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Citation: Lechner, Gernot, Wagner, Marcel Josef, Diaz Tena, Anna, Fleck, Christopher and Reimann, Marc (2021) Exploring a regional repair network with a public funding scheme for customer repairs: The 'GRAZ reperiart'-case. *Journal of Cleaner Production*, 288. p. 125588. ISSN 0959-6526

Published by: Elsevier

URL: <https://doi.org/10.1016/j.jclepro.2020.125588> <<https://doi.org/10.1016/j.jclepro.2020.125588>>

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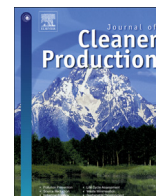
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Exploring a regional repair network with a public funding scheme for customer repairs: The 'GRAZ repariert'-case



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ARTICLE INFO

Article history:

Received 21 April 2020

Received in revised form

10 December 2020

Accepted 17 December 2020

Available online 24 December 2020

handling editor: Cecilia Maria Villas Bôas de Almeida

Keywords:

Circular economy

Repair

Repair network

Funding scheme

ABSTRACT

Repair is an essential part of the transition towards a circular economy by recovering full functionality of faulty products or components, and thus, extending the product usage phase. This is seen as a core strategy to obtain desired environmental impact like waste reduction and resource conservation. Beyond that, repair services also affect societal and economic aspects like the number of local jobs. To realize the potential, supply with as well as demand for repair services has to be ensured. In this study we report on how the city of Graz, Austria deals with challenges related to this by introducing a public funding scheme for repair services to increase demand, and funding and organizing a repair network to strengthen the suppliers. By means of a case study, we explore success factors and critical aspects related to setting up a repair network, and provide insights into the interplay of a financial incentive scheme for promoting repair. Key findings show that: (1) having the local government as the network organizer facilitates the integration of multiple sectors but might jeopardize the network's sustainability due to political reasons; (2) the interplay between public funding and the repair network is effective, but network heterogeneity induces risk; (3) cooperation within the network can improve price and service quality and thus, affect customer demand, but lacking awareness of repair in general and the repair network constrains demand. These insights and the related discussion result in the identification of future research opportunities and related questions.

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1. Introduction

'Reuse what you can, recycle what cannot be reused, repair what is broken, remanufacture what cannot be repaired.' (Stahel, 2016). This statement highlights repair as being an essential part and one of the driving factors of a transition from a linear towards a more resource-efficient Circular Economy (CE) (Duvall et al., 2016). Moreover, Stahel (2016) describes repair as being a 'green' sector which creates local added value and jobs, and these effects are often driven by socially-oriented enterprises (Lechner and Reimann, 2015) and small and medium-sized enterprises (SME). According to Eurostat (2019), 98.4% of all enterprises in the repair of computers and personal and household goods sector were

classified as micro enterprises with less than 10 employees. A similar structure can be observed for instance in the United Kingdom for the repair and installation of machinery and equipment industry sector in 2019 (Statista, 2019).

While these observations indicate that repair favorably impacts environmental and social aspects, particularly in local communities, the market dynamics of repair sectors are less advantageous. In the Netherlands, the number of repair enterprises for consumer electronics nearly halved—from 4500 to 2500—between 1990 and 1997, and 13% of the German radio/television repair companies closed in 1996 (Behrendt et al., 1999). Furthermore, from 2005 to 2010 a 15%-decline in the number of repair firms specialized on personal and household goods was reported in Poland (Eurostat, 2020). Also in the United States a decrease of repair could be observed: according to the Bureau of Labor Statistics, the number of repairpersons specialized on fixing television and radio devices dropped from 110,000 in 1963 to 80,000 in 1982 to 40,000 in 2006,

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despite the increased volume of sales. The same is true for shoe repairpersons, where the number fell from more than 9000 in 1967 to 2825 in 2004 (McCollough, 2010).

Only very recently, a slight reversion seems to take place. From 2012 to 2017, the overall number of employees repairing computers and personal and household goods in the EU increased from about 387,000 to more than 410,000 (Eurostat, 2020), and 0.3% of the overall employees were in employment in this sector. In 2016, 0.8% of all enterprises in the EU—in total more than 200,000—were related to repair of computers/personal/household goods, with a total turnover of more than 28 billion Euros (Eurostat, 2019). In addition, citizens' movements like right-to-repair initiatives or repair cafés have brought the topic back to public's attention. These initiatives¹ are mainly driven by the idea of increased sustainability performance and waste prevention by facilitating a longer usage of products through repair (Stabel, 2010). This is in line with results reported by studies reflecting EU citizens: 64% out of more than 12,000 consumers had decided to repair products (European Commission, 2018), and 77% indicate to prefer repairing broken goods over buying new ones (TNS Political and Social, 2014). The need for increased durability and reparability was on the agenda in the European Parliament (2017) and is subsequently also reflected by legislation: in October 2019, the European Commission enacted an adaptation of the ecodesign regulation which aims to improve reparability of specific product groups e.g. by extended spare parts availability starting from 2021 (European Commission, 2019).

While these trends and initiatives are encouraging, actions from three different groups of stakeholders can help (and will be necessary) to boost repair. Individuals and organizations could up their awareness of and demand for repair services. Producers and repair service providers could increase and improve supply of repairable products and services as well as disclose repair know-how and supply spare parts. Public authorities and regulators can pave the way and provide incentives to stimulate both demand for and supply of repair.

It is this last aspect that we focus on in this paper. Specifically, we present two interconnected activities set by the city of Graz in Austria. On the demand side, a financial incentive scheme for consumers to encourage repair was introduced. In parallel, on the supply side, the local repair network² 'GRAZ repariert' has been established. We have provided scientific support for this initiative from the outset and present our insights in this paper.

Mirroring these findings with the state-of-the-art related to topics on repair we aim to answer the following research questions:

1. What factors can be observed from 'GRAZ repariert' as being relevant for implementing and operating a repair network? How does the existing public funding scheme interact with the repair network?
2. What seem to be related main success factors and critical aspects of these cases, i.e. in terms of the network's and the public funding scheme's sustainability?

These questions were examined using an in-depth case study which facilitates exploring the repair network as well as financial incentives for consumers. Based on the obtained insights, strengths, weaknesses, opportunities and threats obtained through a SWOT-analysis are presented. Theoretical and practical implications are discussed and correlated with present knowledge.

¹ We define 'repair initiative' as a leading action for improving something in the context of 'repair'.

² We define 'network' as a group of interconnected entities sharing information, beliefs, and/or resources.

The remainder of the paper is structured as follows: Section 2 introduces the case, and in Section 3 we provide an overview of related literature. We proceed with presenting the methodology behind the research approach (Section 4). Section 5 contains results of the case study and the SWOT analysis, and insights as well as identified research opportunities are discussed in Section 6. In the last Section 7 we conclude our findings and report on limitations of the work.

