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155 Repair in the Circular Economy: Towards a National Swedish Strategy

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Abstract

Extending the lifetime of products is seen as a key objective for realising the vision of a Circular Economy. One way to increase the lifespan of products is to enable more repair activities. However, consumers encounter a variety of barriers for repairs, prompting public authorities in Europe and the US to adopt or propose policies in support of consumer repairs. Sweden has recently adopted a circular economy action plan, where increasing the number of consumer repairs is a stated objective. However, Sweden has so far only adopted a few repair policies, most notably through the tax reliefs for the repair sector that were implemented in 2017. The aim of this contribution is to research how Sweden could develop a more comprehensive policy mix for promoting consumer repairs, also by taking into consideration initiatives from other countries and regions. The research is based on a literature review and semi-structured interviews with policymakers and other relevant actors in Sweden, Europe and the US. The study shows that a lot of interesting initiatives aiming at increasing repairs are currently being proposed. The new requirements related to repairs, developed within the European Union's (EU) Ecodesign Directive, have been positively received but the process is cumbersome and it will take time before their full effect becomes evident. Initiatives, such as the French repairability index and the French repair fund will create incentives for the producers to design more repairable products and make it easier for consumers to repair. On the same track, the Repair Network of Vienna with its repair vouchers makes repairs cheaper and more trustworthy. Also, the US policy proposals on right-to-repair laws would help to create an open market for repairs for a lot of products. Sweden has the possibility to gain knowledge through the implementation of similar policies, and by considering new policies suggested in literature and by the interviewees. Thus there is potential for Sweden to be a front-runner in creating a more resource efficient society through increased repair activity. Concluding, some preliminary proposals for a future policy mix are presented.

Keywords: Repair, Repair policy, Right-to-Repair, Circular Economy, Ecodesign.

Introduction

Product repairs can support the slowing and closing of material loops, and increase product lifetimes, thereby contributing to the transition to a circular economy (Svensson-Hoglund et al., 2021). Yet, there are indications that the number of product repairs has decreased in recent years, and that throwing away a broken product instead of repairing it is becoming “normalized” (Bakker et al., 2014; McCollough, 2009). The approach towards repair in the European Union (EU) and the United States (US) has different framings: in the US repair is seen primarily as a consumer issue, whereas in the EU repair is more closely connected to environmental issues and the circular economy (Svensson-Hoglund et al. 2021). In the US, several states have proposed right-to-repair (R2R) laws that aim to strengthen consumers’ rights and opportunities in relation to repair, and open up the market for repairs for more commercial actors (Svensson-Hoglund et al. 2021). In the EU, certain R2R obligations have been adopted through the Ecodesign Directive (2009/125/EC). For instance, for some product categories producers are obliged to provide professional repairers with spare parts for up to ten years (European Commission, 2019). However, in order to reach more substantial levels of consumer repairs, a more comprehensive package of policies is needed, where EU member states also adopt national policies (European Commission, 2015; Milios, 2018; 2021a). Through national initiatives that complement EU policies, there is a chance to gain momentum towards a situation where repair is “normalized” (Dalhammar et al., 2021a).

Some EU member states have already adopted progressive circular economy policies, cf. Table 1, and this development is expected to continue (Dalhammar et al., 2021b).

Table 1. Examples of adopted and proposed policies to increase product lifetimes

Practice	Definition	Examples of laws & policies promoting the practice
Longer product lifetimes through design	Extending the technical lifetime through product design, e.g. using more durable materials or adopting design changes to make the product easier to repair	Ecodesign regulations have regulated minimum lifetimes for some products/components (EU level) Changes in mandatory consumer warranties (several EU countries) Modulated fees in producer responsibility schemes (France) Eco-labels with criteria that aims to prolong product lifetimes (e.g. TCO certified)

		Proposals to provide durability information on products at point of sale
Repair	Extending the life of a product during its first use by retaining or restoring its functionalities with minor repairs that can be done by manufacturers or professional service providers	<p>Right-to-repair obligations in Ecodesign Directive (e.g. provision of spare parts, ease of disassembly) (EU level)</p> <p>Repairability index (France)</p> <p>Repair fund linked to producer responsibility schemes (France)</p> <p>Lower taxes for the repair sector (several countries)</p> <p>Local and regional initiatives, such as Repair Network Vienna (includes repair vouchers)</p>
Reuse	Extending the life of a product or part by having a second hand user utilize it for the same original purpose with no or only minor enhancements and changes; can be combined with refurbishing	<p>Re-use parks and re-use malls (several cities and regions in Europe)</p> <p>Quality labels for re-used products (several regions and cities)</p> <p>Support re-use in waste laws</p>
Remanufacture	Enabling a full new service life of a product via a standardized industrial process that takes place within industrial or factory settings, in which cores are restored to original as-new condition and performance, or better. The remanufacturing process is in line with specific technical specifications, including engineering, quality, and testing standards, and typically yields fully warranted products (and per agreement of global industry members).	<p>Support to Remanufacturing networks (EU has provided such support)</p> <p>Public procurement of remanufactured products such as laptops and furniture (several countries)</p> <p>Changing trade agreements to support trade in remanufactured products (discussed at global level)</p>

