the entire life cycle if the procurement process incorporates requirements for quality, improved reparability, or direct provision of post-purchase service for goods/apparel. In the Czech Republic, working groups are also being established at the Ministry for Regional Development, which consider the textile issue significant and plan to develop specific methodologies that would provide public procurers with a tool to promote circular criteria when issuing contracts. This aims to create a market for more innovative and circular textiles without necessarily increasing the cost.

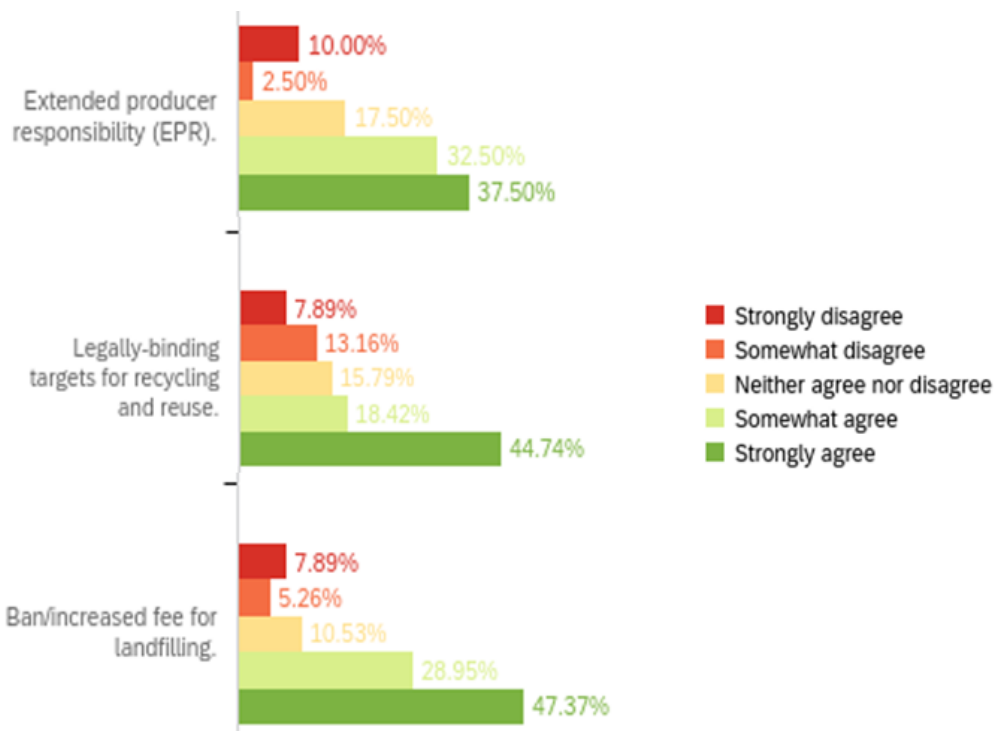
Fiscal incentives related to taxes could be explored. In 2020, VAT for the repair of footwear, leather goods, clothing and textile was reduced to 10%, and second-hand sale of T&C is covered under a margin scheme taxation system (where the taxation only covers the traders' margins)<sup>41</sup>. These are steps in the right direction and could be extended to other beneficial activities. This focus on repair, reuse and recycling and its encouragement through the tax system is needed, given that currently landfilling essentially operates with tax breaks, creating significant disincentives to circularity<sup>42</sup>.

Undesirable activity like landfilling or the use of low-quality primary materials could also be discouraged through policies such as excise taxes on products which are difficult to collect and recycle/reuse. This is related to the idea of an extended producer responsibility scheme (EPR), which was commonly raised by respondents in interviews as well as in the initial roundtable. Under EPR, producers have responsibility for the environmental impacts of their products in the post-consumer stage, which incentivises them to produce more environmentally-friendly products as the responsibility moves upstream to them, in line with the polluter pays principle<sup>41</sup>. As has been previously mentioned, the revenue from these measures could be used for providing economic incentives for a more sustainable textiles economy, such as the tax breaks, subsidies for new technologies or struggling areas, or R&D funding, as suggested in this paper.