2. Case outline and scope of study

As mentioned in the introduction, the city of Graz, Austria has taken two steps to establish a repair culture within the different stakeholders, including citizens and companies. The first step was the introduction of a public funding scheme to incentivize repair by citizens. According to representatives of the city of Graz, the public funding scheme is expected to promote repair through raising consumers awareness of repair and by achieving a positive connotation of repair based on having positive repair experiences. The second step was the establishment of a repair network to strengthen the supply side associated with repair by achieving a local critical mass of repair service suppliers. Further expected outcomes concern the promotion of the public funding and saving resources through waste reduction, as waste management reported on a significant amount of potentially reusable resources—i.e., electrical and electronic equipment (EEE)—in residual waste. While the repair network and the funding scheme emerged independently of each other, they have grown together over time and may be completely merged in the near future.

The repair network 'GRAZ repariert' as well as the public funding scheme are under investigation. This also relates to the geographical dimension of the study, as we focus on the city of Graz but leave out other regions. The study incorporates member organizations of 'GRAZ repariert' but neglects other repair organizations in Graz and also the demand-side of repairs. Thus, sectors of member organizations are considered, but other repair sectors—as for example automotive repair companies—are omitted. The study encompasses repair processes performed within the same use cycle, i.e., ownership is maintained after the repair process.

3. Theoretical background and repair landscape analysis

3.1. Initiatives and networks acting in the repair sector

An increasing number of activists, grass-root initiatives, and for- and not-for-profit organizations act in the field of repair. Concerning supply of repair services, different actors shape the landscape of repair initiatives, such as public sector, lobby groups, private initiatives, networks of repair cafés, repair service providers, or charities. For instance, these include community repair in terms of Repair Café (2020) or the Fixit Clinic (2020), independent repair companies (Lechner and Reimann, 2015), providers of information on or spare parts/tools for repairing (iFixit, 2020), or lobbying organizations like Open Repair Alliance (2020), RREUSE (2020), Right to Repair Europe (2020) or The Repair Association (2020) to name but a few.

A structured search related to 'repair' using publicly available databases enabled a mapping of initiatives and obtaining an aggregated overview of different types of 23 repair initiatives (see Appendix A for details). Remarkably, most of the initiatives have emerged since 2008 in Europe. Initiatives' sizes vary from single institutions ('Programa UPC Reutilitza' by Universitat Politècnica de Catalunya) to lobby groups representing 850 social enterprises (RREUSE) to a network of about 1500 repair cafés worldwide (Stichting Repair Café International). Analyzing product types

reveals both specialization and generalization: some initiatives focus exclusively on EEE or furniture, while others have no restrictions concerning specific product categories. Explicitly open for any product category are four initiatives.

While most of the initiatives emerged recently and thus have not been in the focus of research, *Repair Cafés*, *makerspaces* or *Fixit Clinics* have already been considered in scientific literature. Exemplary topics studied in this context cover attitudes, motivations, and activities of contributing volunteers (Charter and Keiller, 2014a, b), the impact of product design on repair practice (Rosner and Ames, 2014), or the initiatives' roles in terms of political participation (Kannengiesser, 2017). In addition, reuse and repair networks acting as coordinator of reusing items collected in community waste centers and related compensation were studied (Gelbmann and Hammerl, 2015). In the automotive domain, collaboration in European vehicle repair networks (Quadt et al., 2004) and application of Life Cycle Assessment for developing a sustainable auto-repair network (Resta et al., 2009) were in focus. Finally, forms of learning of repair knowledge/skills and collaboration between repairers in informal networks have been investigated (Ahmed et al., 2015).

Our study contributes to this literature, by studying a formal network of diverse actors and analyzing their motivations and activities as well as their collaboration. Moreover, a unique feature in our study is the role of the local government as the network organizer and the effect this has on the repair service provided.

3.2. Policy-making related to reuse and repair

In recent years, policy-making targeting at reuse and repair has attracted more attention. Dalhammar (2019) revisits policies for sustainable consumption. The author refers to the classification of policy instruments as administrative, economic, and informative, and lists several examples for policies on the EU and member state level. These incorporate the EU's Ecodesign Directive, measures taken against planned obsolescence and in support of spare parts availability in France, and reduced value added tax (VAT) for selected repair services in Sweden. Further approaches examine product policies in the EU (Faure and Dalhammar, 2018), analyze the emerging right-to-repair legislation (Svensson et al., 2018), or focus on aspects of employment in the Circular Economy (Llorente-González and Vence, 2020). In terms of stimulating demand for repair services across Europe and the US, RREUSE (2017) summarized three types of incentives controlled by policy-making: (1) VAT reductions on repair services and sales of second-hand goods; (2) tax reductions for incentivizing repair; (3) using tax reductions to increase donation of used goods to social enterprises. Such taxation-related policy measures could contribute to a transition toward CE, with positive social effects like additional jobs (Wijkman and Skånberg, 2015). Nevertheless, while often policy-making is seen as a primarily (trans-)national means for sustainability on a big scale, also local authorities have significant potential impact on climate mitigation actions (Bulkeley and Kern, 2006; Boehnke et al., 2019; Dinnie and Holstead, 2018).

Local and national initiatives driven by the public sector could be identified in databases. The initiatives focus on: establishing donation centers for collecting used objects which are then forwarded to repairers (Métropole de Lyon, 2020); recovery and repair of damaged furniture by homeless people (Urbact, 2017); gamification approaches to integrate circular economy into daily life of residents (Stad Antwerpen, 2020); collection and preparation for reuse of used products in interconnected reuse centers by socially disadvantaged workers (CPU Reuse, 2020); tax policy for incentivizing repair of bicycles, clothes, and white goods in Sweden (Köpl et al., 2019).

With respect to this literature our work combines the supply side intervention by the local government being the network organizer with the demand side intervention, where a funding scheme for consumers using repair services is set up. Thereby our study, contributes to our understanding of the interaction between supply and demand side measures.

3.3. Aspects impacting demand and supply side of reuse and repair

Considering the nature of repair as being a service, we first provide a general overview of related general aspects and concepts which have been found to impact demand and supply. Across multiple service industries, studies indicate a complex interplay between various factors like service quality, customer satisfaction or experience, purchase intention, and loyalty (e.g., Bloemer et al., 1999; Cronin and Taylor, 1992; Noyan and Şimşek, 2014). In addition, results from different sectors indicate that brands can contribute to customer satisfaction and customer loyalty (Özlem Sürücü et al., 2019; Sweeney and Swait, 2008), and that service quality might affect brands (Alexandris et al., 2008; Wu et al., 2011). Focusing on repair, the impact of service quality on customer satisfaction and thus, loyalty (Izogo and Ogba, 2015) and consumer satisfaction in the presence/absence of warranty (Andaleeb and Basu, 1998) have been investigated for automobile repair. Major determinants of these structures are the five key dimensions of service quality (Parasuraman et al., 1988)—reliability, responsiveness, assurance, empathy, tangibles—but also further aspects including convenience, price, availability, trust, or perceived value can be of importance (Cronin and Taylor, 1992; Rasheed and Abadi, 2014).