Clearly, the current policy situation in the EU is quite dynamic, and it is important that front-runner countries (e.g. France) adopt progressive policies, as this can lead to a situation where other countries can follow. Further, national initiatives will be important stimulus for further EU policy developments (Dalhammar, 2007)

The aim of this research is to investigate how Sweden could develop a comprehensive policy mix for promoting consumer repairs, and what we can learn from other countries and regions. The research included an analysis of: i) how Sweden, the EU, progressive EU member states and the US supports repairs; ii) what Sweden can learn from other countries and regions; and iii) an analysis of what policies should be adopted at the EU level vs. the national level.

Methods

The methods included a literature review and an interview study. The literature review was performed in order to provide information on the role of repair in the circular economy, and to obtain an overview of existing and proposed policies. The literature review was conducted using relevant search words (i.e. repair, circular economy, policy, strategy, USA, Sweden, EU) in Web of Science, Scopus and Google Scholar. The search for keywords was performed both in English and Swedish. Additional literature was found through the search of the relevant themes in public documents, and through recommendations by the interviewees.

The interview study contained 15 semi-structured interviews with experts in the field; see Table 2. A number of experts were contacted, and more names were provided through the “snowballing” method (i.e. experts proposing other experts). 15 people agreed to be interviewed during the available time period for this research.

Table 2. List of interviewed actors.

Respondent	Date	Organisation
<i>European actors</i>		
1	12 Mar. 2021	Repair network
2	16 Mar. 2021	NGO
3	17 Mar. 2021	NGO
4	17 Mar. 2021	Repair and re-use company
5	25 Mar. 2021	NGO
6	1 Apr. 2021	Repair company
7	9 Apr. 2021	NGO
<i>Actor in the US</i>		
8	30 Mar. 2021	NGO

Swedish actors		
9	23 Mar. 2021	National authority
10	26 Mar. 2021	Repair section of large OEM
11	29 Mar. 2021	Researcher
12	29 Mar. 2021	National delegation for circular economy
13	30 Mar. 2021	National authority
14	14 Apr. 2021	Politician
15	12 Apr. 2021	NGO

Semi-structured interviews were considered the most appropriate way to conduct this research, as it provides the possibility for interviewees to share insights and allows for exploring new issues brought up during the interviews. The interview guide had 17 questions, related to inter alia: how the interviewees work with repairs, their ideas and expectations related to existing and adopted EU and national policies for repairs, and their views on what kinds of policies the EU and European countries should develop.

Due to the ongoing pandemic, all interviews were conducted online through video communication software. The interviews lasted between 30 and 60 minutes and were conducted in English or Swedish.

The policy analysis methodology presented by Walker (2000) was used as guidance when discussing the appropriate policy mix. This was further informed by proposals in relevant literature, and by the opinions of the interviewees.

Results

The results section is divided in two parts: the literature review and the interviews. In the discussion section that follows, the results and the implications for Swedish and European policies are analysed.

Literature review

Barriers for consumer repairs

Whether a consumer chooses to repair a broken product or not depends on a number of factors, including the price of the repair, the price of a new product, and the cost – in time and money required to get a good repair service (Ackermann et al., 2018; Maitre-Ekern & Dalhammar, 2019). If the price of a new product is not much higher than the costs of repair, a consumer is likely to buy a new product instead of proceeding to repairs (Cerulli-Harms et al., 2018 Jaeger-Erben et al., 2021; Laitala et al., 2021). Apart from the price issue, other barriers for repairs include lack of knowledge (Woidasky & Cetinkaya, 2021), product design (Cooper & Salvia, 2018) and existing

laws (Svensson-Hoglund et al., 2021). Consumers are also likely to be influenced by various cultural and social factors that affect the choice to repair or not (Ackermann et al., 2018; Jaeger-Erben et al., 2021).