70% of the study's respondents held that an EPR system for textiles would be desirable. This has been previously implemented abroad, such as for clothing, linen and shoes in France<sup>43</sup>, and it has been associated with a tripling of the collection and recycling rates for post-consumer textiles<sup>44</sup>. According to the OECD (2021), introducing EPR schemes for T&C could target approximately 200 000 tonnes of waste, although the exact impact would depend on the design and effectiveness of the scheme<sup>41</sup>. EPR could also raise public revenue which could subsequently be redirected towards subsidies, R&D or direct provision measures (as discussed previously). However, it is necessary to keep the limitations of EPR in mind, as firms often gather in producer responsibility organisations (PROs) which can be powerful in gathering the interests of the producers, and the existence of the EPR might also mislead someone into seeing it as sufficient in addressing the externalities of the waste since its treatment would be financed. This can limit the focus that is placed on reducing consumption or reuse.

**Legal and institutional changes**

Secondly, alongside the economic policy changes, legal and institutional change and support plays a key role. The support for them amongst the respondents is shown in Figure 9 below. Multiple interviewees raised the issue of problematic legal definitions of waste which prevent the materials from being maintained in use. Alongside addressing these issues, the law can play a role in promoting circularity by introducing legally-binding targets for recycling and even reuse, as has been done in Spain or France<sup>45</sup>. However, the data gaps must be addressed first for such targets to be set accurately.



Source: own elaboration

**Figure 9: Policy responses: Legal and institutional change and support**

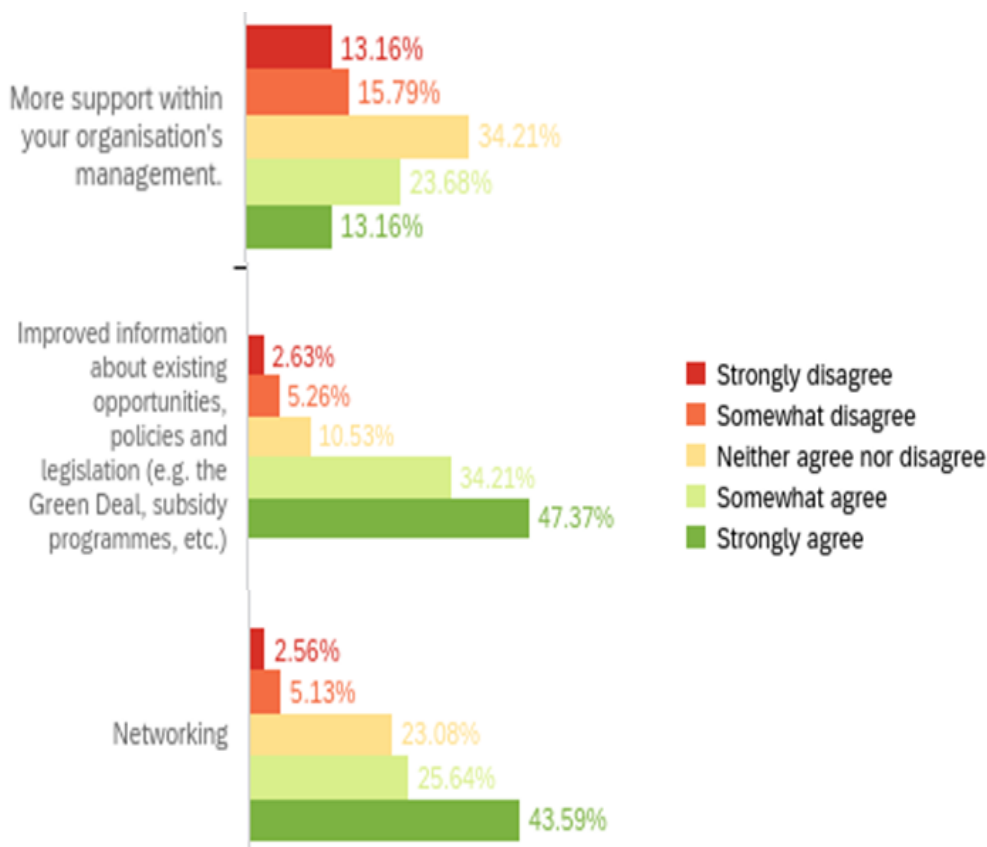
The final challenge associated with legal measures is a clear definition of the methods of collection and measurement of textile waste. These should be improved both locally and globally. Similar methodologies have already been proposed in the area and similarly European institutions should propose appropriate measurement methodologies for data collection and comparison of results between member states in the areas of: waste registration, direct measurement at the point of origin (e.g. flow analysis based on mass balance sheets or waste composition analyses)<sup>46</sup>. Data availability (preferably with the highest possible level of detail within open access) is a prerequisite for setting specific goals, but also for evaluating the effectiveness of individual interventions<sup>13</sup>.