Various aspects have also refined the view of repair: in general, on the demand-side manifold factors impact the repair decision of consumers (Chang et al., 2013), including availability and awareness of repair and services (Sabbaghi and Behdad, 2018; Hielscher and Jaeger-Erben, 2021), repair prices (McCollough, 2009, 2010; Dalhammar, 2019; King et al., 2006; Pérez-Belis et al., 2017; Sabbaghi and Behdad, 2017), product's age and perceived quality (Sabbaghi and Behdad, 2017; Tecchio et al., 2019; Wieser and Tröger, 2018), repair service quality (McCollough, 2009, 2010; Kumar et al., 2018), repair time (Sabbaghi and Behdad, 2017; Kumar et al., 2018; Whalen et al., 2018).

One crucial decision shaping the demand for repair is the consumer's repair versus replacement decision. In the case of mobile phones, the well-known driver of replacement 'seeking for (technical) novelty' is complemented by basic functionality and the 'ability to keep up with social practices' (Wieser and Tröger, 2018). Nevertheless, the willingness-to-repair is found to decrease with rising wages, and when the price to repair gets closer to the price to replace (McCollough, 2010). This emphasizes the role of (time-dependent) willingness-to-pay for repair services (Sabbaghi and Behdad, 2018). Even though consumers frequently perceive repair as being expensive (e.g., Pérez-Belis et al., 2017), simulations based on real-world data demonstrate the cost-efficiency of repair compared with replacement (Brusselaers et al., 2019).

While the individual's decision whether to repair or not has a direct impact on demand for repair services, repair might affect sales of new products also indirectly: using survey data, Sabbaghi et al. (2016) found a significant effect of usefulness of repair information, complexity of repair, and willingness of consumers to repair broken products on recommendations and future purchase decisions, what is also in line with other research (e.g., Raihanian Mashhadi et al., 2016).

However, in order to provide a repair service several success factors and barriers have to be taken into account. Kissling et al. (2013) determine generic success factors and barriers for reuse of

EEE based on 28 semi-structured interviews with diverse organizations operating in this field. The separation according to geographical regions, product categories, and operating models facilitates a differentiated view on the impact of labor cost or the complexity of legal and regulatory context. Competition with new products both in terms of price and consumer's demand for new items, high labor cost, and issues related to take-back of equipment, but also time to repair/refurbish products were found to be major barriers, and potential policies should promote reuse and increase supply of used products to overcome these barriers (Whalen et al., 2018). Research findings suggest that particularly supply of used products can be controlled: significant amounts (up to 90%) of EEE thrown away by citizens are reusable, but a change of waste management from material recovery to other end-of-life options like direct reuse or repair as well as minor changes in product design would lead to an improved reusability of used products. (Dindarian et al., 2012; Parajuly and Wenzel, 2017).

Concerning repair service operations, a success rate of about 75% (Monier et al., 2016) and 85% (Tecchio et al., 2019) was reported for washing machines, slightly lower values for dishwashers and vacuum cleaners but improved ones for fully-automated coffee machines (Monier et al., 2016). Causes impeding successful repair are unavailability (of spare parts, tools, repair manuals), complexity (e.g., of products), and economical factors (expensive spare parts, excessive time consumption for repair) (Sabbaghi et al., 2017).

Our case study contributes to this literature, by capturing the interplay between cooperation, service quality, brand as levers to affect demand for repair services.

Summarizing, as seen, factors related to repair which impact supply and demand, and works on (policy) instruments for regulation have been found. In contrast, scientific literature dealing with repair initiatives or networks which include for-profit and non-profit organizations is scarce, as are studies related to (economic) incentive schemes. These results reflect the uniqueness of 'GRAZ repariert', as it balances both supply and demand simultaneously and combines heterogeneous actors in a repair network.

4. Methodology and case description

An overview of the research methodology is provided in Fig. 1,

summarizing data sources and applied methods of the case study. The figure also visualizes the links of data and methods with the results sections. Below we detail the research design and data acquisition (Section 4.1) and provide necessary background information on the repair network and the public funding scheme separately (Section 4.2).

4.1. Research design and data acquisition

The study was designed as action research and organized as an exploratory, longitudinal single case study, an important means for exploring emerging phenomena related to CE and sustainability (Antikainen and Valkokari, 2016; Engert and Baumgartner, 2016; Weissbrod and Bocken, 2017). According to Yin (2009) a case study is 'an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context'. We decided for an exploratory single case study due to several considerations: the emergence of repair networks is a *contemporary phenomenon* which is *rarely found*. Naturally, this limits the number of contributing scientific works (Eisenhardt, 1989). 'GRAZ repariert' differs from other networks (*case-specific context*), as it consists of diverse organizations: private companies collaborate with public institutions, for-profit and non-profit organizations work together, and their sizes range from single-person enterprises to firms with several dozen employees. Furthermore, it was the first network profiting from public funding for repair services. These characteristics require a comprehensive view of the phenomenon to obtain a *comprehensive understanding* of the case. As reflected, such non-explored cases give rise to 'What?' and 'How?'.

An initial review of scientific literature related to repair and preparatory talks with persons responsible for the repair network facilitated to create this questionnaire with open- and closed-ended questions and to design the survey. Questions were categorized as general company data, networking of member organizations, repair service operations, challenges related to repair services, and repair network evaluation. The survey was conducted between 10th June and 14th June 2019 as semi-structured interviews with 26 (out of 27 members as per 10th June 2019) participating organizations in a face-to-face setting. The interviewer took notes and filled the questionnaire: this approach leaves