Technical barriers may be due to design, poor quality materials, or lack of spare parts or proper repair information (Maitre-Ekern & Dalhammar, 2019; Hernandez et al., 2020). Design that does not support disassembly – e.g. by gluing components – or requires specific tools for repairs, constitutes a barrier for repairs (Cooper & Salvia, 2018; Maitre-Ekern & Dalhammar, 2019). Moreover, rapid technological development can also lead to problems for repairers, who need to keep updated in order to perform repairs (Hernandez et al., 2020).

Functional obsolescence can, for instance, happen in the case that an important component in a product breaks down, even if the other parts of the product function properly (Cordella et al., 2021; Jaeger-Erben et al., 2021). Furthermore, software updates can often lead to a situation where older models of a product do not function as intended (Maitre-Ekern & Dalhammar, 2016).

The economic case for repairs is undermined by structural factors. Quite often, considering the price of repairs and warranties provided when buying a new product, it is not beneficial for consumers to undertake repairs. This situation is significantly affected by the fact that products are typically produced in countries where the price of labour is low, whereas the price of labour needed for repairs is high in most OECD countries (Bocken, 2020; Cerulli-Harms et al., 2018; Maitre-Ekern & Dalhammar, 2019). If spare parts are expensive or hard to get, this can also affect the price of repairs negatively (Svensson-Hoglund et al. 2021).

Regarding administrative barriers, laws related to chemicals and intellectual property rights (such as patents and copyrights) are often barriers for repairs (Svensson-Hoglund et al. 2021), as they can hinder the use/re-use of spare parts, and be used by Original Equipment Manufacturers (OEMs) to restrict access to spare parts or raise the price of spare parts. They can also hinder independent repairers from repairing a product.

Social and cultural barriers may be due to consumer actions and habits. A desire for novelty can lead to discarding of functioning products (Jaeger-Erben et al., 2021; Laitala et al., 2021). This is especially relevant for products with short innovation cycles like computers and cell phones, as consumers tend to have high expectations related to performance and aesthetics (Jaeger-Erben et al., 2021; Maitre-Ekern & Dalhammar, 2016). Low prices for many products lead to less "economic and emotional" investment in products, which inhibits the incentives for repairs (Ackermann et al., 2018; Cooper & Salvia, 2018; Hernandez et al., 2020). Further, the cost in terms of money, time and energy for performing repairs is often considered to be high, whereas the repair service

is not always of high quality (Jaeger-Erben et al., 2021). An overview of consumer repair barriers is presented in Figure 1.