Last but not least, a landfilling ban or a significant increase in the fee would act as a significant impulse for circularity, according to 76.32% of respondents. A reduced VAT rate is currently applied to landfilling and the fee stands at less than (approximately 16 GBP) and 900 CZK/tonne for usable waste (around 30 GBP), which is among the lower fees within the EU<sup>47</sup>. Landfilling is therefore in effect encouraged as it becomes a relatively cheaper option. Increases in landfilling fees have been found to negatively correlate with the amounts of waste that is landfilled, and so there might be significant scope for the landfilling of textile waste through more significant fee increases or an earlier ban (at the moment, it has been postponed to 2030)<sup>48</sup>.



**Supplementary measures and private responses**

Thirdly, while government intervention plays a key role in directing the industry towards greater circularity, private responses can supplement it. While many of the interviewed stakeholders already felt like internal support within their organisation is sufficient (as seen in the section exploring the barriers), this was not the case for all, especially when it comes to financing sustainability in cases where this involves extra costs. Moreover, since the respondent pool is likely to suffer from a selection bias of more sustainable organisations, this will be less so the case in general, with other firms likely struggling even more to obtain funding for sustainability-related changes. Some of the progress on the private side could also include improved data collection and reporting, greater transparency and information diffusion within the industry, and networking opportunities facilitating coordination and communication between the stakeholders. The support for some of these responses is visualised in Figure 10 below.



Source: own elaboration

**Figure 10: Supplementary measures and private responses**

Recommended solutions combine partial public funding and legislative changes in waste definitions to ensure that as much material as possible is considered secondary raw materials or other by-products, thus avoiding their classification as waste (which is a problem across material waste flows and currently being addressed by the working group of the Czech Circular Hotspot led by INCIEN - whose representative was one of the respondents in the in-depth interviews). Other recommendations propose a shift in priorities in public procurement from basic quantitative criteria evaluating price to additional environmental criteria such as repairability, recyclability, etc. Lastly, an important stimulus is the gradual increase in landfill costs, which is currently the most common method of handling textile waste not only in the Czech Republic.



## Conclusions

This case study focused on identifying the barriers to implementing a circular economy in the Czech textile industry, specifically in regards to textile waste. The research found that a lack of knowledge and awareness, inadequate legislation and regulation which does not create incentives for circularity, and financial barriers (on a firm-specific level as well as in the macroeconomic setting) were the main obstacles to creating a circular economy in this sector. In addition, the research found that there was a general lack of collaboration and communication among stakeholders in the textile industry, which further hindered progress towards circularity.

The Czech textile industry faces significant challenges in transitioning to a circular economy, primarily due to a lack of knowledge and awareness, inadequate legislation and regulation, and financial barriers. The study highlights the importance of collaboration and communication among stakeholders to create a more circular system in the textile industry. The research also recommends the need for greater investment in research and development to find innovative solutions to textile waste, as well as the need for more supportive policies and regulations to incentivise circularity.