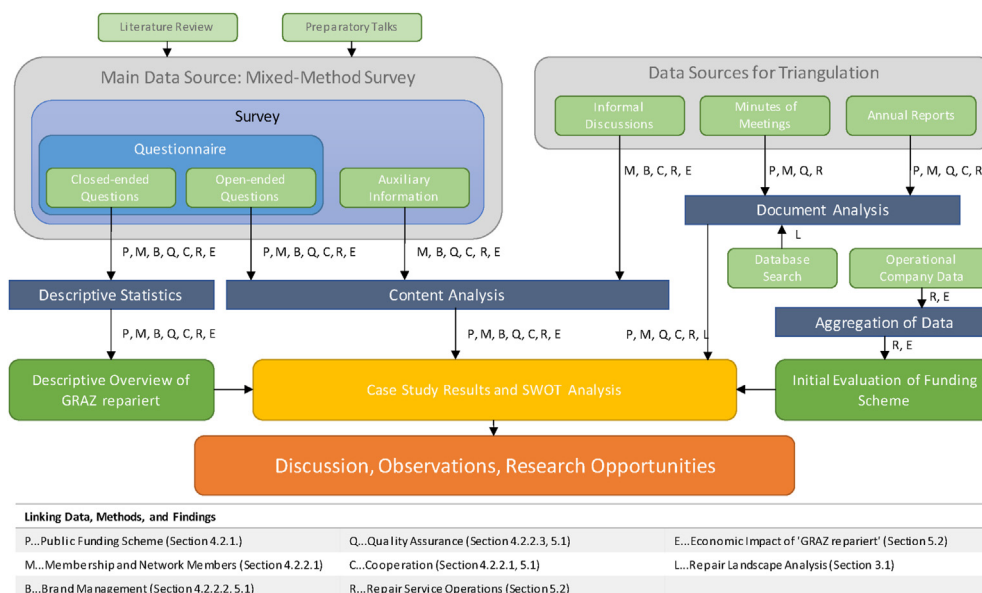


Fig. 1. Overview of research methodology.

room for discussions beyond the scope of the questionnaire, what copes with the exploratory character of the study. Further advantages of this approach are the option to control consistency of answers (e.g., through asking again or for refinement) and that vague or minimal answers are avoided, as interviewees often feel more comfortable to answer orally than in writing (cf. Reja et al., 2003). Closed-ended questions of the questionnaire were quantitatively analyzed with methods of descriptive statistics. Further details on the study can be found in Wagner (2020).

While the main data source of this case study is the mixed-method survey, we triangulated other data sources to obtain an increase in the case study's quality through heterogeneous perspectives on the single case (Jick, 1979; Creswell and Plano Clark, 2017). Qualitative data from informal discussions as well as auxiliary information were recorded through notes and memory minutes, respectively. Both data sources as well as open-ended questions of the questionnaire were then analyzed applying summarizing content analysis, resulting in abstract categories (Mayring, 2014).

Furthermore, the design as action research allows researchers to obtain a better understanding through cycles of action and research, 'while at the same time, the organization or program under investigation is gradually changed' (Blessing and Chakrabarti, 2009). For this purpose, the authors followed the plan-act-observe-reflect spiral (Kemmis et al., 2014): in biannual steering group meetings—one author manages the examined repair network, and two authors participate as scientific advisors—the respective development was analyzed. Based on related insights the next steps concerning the network's advancement were discussed and decided, which were then implemented during the following cycle of six months. Minutes of meetings and annual reports documented the development of 'GRAZ repariert' and could thus be manually reviewed and evaluated through document analysis (Bowen, 2009), particularly in terms of importance of different topics and indicators for impact of taken actions. The same method was applied on the results of a database search which revealed information on other repair initiatives.

An initial evaluation of the public funding scheme could be obtained through statistical data analysis of a company's (confidential) operational data. Further phone calls and personal discussions with the network organizers complemented the data sources to answer open questions regarding the collected data and thus, remove ambiguity.

Finally, a SWOT analysis facilitates the identification of 'the strengths and weaknesses of an organization and the opportunities and threats in the environment' (Dyson, 2004) to provide a base for potential future strategic development. Diverse backgrounds of authors help to avoid a pure subjective perception (Phadermrod et al., 2019). To avoid limitations in terms of perception and interpretation, two external researchers not involved in the repair network contribute to, reflect and report on the case. Their scientific background and knowledge on repair and CE facilitated an extended perspective on the repair network.

4.2. Background information

4.2.1. Public funding scheme

Public funding of repair intends to strengthen businesses in the repair sector, e.g., by reducing cost for consumers resulting in an increased incentive to consume repair services instead of making new purchases (Köppl et al., 2019). Such a mechanism has been implemented by the city administration of Graz in November 2016 for repair of electronic and electrical products. As such, Graz was the first city in Europe to establish that mechanism.

Citizens of Graz—this is the demand-side restriction—can apply

for reimbursement of 50% of cost after a repair service (max. €100 per year per household). Customers submit the required documents—invoice and application form—by mail or by electronic means to the administration within three months of the billing date. Subsequent to an assessment in terms of completeness and eligibility, and subject to budget availability, the amount is paid out.

On the repair supply side the funding regime is also limited to companies in the city area of Graz. In addition, companies must be members of an approved repair network like 'Reparaturführer Österreich' (<https://www.reparaturfuehrer.at/>). Since its inception, 'GRAZ repariert' (see below) is also an admissible network.

4.2.2. 'GRAZ repariert'

'GRAZ repariert' (<https://grazrepariert.at/>) is a repair network which has been established in 2018 in the city of Graz, Austria, based on a collaboration between the city administration of Graz and 'ARGE Waste Prevention, Resource Protection and Sustainable Development Ltd' (ARGE). To date, the network is managed by the local government of Graz and ARGE. Main tasks include new member acquisition and membership management, brand management, and the safeguarding of quality standards. We will expand on these tasks in more detail below.

An expert advisory board complements the organization of 'GRAZ repariert': a few representatives of members of the repair network as well as external partners who are experienced with establishing and operating repair networks meet twice a year to discuss and advise on strategic direction and future development. The board unites the diverse interests and backgrounds of businesses, city administration, academia, and non-profit pro-repair initiatives.

4.2.2.1. Membership and network members. In 2018, 13 local repair service suppliers joined the network as founding members. Membership of 'GRAZ repariert' is split into two categories, full and associate members. Professional companies offering repair services are categorized as full members and pay an annual subscription of 50 Euros, while associate members (no subscription) are non-profit, supportive organizations like 'Repair cafés' or academic institutions like the University of Graz.

Apart from the prerequisite of operating a subsidiary in Graz, joining 'GRAZ repariert' comes along with keeping certain quality standards which are ascertained during a company visit including a one-on-one interview: (1) Repair service is an essential part of the business model; (2) Full cost transparency with detailed quotations as well as interaction with customers in case of a cost overrun; (3) Costs for quotations are absorbed by companies when repair service takes place; (4) Cooperation among network members (exchange of know-how, referring customers to other members, spare parts acquisition, public relations activities); (5) Mandatory customer feedback scheme. These rather strict criteria were formulated at an early stage of the foundation phase and are continuously re-evaluated. Now, they form an integral part of the statutes of the network.

At the time of data acquisition in the first half of 2019, the average number of employees of the 26 interviewed companies was five (median: 3 employees), indicating that the members of 'GRAZ repariert' are small and medium-sized enterprises. Seven of the companies are single-person enterprises, and three members—all belonging to category 'household appliances'—have more than 10 employees, with a maximum of 40 (cf. Fig. 2). Currently (as per 29th September 2020), the network is made up of 44 companies. The dates of foundation of the companies range from 1898 to 2018.

The companies offer services in various sectors (cf. Table 1), with some companies serving more than one of the listed sectors.