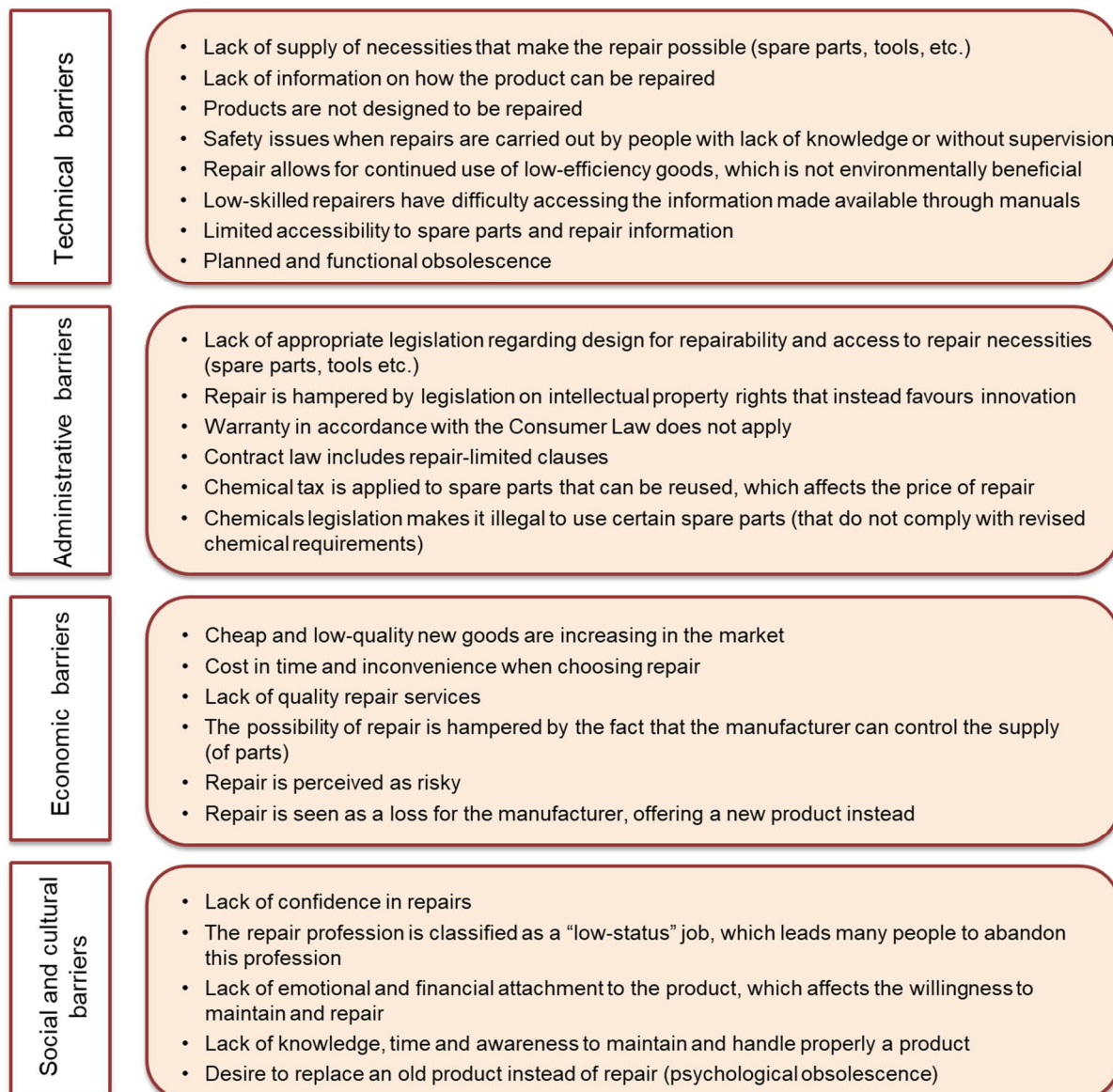


Figure 1. Overview of consumer repair barriers (own illustration based on Svensson-Hoglund et al., 2021 and Hernandez et al., 2020).

Policies at the EU level

The most important policy development at the EU level concerns new requirements under the Ecodesign Directive, with some new product regulations adopted in October 2019. Manufacturers and importers of some product groups must now supply professional repairers with spare parts for at least 7 years (and at most 10 years), and deliver them within 15 workdays (European Commission, 2019). It is also stated that repair should be possible with commonly available tools, and that repair information shall be accessible (European Commission, 2019). These requirements entered into force in 1 March 2021 for four product categories.

These new requirements have been criticized for mainly being aimed at professional repairers, and it is unclear what categories of actors can be considered professionals (HOP, 2020; Mikolajczak, 2021). The regulations state that the repairers should have the necessary technical expertise and be present in a register set up by the respective EU member states. Few member states have such registers yet, and therefore it is the manufacturers that decide which repairers are to be considered professional ones (Mikolajczak, 2021). HOP (2020) argues for further developments, to ensure that independent repairers and consumers can access spare parts and repair manuals. It has also been argued that requirements related to repairs must be adopted for many more product categories (Keirsblick et al., 2020). Additionally, the delivery time must be shorter than 15 working days, as long waiting times reduce the attractiveness of repairs (HOP, 2020; Mikolajczak, 2021). Another issue to consider is software-hardware interactions, to be better regulated under the Ecodesign Directive (HOP, 2020; Zuloaga et al., 2021).

Mandated by the European Commission, the European standardization organisations have developed a number of standards that can support future regulations under the Ecodesign Directive, as well as other policies like labelling (Dalhammar et al., 2021c; Tecchio et al., 2017). One of the standards related to repairs, among other things it includes a basis for a scoring system to rate products' 'repairability'; cf. Table 3 (see also Cordella et al., 2019).

Table 3. Examples of criteria in repairability scorecard (based on EN 45554:2020).

Aspect	Examples
<i>Design for disassembly</i>	Fastener types
<i>Tools and interface</i>	Necessary tools required for repairs Diagnostic support and interfaces
<i>Repair environment required</i>	Workshop environment required for conducting repairs
<i>Skill level</i>	Skill level needed for conducting repairs
<i>Software and data management influencing repair opportunities</i>	Password and factory reset Data management
<i>Return options for products</i>	Available return options for repair, re-use or upgrade processes
<i>Repair information</i>	Availability for different actors (e.g. authorized and independent repairers, consumers) Comprehensiveness of information

<i>Access to spare parts</i>	Duration (time) that spare parts will be available Spare parts interfaces Spare parts availability for different actors (e.g. authorized and independent repairers, consumers)
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In the area of consumer law, the EU has adopted a new Directive on sale of goods (Directive (EU) 2019/771). Among other things, the Directive includes certain changes regarding consumer guarantees, and the right for consumers to ask for repairs as redress options when a product is faulty. The Directive is however not expected to have large implications for repairs.