The three main solutions identified are as follows:

Firstly, externalities present within the textile industry should be internalised, such as using excise taxes on unsustainable products and increasing the fee for landfilling or moving the date of the prohibition of landfilling forward. Through these steps, the gap between the “sustainable” textile and clothing and the typically cheap “conventional” fast fashion would be narrowed, as the environmental cost of using primary raw materials would be economically reflected and recycled products would become more competitive. Secondly, an EPR scheme for textile should be considered as it would put more pressure on producers to introduce eco-design measures and the revenues could be redirected to supporting the network for separate textile collection, investing in research and development of recycling technology, and providing financial incentives to the stakeholders engaged in desirable activities promoting circularity. Last but not least, the existing data and information gap must be narrowed.

The study suggests several avenues for further research, including investigating the potential for innovative business models such as product-service systems, exploring the role of consumer behaviour in creating a circular economy in the textile industry, investigating the legal side of the potential policy solutions, and evaluating the optimal levels of economic incentives, as well as conducting a material flow analysis. Additionally, the study recommends examining the potential for developing a centralised textile waste management system and evaluating the potential for digital technologies to improve circularity in the industry.

The findings of the case study in this paper can potentially be extrapolated beyond the Czech Republic, as the EU ran an Open Public Consultation of 544 stakeholders in preparation for the textiles strategy and highlighted similar problems being encountered by stakeholders in other European countries, which points to the legitimacy and extrapolative value of the findings of this paper. Despite only covering one of the 27 EU countries, our study worked directly with 78 survey respondents and 10 interviewees, so proportionally to the population, the stakeholder based consulted is significantly larger than in the EU-wide Open Public Consultation. Given that the results are similar, we can assume that 1. the results are aligned with EU-wide data, and 2. that stakeholders in the textile industries of other EU countries are likely to be facing similar issues as those in the Czech Republic.

Overall, the paper sheds light on the current state of circularity of the textile industry, contributes to an understanding of what prevents greater circularity, and helps find a path that would move us away from the current linear model and towards a more sustainable economy of textiles, in line with the framework set by the Green Deal.

The summary of main findings are the following: legal and institutional barriers are deemed most pressing by the stakeholders within the industry, followed by macroeconomic and lastly microeconomic barriers. In particular, respondents highlighted the lack of incentives for a sustainable textiles economy, low demand for recycled products, labour conditions and high costs, as well as a general lack of information, data and cooperation. In terms of the potential responses and solutions, the need for internalisation of externalities within the textile sector has been repeatedly mentioned. Specifically,

measures such as excise taxes, extended producer responsibility (EPR) and increased fees/earlier prohibition of landfilling have been repeatedly raised. Lastly, more work is needed to close the existing data and information gap.

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## Bariéry cirkulární ekonomiky v textilním průmyslu: případová studie České republiky

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### Sourhn

Evropská unie se zavázala zvýšit cirkularitu textilních výrobků v souladu se Zelenou dohodou a Strategii pro udržitelné a cirkulární textilie. Tato strategie přináší zcela zásadní změny v rámci celého životního cyklu výrobků – od požadavků na ekodesign v oblasti opravitelnosti či recyklovatelnosti, zajištění funkční sběrné sítě na textil, ale například i zavedení digitálního štítkování. Avšak praktická aplikace principů cirkulární ekonomiky v textilním průmyslu čelí několika výzvám. Tato studie si klade za cíl identifikovat bariéry pro dosažení cirkularity a potenciální politické reakce v kontextu České republiky prostřednictvím kombinace dotazníků a kvalitativních hloubkových rozhovorů se zainteresovanými stranami. Identifikované bariéry zahrnují mikroekonomické, makroekonomické, technologické, institucionální a datové faktory. Pokud jde o širší doporučení, zjištěné priority zahrnují nepříznivé podmínky pro udržitelnou výrobu textilních výrobků, vysokou míru ukládání odpadů na skládky a nutnosti zavedení rozšířené odpovědnosti výrobce (EPR). Závěry této studie mohou posloužit k rozvoji národních opatření (pro Českou republiku i pro ostatní země EU) a přispět k dosažení cílů EU pro cirkulární ekonomiky a její aplikaci textilu.

**Klíčová slova:** textilní odpad, oběhové hospodářství, analýza zainteresovaných stran, mezery v datech, řízení textilního odpadu, bariéry pro cirkularitu