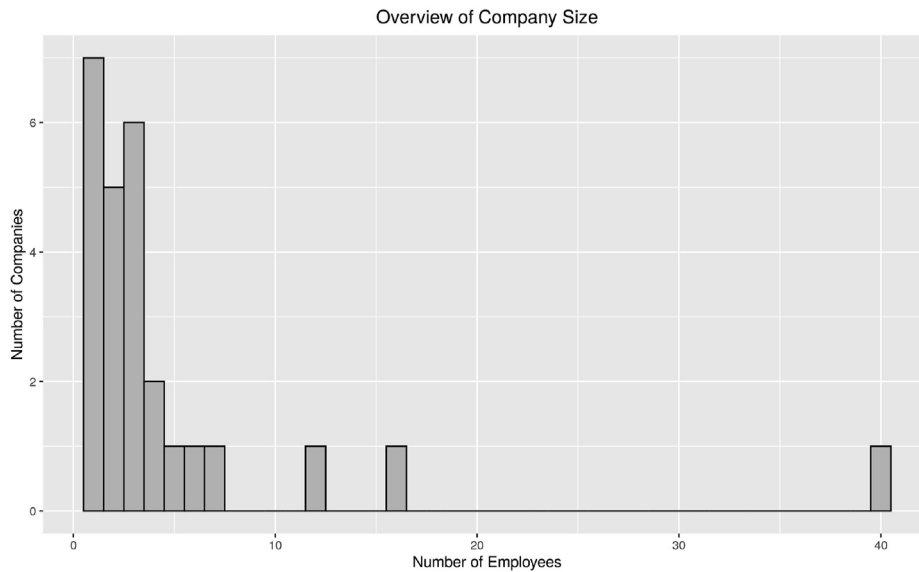


Fig. 2. Overview of company size.

Table 1

Number of companies in offered repair service categories.

Category	Number of Companies
Household Appliances	10
Textile & Leather	9
IT & Office	8
Hi-Fi & TV	6
Miscellaneous	4
Bicycle	3
Camera	3
Mobile Phone	3
Watches & Jewelry	3
Furniture	1
Musical Instruments	1



Fig. 3. Logo of 'GRAZ repariert'.

4.2.2.2. Brand management. The name 'GRAZ repariert' combines the regionality (city of Graz) with the purpose 'repair', and the objective of the network's brand management is to develop a brand standing for reputable and high-quality repair. The development as well as the final decision concerning logo and name of the network were undertaken by means of collaborative decision-making between the city administration, ARGE and some of the founding members.

Logo and name (Fig. 3) promotion were seen as the starting point for increasing brand awareness of (potential) customers. Consequently, leaflets regarding general information on repair and basic advertising material like stickers or posters were designed and bought, and subsequently distributed to (potential) customers through the members of the network. Furthermore, press releases and press conferences ensured to attract attention in media like newspapers or regional TV news.

Naturally, brand awareness should not be limited to offline customers. An online platform (<https://grazrepariert.at/>) is the main source for customer information: anyone interested should be provided with an easy-to-use, accurate search result for product-specific repair service suppliers. For this purpose, users can either input individual search terms or select from the product categories for which repair is offered within the network. Further information offered on the platform covers profiles of the member organizations as well as correct use, maintenance, and disposal of products.

4.2.2.3. Quality assurance. The intention of quality assurance implemented at 'GRAZ repariert' addresses potential for further development of both network and companies by providing high-quality repair services to customers. Customers get the chance to give feedback to companies and the repair network. While a postcard-like form—returned via email or mail—allows to assess the repair service by indicating the satisfaction and a written reason for this decision (see Fig. 4), also the online platform provides a possibility for electronic feedback. In all cases, customers have to provide their real names and e-mail addresses with the purpose to obtain only serious feedback and enable a communication loop to discuss and potentially resolve problems directly.

The feedback is collected and analyzed by the organizers of 'GRAZ repariert', and results are forwarded to companies. Failing to meet standards results in adverse consequences for companies, ranging from clarifying consultations to warnings to disqualification of members. Contrary, meeting the quality standards qualifies companies to present a quality certificate of 'GRAZ repariert' at the entrance or checkout area of their premise.

5. Case study results

We first elaborate on case study results based on responses of the member companies and the analysis of further data sources. We do this through the lens of the three main tasks of the network

Fig. 4. Front and back of postcard-like form for feedback.

administration shaping the structure of the network. Thereafter, we focus on operational aspects and economic impact. Finally, we summarize our findings in a SWOT analysis.

5.1. Brand management, quality assurance, and cooperation

According to the organizers of 'GRAZ repariert', a major strength of the network is the high level of involvement and effective participation of companies. A company dealing with repair of Hi-Fi and electronic equipment, expressed its initial skepticism about the network's supposed benefit. Yet, after the first meeting the representative identified the added value for his company as well as for the overall network and stated that this perception motivated his active participation in all meetings. This kind of active participation is also reflected by the fact that roughly 50% of the non-founding members were acquired by other members and their customers. Moreover, participation in collaborative decision processes concerning the name and the logo led to a strong identification of the companies with the brand 'GRAZ repariert'.

Yet, limited brand recognition was identified as a weakness by members. Specifically, the need for brand management and related advertising were also expressed in the questionnaire. Ten (out of 26) companies expect to increase advertisement through the repair network, and seven organizations suggested to increase presence in media. A further expectation related to brand management was to increase awareness for repair in public (four organizations). One company stated that its expectation is that 'GRAZ repariert' supports in 'getting repairers out of the niche'.

While the general public's ignorance concerning repair—specifically, only a few customers decide to get something mended but the majority is not aware of the network or does not seem to care about repair—was mentioned, the network also faces an opportunity to change this and attract new customer segments. As an example, a tailor reported that a new type of customer—male, aged between 18 and 35—has started to make use of her textile repair service since she has been part of the network.

Another important aspect representing an opportunity for the network is given by the strict quality assurance induced since the networks' inception. In fact, responses by the member organizations indicate that there's a common understanding about the importance of quality for the viability of the network. One organization demanded explicitly for 'careful selection of companies to keep standards up'. As time goes on, this focus can help strengthen the brand and present a competitive advantage over other initiatives that do not have (such) stringent requirements in terms of quality (as indicated e.g., by [Kissling et al., 2013](#)).

Possible cooperation and collaboration between network members was emphasized strongly as another strength of the

initiative. Companies appreciate getting to know further organizations dealing with repair through the network and the possibility to exchange know how. A company representative reported about his surprise concerning the number of repair organizations. A repairer of computers forwards mobile phones to be repaired to another company and vice versa. Concerning the intensity of cooperation, 17 out of 26 companies (about 65%) state that they cooperate with on average 2.3 other companies. Two companies communicate with others several times per week (and another five companies once a week), and the remaining ten responders indicated a respective frequency of once per month or rarer. In particular, 100% of companies categorized as 'Hi-Fi & TV' and 83% of companies in the 'Household Appliances' category are networked.