The latest EU Circular Economy Action Plan (European Commission, 2020a) and the New Consumer Agenda (European Commission, 2020b) include a number of initiatives to strengthen consumer repairs, but it remains to be seen what the legislative proposals regarding these will be.

There is a growing number of proposals for future circular economy policies at the EU level. The European Parliament has recommended that the European Commission should "develop and introduce mandatory labelling, to provide clear, immediately visible and easy-to-understand information to consumers on the estimated lifetime and reparability of a product at the time of purchase" (Article 6(b) in European Parliament resolution 2020/2021(INI)). Proposals for such a labelling system do exist in literature, but there is certain uncertainty on how to apply it in practice (Cordella et al., 2019).

In a white paper, HOP (2020) presents 20 measures to combat planned obsolescence. These include measures aimed at advertising, and also: a durability/repair index for products (harmonised in the EU); proposal for the implementation of an EU repair fund (similar to the planned French one; see below); requirements that producers account for how long they will provide spare parts; and suggestions for EU member states to have more flexibility regarding changing Value Added Tax (VAT) for the repair sector and for green products (through changes of the VAT Directive 2006/112/CE).

National policies

France seems to be a leader when it comes to repair related policies. The country has criminalized planned obsolescence (Maitre-Ekern and Dalhammar, 2016) and through the recently adopted "anti-waste law" (Law 2020-105) France is the first country to introduce a mandatory reparability index (Law 2020-105 Article 16 L 541-9-2) (Ministry of Ecological Transition, 2020a). The aim of the index is both to provide relevant information on reparability to consumers, and to provide incentives for producers to design more repairable products.

The law also introduces so-called repair funds (Law 2020-105 Article 62 L 541-10-4&5) (Ministry of Ecological Transition, 2020a). Depending on whether the product complies

with certain criteria or not, the producer pays money into a fund, arranged through the producer responsibility schemes. That money can be used to reduce the costs for consumer repairs when undertaken at professional repairers. The criteria will be designed for relevant product groups/sectors. Producers of household appliances, including electric and electronic equipment (mobile phones, computer equipment, large and small household appliances, TV sets, hi-fi stereo systems etc.) and furniture need to provide spare parts from the date that the last product of a certain model was put on the market (Law 2020-105 Article 19 L 111-4) (Ministry of Ecological Transition, 2020b). The use of re-used/harvested spare parts is encouraged. From January 2022 it is also lawful to use 3D printing to print spare parts that are no longer available on the market (Law 2020-105 Article 19 L 111-4).

France has also made use of modulated fees in producer responsibility schemes to support product longevity and repairs. A bonus-malus system is applied, where the producer fee is based on various criteria (Micheaux & Aggeri, 2021), e.g.:

- Dishwashers and washing machines: if a producer supplies spare parts for 11 years there is 20% reduction of the fee;
- Vacuum cleaners: if a producer fails to provide certain technical information to authorized repairers, it leads to 20% increase of the fee;
- Computers: 20% reduction of the fee is granted if product updates can be performed by commonly available tools.

So far, the application of modulated fees and the bonus-malus system has not affected product design but it may happen over a longer term (Micheaux & Aggeri, 2021). Further, implementing such a scheme at the EU level would provide stronger incentives (Micheaux & Aggeri, 2021).

In Austria a number of local repair networks have been created, to make it easier for consumers to identify professional repairers (Lechner et al., 2021; Piringer & Schada, 2020). The cities of Graz and Vienna both have such networks, receiving funding from the respective municipal authorities. Repairers who want to join the networks must comply with certain criteria, e.g. that repair activities represent a large portion of their turnover, that there is price transparency towards consumers, and that the repairers do not solely serve one brand of products (Lechner et al., 2021; Piringer & Schada, 2020). The networks also offer a platform for various activities, including information sharing and swapping of spare parts (Lechner et al., 2021; Whalen et al., 2018).

The two networks subsidise consumer repairs, but use different systems. In Graz, the consumer can get a subsidy for half the repair cost, max. 100 EUR per year and household (Lechner et al., 2021). The consumer is entitled to the subsidy after the repair has taken place. In Vienna, consumers can download repair checks, which they hand in to repairers (thus, they get the subsidy at the time of purchasing the repair service), and it covers 50% of the cost of repairs up to maximum of 100 EUR (Piringer

& Schada, 2020). Subsidies can only be used at repairers that are part of the network. This is a way to increase quality control and to ensure that money is mainly used at independent repairers (mainly engaged with repairs and serving several brands).

In the US, several states have proposed laws of fair repairs (fair repair bills), with the purpose to make it legal for consumers and independent repairers to repair electrical and electronic products. This includes proposals on making spare parts and repair manuals available. While the proposed bills have different content, most of them aim to provide consumers and independent repairers with the same repair information and spare parts that are provided to authorized repairers (Svensson-Hoglund et al., 2021). Only three of the bills require producers to develop more sustainable and repairable products. The aim of the bills is rather to strengthen consumer rights, whereas environmental benefits are seen as a side effect (Svensson-Hoglund et al., 2021).

In Sweden, some tax measures to promote repairs were implemented in 2017 (Dalhammar, 2020; Milios, 2021b). One measure was to reduce the VAT for repair services of bikes, footwear and textiles from 25% to 12%. A second measure was to allow a tax deduction for repair services conducted in homes, allowing 50% of the labour cost to be deducted. An interview study with repair shops indicated that the measures had little effect on consumer demand for repairs (Almén et al., 2020). Potential explanations include low awareness among consumers; repair services are still quite expensive; and that consumers often buy cheaper products of low quality which undermines the case for making repairs (Almén et al., 2020). In April 2021 a government proposal was launched, proposing that the tax deductions (see above) would also be available for repair services outside the home, and include new product categories like furniture, prams and certain tools (Ministry of Finance, 2021). The proposed measures are currently being debated.

Interviews

The results from the interviews are presented under the following headings: product design; increased awareness about repair; access to and price for repair services; alternative business models; the need for progressive countries; and Swedish actors.

Product design

All interviewees agreed that product design is a key issue for consumer repairs, and that ecodesign measures should be regulated at the EU level. Only EU rules can make a difference at global level, not national ones.

While all respondents consider the new rules under the Ecodesign Directive related to repairs to be a step in the right direction there was disagreement on how important they will be. Some respondents thought they can be very influential, while other interviewees expressed more caution, and stressed that the devil is in the detail; the wording of future regulations and other EU laws and policies will be decisive.

Among current problems identified by the interviews were: the rules mainly aim to support professional repairers; few product groups are regulated yet; and the regulated product groups are not those with the greatest environmental potential. Two of the respondents also believed that large producers will be good at identifying and making use of existing loopholes in ecodesign regulations, and also stressed that sanctions need to be deterrent enough to matter to large producers.

Another problem identified concerned the slow process of implementing ecodesign regulations. A product-specific approach is probably necessary in most cases, as product groups and sectors differ, but it also means that the process is slow; especially as the resources devoted to ecodesign are limited in the EU. Several interviewees also pointed out that this means that EU member states need to keep pushing in order to speed up developments.

The interviewees also stressed that spare parts are expensive to produce, and that a better product design could keep down the need for spare parts. Among proposals from interviews were: to include more product groups under ecodesign regulations; to regulate the price for spare parts in order to make them less expensive; to enact stricter regulations of software and its updates, as this often lead to premature obsolescence; to increase the transparency for consumers regarding spare parts and expected product lifetimes; to change intellectual property laws so as to enable 3D printing of spare parts; to ensure that most products can be repaired with commonly available tools; to set stricter requirements regarding the maximum time for producers to deliver spare parts; and to quote requirements for using recycled material in products.

Increased awareness about repair

Several respondents stated that they see an increasing willingness to repair among consumers. But generally, consumers' awareness about repair activities is considered to be low: it is important to inform consumers about their rights, and about the positive impacts of repairs.

A majority of interviewees were in favour of campaigns related to repair, and to include information about repair in school curricula. This could increase awareness about how to self-repair stuff, and what kind of faults that could be repaired at a professional repairer. It can also increase the general acceptance for future repair policies. Further, there was a need to attract more young people to become repairers, as recruitment to this profession is often difficult.

One interviewee stated the importance of persuading consumers to keep their products for a long time, which is hard when the advertising industry aims to make people switch products more often; this highlights the need to also regulate advertising per se. It was also stressed by one interviewee that we need to change consumer mentality: it should not be OK to own many products.