5.2. Repair service operations and economic impact of 'GRAZ repariert'

In May 2019 alone, the 26 companies processed 4480 repairs in total. The number of repairs per company shows a significant variation, from one repair (IT company) to 700 repairs (household appliances), and is mainly driven by enterprise size and product complexity. In sectors household appliances, watches & jewelry and furniture the number of repairs per employee were 26, 12 and 13.33, respectively. Conversely, in the product categories bicycles and textile & leather, 250 and 90 repairs per employee were reported in May 2019.

The number of repairs is further reflected in the proportionate revenue shown in [Fig. 5](#), which also highlights the relative contribution of the repair operations to a firms' overall revenue. Clearly, some of the firms crucially depend on the repair business while for others it is only a small financial contributor.

Together with statements of participating organizations, these numbers highlight the economic benefits directly observed. The head of a company offering plumbing repairs indicated a 1.5-week return on investment concerning the annual membership subscription. A further company added that the membership clearly has increased the number of repairs. Overall, an increase in revenue since they have joined the network has been observed by ten organizations.

Another interesting observation concerns the link of the repair network with the funding scheme. Eligible companies estimated that the fraction of repairs induced only due to the funding regime was as high as 24%. More specifically, one company provided figures obtained from their repair service operations. This company operates both within and outside the city area of Graz. Comparing the numbers of January to May 2018 and 2019, respectively, a decrease of 7% in repairs could be observed in the surroundings of Graz in 2019. At the same time, within city boundaries—where the

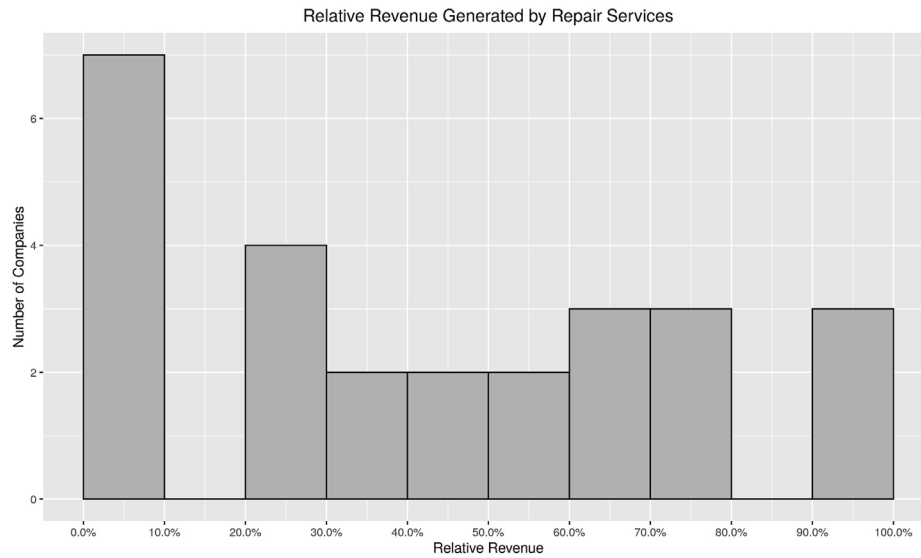


Fig. 5. Relative revenue of repair services.

funding regime is effective—repairs increased by 33%. To provide a final piece of evidence we obtained the dynamics of funding applications by citizens of Graz in Table 2. While we cannot provide a conclusive result on the cause-effect-relationship between ‘GRAZ repariert’ and the funding scheme, numbers indicate a steep rise of funding applications after introduction of the repair network.

Yet, the limitation of the funding scheme to certain product types also poses a considerable threat to the network. At the time of data collection, 16 out of 27 companies in the network were classified to belong to the fundable categories of electrical or electronic equipment. Several other companies expressed their surprise when realizing that being a network member does not automatically imply to be eligible for repair funding. A recurrent theme in member meetings is also the definition of what is a repair eligible for funding and what is just planned maintenance. The network administration frequently has to deal with unjustified applications that miss the scope of the funding scheme. On the other hand, members voiced their discontent with the fact that some companies seem to get away with interpreting the rules rather lenient, thereby attracting extra demand.

As a weakness, members reported on difficulties concerning repair, thus not being able to meet customer expectations even though they had opted for repair. Specifically, 85% of the interviewed companies stated that in May 2019 at least one product could not be repaired. Main causes for failing to repair were: (1) too expensive for customer (73% of companies faced such a situation); (2) damaged beyond repair (65%); (3) spare parts not available (61.5%); (4) lacking expertise (54%); and (5) inefficient repair (about 35%). All of those named aspects also pose a threat to the network. In fact, several companies mentioned their discontent with (certain) manufacturer policies and quality standards of their products.

Table 2
Number of funding applications over time.

year	number of applications	remarks
2016	8	funding scheme introduced in November
2017	163	
2018	1042	‘GRAZ repariert’ introduced in September
2019	2956	

Collaboration and cooperation (already mentioned above) are also operational strengths counteracting those difficulties, but utilizing them more effectively could be a huge opportunity for the network. Overall, 3 out of 5 companies indicated that they recommend other network members if they fail to repair a product, while nearly 40% mutually exchange experiences. Further details can be found in Fig. 6, which also highlights that the implementation of joint spare parts acquisition or cooperation for processing customer repairs are rather seldom forms of cooperation.

Considering the findings discussed above, the strengths, weaknesses, opportunities and threats are summarized in Table 3.

6. Discussion

What sets ‘GRAZ repariert’ apart from most other existing repair initiatives is the fact that the network is organized and managed by the local government, namely the city of Graz. The governing by

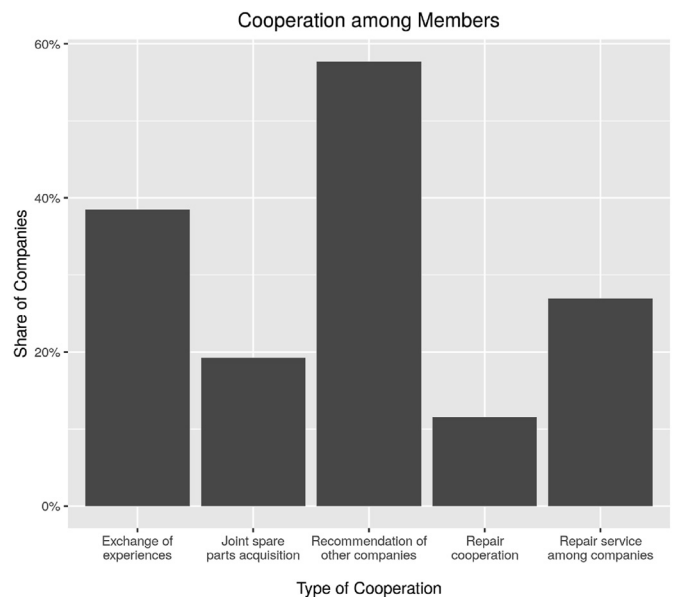


Fig. 6. Cooperation among members.

Table 3
SWOT analysis.

STRENGTHS	WEAKNESSES
1. Active participation of members, collaborative decision-making 2. Exchange of tangible and intangible assets between members 3. Economic benefit from network participation	1. Loss of customers due to unfulfilled demand requirements 2. Limited brand recognition 3. Uneven benefits across network members
OPPORTUNITIES	THREATS
1. Leveraging quality assurance as competitive advantage 2. Attraction of new customer segments 3. Local government as key stakeholder in network facilitating (cross-sectoral) collaboration	1. Limitations of funding scheme to certain product types endanger network's coherence 2. Lack of resilience against changes in financing scheme 3. Manufacturers' new product policies

enabling-approach is characterized by the local government's 'provision of financial incentives or subsidies to encourage action by other actors' and widely used for climate protection actions (Bulkeley and Kern, 2006). While large cities were preferred study objects, our findings support recent findings that also small and medium-sized cities adopt the enabling-practice to realize progressive policies despite having less resources (Boehnke et al., 2019).

An advantage of this approach is that the scope of the network is not limited to a specific sector or industry, what has rarely been observed so far. Rather, 'GRAZ repariert' fosters the common goal of further multi-sectoral strengthening of repair services, as our results highlight nicely. However, a combination of endogenous and exogenous factors jeopardize the sustainability of 'GRAZ repariert'. First, our results show that there is little inter-sectoral cooperation between member companies. Rather, the network organizer, i.e. the representatives of the city council, facilitates the contact between members. Thus, the network depends on a few persons making it vulnerable to changes of personnel, as the personal contact to organizations and building trust over the years are essential components. In terms of network topology this represents a centralized network; if this center disappeared, the network might decompose (Newman, 2010).

Second, the economic sustainability of both 'GRAZ repariert' and the funding scheme is dependent on public funding. This not only concerns direct cost for repair funding, but also indirect cost related to repair network organizers and staff processing funding applications. The basis for initiatives' funding is political support, which is likely to be withheld under conditions without media presence or missing impact on environment or local labor market (cf. Bulkeley and Kern, 2006; Dinnie and Holstead, 2018). A key element to prevent this is an elaborated media strategy to increase the level of awareness. However, the funding of this through the City of Graz again depends on political support.

Summarizing this gives rise to our first observation:

Observation 1. Having the local government as the network organizer enables broad multi-sectoral coverage of repair services, but may jeopardize the sustainability of the network and the funding scheme for political reasons.

Building on that, we believe that the following research questions should be addressed to shed more light on the optimal network structure:

- O1.1 Which private and public funding schemes exist? Under which conditions is public funding of initiative and networks preferable? What kind of mixed funding schemes, including public and private sources, are conceivable?
- O1.2 How can a repair network be designed resiliently? What role should the public sector play in the management and operation of the network?

While quantitative results but also perceived effects by the companies highlight the interaction between the repair network and the funding scheme nicely, the limitation of the funding regime to electronic and electrical products, as well as the definition of what is a fundable repair (as opposed to planned maintenance) present main danger to the coherence of the network when firms perceive different value for their membership fees. These issues are further pronounced by the multi-sectoral scope of the network. Also, considering the environmental impact of other product types like furniture (Iritani et al., 2015) or textiles (Chen and Burns, 2006) the question should be posed whether to include further product types into funding schemes or other policy measures. As research currently focuses on EEE, this gives rise to a broad field of research.

The actions taken in the city of Graz complement the economic policy measures suggested in literature (Köppel et al., 2019; Whalen et al., 2018; Kissling et al., 2013). However, as to the best of our knowledge our research is the first work examining an implementation of suggested funding scheme (RREUSE, 2017), no statements about its efficiency can be made due to the lack of comparability.

Summarizing this, we formulate our second observation:

Observation 2. The interplay between funding regime and repair network is effective, but network heterogeneity induces risk.

Accordingly, we state following research questions:

- O2.1 How does the incentive regime affect the organizations in the repair network?
- O2.2 What is the perceived impact of the incentive regime on customers? Does the regime attract novel customer segments at all, and if yes, what are crucial factors?
- O2.3 Under which conditions can negative effects induced by excluding public funding (funding exclusively for specific product types, companies in a network, services) occur?
- O2.4 How should such a funding regime be designed? For example, money-back, tax-return, or direct funding of repair companies?

As found in our case study results, and in line with current literature (McCullough, 2009, 2010; Dalhammar, 2019; King et al., 2006; Pérez-Belis et al., 2017; Sabbaghi and Behdad, 2017), cost for repair seems to be a major factor influencing the demand for repair services (see Table 2). Reasonable pricing of repair services is inevitable (see, e.g., Pérez-Belis et al., 2017). While it is obvious that individual customers opt for decreasing repair costs, the market size for repair remains unclear. To what extent an increased market size can be obtained through sustainable consumption decisions is discussed controversially in literature, particularly when considering the gap between attitudes toward environmental and social issues and actual consumption decisions (Dalhammar, 2019). Having this in mind, further regulation like extended warranty periods, increased taxes on consumption of non-renewable

resources and lowering taxes on labor would impact demand for repair services (Wijkman and Skånberg, 2015; Brusselaers et al., 2019).

Besides price, awareness and service quality play a crucial role in customers' decisions whether to repair or not. Advertisement—as demanded by network members—can support in making potential repair customers aware of the availability of repair services (Sabbaghi and Behdad, 2018; Whalen et al., 2018), while brand management and quality assurance interact: to create a strong repair brand, also the quality of service must be high (McCullough, 2009, 2010; Alexandris et al., 2008; Wu et al., 2011; Kumar et al., 2018). Improved service quality in turn can contribute to increasing demand and customer loyalty (cf. Cronin and Taylor, 1992; Izogo and Ogba, 2015; Rasheed and Abadi, 2014).

From the case study we observed that cooperation between members of 'GRAZ repariert' is seen as a driver to becoming more efficient and effective and to improve service quality, for instance by exchanging know how and repair information, joint spare parts acquisition or repair. These aspects have also been highlighted in previous studies (cf. Right to Repair Europe, 2020; Whalen et al., 2018; Sabbaghi et al., 2017). Collaborative actions between repairers targeting those aspects, have been reported from developing countries (Ahmed et al., 2015).