All interviewees thought that labelling of products – related to their durability/lifetime and repairability – would be a very important policy development. This could lead to better understanding among consumers, and ultimately affect purchasing decisions. It can also change design practices among manufacturers, who will use the label as a benchmarking system. The interviewees thought that the French repairability index was an important initiative, though the current design of the system has some flaws. A couple of respondents pointed out that under the scheme, products that were not very repairable (due to the design) could get a good score, if for example the producers have a good score for supplying spare parts. One interviewee pointed out that the index should also include go/no-go criteria to better address this problem. Several interviewees however still saw the index as a very positive development, and thought that problems would be addressed, stressing that all new policies have problems in the beginning. Some interviewees also stressed that France does the right thing by going ahead, as this puts pressure on the European Commission to propose EU policies. One interviewee also claimed that the French index has led to some positive developments, for instance Samsung has published more repair manuals.

The majority of respondents stressed that provision of information is not very effective as a standalone policy intervention, since the market is not “self-correcting” and many manufacturers will not change practices due to informative policies alone.

The access to and price for repair services

Several interviewees stressed that consumer law can be a key enabler of repair services, through strengthened guarantees. Also, several respondents stressed that repair services should be more visible in city centres, highlighting the need for some public support for facilities, tools and marketing.

In Sweden, the municipalities have far-reaching powers, enjoy a high degree of autonomy, and exercise strong control over waste management. This means that it makes sense that they also take some responsibility for repair infrastructure and support relevant actors. One respondent also thought that they could support schemes for offering repair in homes for some product categories, like furniture.

The majority of interviewees stressed the need for a coordinated national repair network, which can assist the identification of repairers, registered in a database. This could then constitute the repair register envisioned in Ecodesign regulations. The majority of respondents thought that ‘Repair Network Vienna’ could serve as an example for other cities and countries. Of course, this network only includes repairers that comply with strict criteria; having such exclusionary criteria would require a strong political commitment.

Regarding the price of repairs, several interviewees stressed the need for national initiatives that make repair more economically attractive. Two respondents stressed that VAT reduction for repairs should be considered for all types of repair activities;

four interviewees stressed the importance for the EU to change the VAT Directive in order to support repairs. One respondent advocated raising the VAT for new products at the same time, to increase the effect. Some interviewees thought that the Vienna repair vouchers should be adopted in more places, as they do not only increase the number of repairs but there is also some evidence that the quality of repairs (including quality of spare parts) is increased, since consumers are more willing to invest in quality when 50% of the price is subsidized. However, some interviewees thought the public sector should not subsidize this, but rather the producers. The planned French repair funds were seen as a step in the right direction in this regard. The benefit of such a system is that it provides direct incentives for design changes among producers.

One respondent brought up the issue of educating consumers about the "total cost of ownership": that a 300 EUR dishwasher that lasts 3 years is more expensive than a 1000 EUR dishwasher that lasts 20 years. Therefore, durability labelling should include measures that allows for consumers to better compare price and lifetime.

Alternative business models

Many corporations would need to change their business models (BMs) in order to really move towards a repair economy. Several interviewees view the current linear economy as a significant barrier for such developments. Too many BMs are based on selling low quality products, which may undermine consumer confidence also for higher quality products. Both regulations and "carrots" are required. Various taxes, or eco-modulation schemes could be applied to reward better products and "punish" low quality ones. Other proposals include stimulus to product-service system solutions, or policies to make costs for repair during the product lifetime being part of the price of a product at the time of sale. 'Fixed price repair' – when consumers pay the same price regardless of what the repair costs – seems to lead to more consumer repairs and should be encouraged.

The need for progressive countries

All respondents agreed that we need progressive countries, but had slightly different views on how countries should lead. Some respondents stressed the need to protect the integrity of the EU Internal Market, which is in jeopardy if EU member states have many diverse policies. Other interviewees thought it was important that EU member states learned from each and adopted similar policies, in order to strengthen the case for adopting EU-wide policies. EU member states sometimes can have more expertise than the Commission in some areas of regulation and can play an important role in pushing developments.

Swedish actors

The Swedish interviewees regarded the recently adopted Swedish national action plan for circular economy as a step in the right direction. The interviewees stated that more is needed and that – as usual – there is too much focus on recycling. The respondents want a more progressive "push" to really change the rules of the game. It was also pointed out that many measures discussed in the action plan were already being implemented.

One question concerned how Swedish authorities should cooperate in order to best move forward in adopting a comprehensive policy mix for repairs. The interviewees had slightly different ideas on this, and it can depend on the product group and the context. But cooperation may be required between the Environmental Protection Agency, the Energy Agency and the Chemicals Agency, and possibly also involve cooperation with various governmental functions and committees.

Discussion

The results indicate the need to simultaneously address various issues – product design, consumer awareness, business models etc. – in order to increase the number of repairs. Policies at both the EU level and EU member state level are needed in order to move forward. EU-level policies constitute the most appropriate approach to regulate some issues concerning product repair, whereas policy making at member states can be important as "first movers" or pioneers when it comes to certain policy approaches. Over time, it is likely that EU policies will be adopted, and then take priority over member state policies. At this point in time, there could be a reason for EU member states to coordinate their policies, at least to some extent; there is for example no reason for all member states to have their own repairability indexes, durability indexes, and product labelling schemes.

Sweden has the potential to learn, and be inspired by, from initiatives in other countries and regions. This includes the French national policies, and also regional and local actions, like Repair Network Vienna. It became evident through the interviews in this research that the Swedish actors asked for a clearer and more comprehensive strategy to change the rules of the game on the market.

Based on the literature review and interview study, some important areas where the EU and Sweden should consider future policy developments are elaborated in Figure 2 below.

Proposals for future policy instruments

National level – Sweden

Administrative

- Set up a repair register for e.g. spare parts and information manuals, including also independent repairers.
- Increase the availability of spare parts, for example by allowing 3D printing and stricter regulation when implementing the Ecodesign Directive.
- Review the relevant legislation so as to prevent intellectual property rights from hindering repairs and the rejection of repairs by embedded software in products.
- Extend the product guarantee period and include an additional warranty period after the repair of a product.
- Design policy instruments that favour circular business models, for instance by setting a fixed price for repairs.

Economic

- Introduce customised fees and repair funds, similar to the case of France.
- Further reduce VAT rates on repair service, similar to the case of Malta.
- Introduce repair networks with repair checks, like in Vienna.

Informative

- Implement a repair index based on that of France.
- Set as a requirement that repairs are highlighted in products' marketing.
- Educate and train professionals in repairing, and introduce repair activities in the education system.

EU-level

Administrative

- Call on the European Commission to revise the Ecodesign Directive to include consumers and independent repairers.
- Include sustainability aspects in future policy instruments in order to incentivise products that are both durable and repairable.

Economic

- Take into consideration the price aspect of spare parts when designing future policy instruments.
- Reform the VAT Directive, so that all repair service can benefit from the tax reduction and so that VAT can be removed completely.

Informative

- Introduce a harmonized sustainability/repair index within the EU.

Figure 2. Proposals for future policy instruments for Sweden and the EU.

Conclusions

This contribution investigated how Sweden, the EU, and some progressive EU member states, along with the USA, strategically approach the issue of repairs at a policy level, by promoting repair opportunities. This investigation aimed at identifying a number of specific policy instruments that Sweden could adopt in a potential future Swedish repair strategy, or lobby for vis-à-vis the EU.

The EU collectively, and its member states individually, work in different ways to achieve a resource-efficient circular economy, where administrative, economic and informative instruments are used vis-à-vis producers, consumers and the market. The EU has implemented new repair criteria in the Ecodesign Directive, and has proposed policy repair initiatives – but the process is slow and not all member states are able to

follow. France has adopted a number of forward-looking instruments, which in various ways enable consumers to repair and put pressure on producers to produce more sustainable products. Furthermore, Vienna has shown with its repair networks that it is possible to make repairs cheaper while increasing both consumer confidence and the quality of the repair service. In the USA the states act mainly via consumer law initiatives that can result in increased repair possibilities for a large number of product groups, if they are adopted. On the other hand, Sweden's action plan for CE contains only few new initiatives, and apart from tax reduction measures that promote repair, there is not much substance in the rest of the document concerning repairs.

In an effort to increase the proportion of repairs in Sweden – and potentially in the EU in the future – additional commitments are required. Based on the empirical evidence analysed (literature and interviews), this article resulted in a number of potential policy interventions that Sweden and the EU should focus on in the future (cf. Figure 2).

It is up to the member states and the EU to draw upon these policy approaches and adopt a balanced policy mix to address the issue of enabling repairs in a holistic manner and by taking into account the associated environmental, economic and social impacts. Ultimately, increasing repair opportunities in Sweden and the EU, and promoting the transition to a repair society, would also contribute to achieving both the Paris Agreement's target and the Swedish national climate target, while at the same time the consumption of resources has the potential to be significantly reduced.

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