Yet, our results for 'Graz repariert' highlight that there is room for improvement on these issues, which is also known from former research (Dalhammar, 2019; Whalen et al., 2018; Kissling et al., 2013). Specifically, our case—and related literature, e.g. (Tecchio et al., 2019; Monier et al., 2016)—shows that although customers decided for repair, some attempts failed, potentially resulting in negative experiences. One driver of this is that consumers contact 'GRAZ repariert' network members directly, and not via central network administration. As a result, mismatches occur, where companies are not capable to honor the specific consumer request, e.g. due to lacking spare parts or expertise. Solutions approaches to such logistical issues have been proposed in literature, e.g. by establishing a single point of contact for customers ('one-stop-solution') (Kissling et al., 2013). In the context of 'Graz repariert' this indeed seems to be a viable option, due to the existing centralized internal organization of the network.

Finally, the role of non-profit organizations in the network presents an opportunity for enhancing service quality. For example, repair cafés enable people to repair products under guidance of volunteer fixers with relaxed consideration of cost and time efficiency (Charter and Keiller, 2014b). Such positive repair experience combined with increased knowledge on unsustainable practice—e.g., obtained in incorporated repair cafés—can lead to a reduction of skepticism toward repair (Wieser and Tröger, 2018; Raihanian Mashhadi et al., 2016), bring interested individuals closer to repair (Hielscher and Jaeger-Erben, 2021; McCullough, 2009) and thus may increase the potential market size for repair services.

For all of these points it is important to define rules of collaboration—as for example quality assurance—and facilitate it by streamlined organization. Nevertheless, as state-of-the-art literature focuses almost exclusively on EEE the question remains if research findings are valid also for heterogeneous sectors and products.

As a result of this discussion we formulate our third observation:

Observation 3. Customer demand for repair is driven by price and service quality, both of which are crucially affected by the cooperation within the network, but lacking repair and brand awareness constrains demand.

In light of this observation, the following research questions need closer investigation:

O3.1 Does the repair network create demand-side added value? Specifically, does a repair network enlarge the target market, i.e. reach individuals who would not make use repair services without it?

O3.2 How should such a repair network be designed for fostering collaboration? Does the increased efficiency of intra-sectoral cooperation outweigh increased visibility of a multi-sectoral network or vice versa? Are these factors inconsistent at all?

O3.3 To enhance the effectiveness of the match between repair supplier and consumer, are alternative designs like a single point of contact between customers and the network conceivable?

O3.4 What are (perceived) factors that influence customers to use repair services, particularly in terms of heterogeneous products?

O3.5 Could a central unit coordinating interaction between members internally and representing the network externally contribute to sustainability of the network?

6.1. Impact assessment of implemented measures

The rising number of network members and the number of applications for public funding indicate the effectiveness of taken measures, although the individual contribution of establishing a repair network and the public funding scheme, respectively, remains unknown. Apart from these numbers, the organizers of 'GRAZ repariert' assess the network's success based on soft factors like political support, renewal of public funds for renumeration network organizers, media presence, analysis of feedback forms, or perceived credit of trust by policy-makers and authorities. However, measuring economic, environmental, and social impact of the network and the public funding scheme requires a comprehensive assessment (Stahel, 2010; Boehnke et al., 2019; Dinnie and Holstead, 2018). Due to the focus on member organizations of 'GRAZ repariert', this is not reflected by the study, as only a part of repairs in the city of Graz are gathered. Extending the scope to the entire repair sector in Graz would allow to add more performance indicators, thus being able to compare various regions.

A multi-faceted assessment could support organizers and policy-makers in taking various dimensions into account. In Table 4 we present exemplary indicators facilitating assessment of interventions' effectiveness. All indicators are related to their purpose of application, i.e., the research questions proposed above. Additional indicators could build on these numbers to assess further economic, environmental, and social aspects.

7. Conclusion

As the literature review reveals, previous research on repair networks and public funding schemes is scarce, emphasizing that activities related to 'repair [...] were not analyzed exhaustively in literature' (Rosa et al., 2019).

This paper aims to fill this gap by presenting our insights from an in-depth study of 'GRAZ repariert', a network in the city of Graz, Austria. Having accompanied the network since its inception, we are able to draw from a rich source of data and information, as well as real-world experience in setting up and maintaining such a network.

In this paper we have focused on identifying related characteristics of such initiatives, which are brand management, collaboration in the network, sustainability challenges, and the joint consideration of repair network and funding scheme. There is evidence that the repair network, the funding scheme as well as their

Table 4
Exemplary indicators for impact assessment of schemes' effectiveness.

Exemplary Indicator	Purpose of Application
Number of repairs per capita	O2.1, O2.2, O2.4 O3.1, O3.3, O3.4
Revenue of repair sector	O2.1, O3.2
Prices of repair services	O2.1-O2.4, O3.2
Number of applications for public funding	O1.1, O2.1-O2.4
Share of population consuming repair services	All but O1.2, O3.2
Appearances on mass media	O3.4
Analysis of feedback forms	O2.3, O2.4, O3.3, O3.4
New jobs in repair sector	Socio-economic impact of repair
Weight of related municipal waste	Environmental impact of repair
Endorsement by political parties (e.g., number of meetings, subsidies)	Support through policy-makers
Total number of repair organizations in Graz	Interregional comparison of repair sector's development

combination are effective. Moreover, the local government acting as network organizer facilitates this effectiveness. It also enhances network heterogeneity, thereby capturing a wide range of sectors. Yet, the local government's role also induces network vulnerability due to the dependency on underlying political objectives, and the potentially weak ties between member companies from different sectors. Finally, our results also indicate that service quality and brand play an important role for network stability and sustainability.

Based on our observations we have posed several research questions paving the way to a deeper understanding of repair networks as well as their link to public agenda. These questions to some extent reflect the role of our study as a starting point and its associated limitations. For example, the focus of this study was on the network and its participants, leaving out customer or other stakeholder perspectives. Specifically, impact assessment certainly requires a separate, detailed study. In light of that, we are currently preparing a comprehensive study of citizen perspectives on repair in Graz. Apart from that, the implementation of a repair network and a financial incentive scheme is context-sensitive, and conclusions drawn from a single case study are hardly generalizable. Researching several cases of repair networks and funding schemes in detail would overcome this issue and allow to compare effectiveness and efficiency of such initiatives.

Declaration of competing interest

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

Acknowledgement

The authors thank Ines Fachbach for her helpful comments on the revision of this manuscript. In addition, the authors would like to thank three reviewers for their valuable comments and suggestions which helped to improve the article significantly.

Appendix A. Database search: repair initiatives

Four databases were enquired with keywords and filters found in Table A.5, and output was reviewed manually. All cases in EU and US were included, while aftermarket services of for-profit

corporations were omitted. Finally, websites of 23 cases were reviewed and clustered manually according to similarity of initiator agent, activities, functioning and scale. The resultant scheme is available on request from the authors.

Table A.5
Database search on repair

Database	Research Query	Output (n)
Good practices		
–		
European		
Circular Economy	'Repair'	6
Stakeholder Platform		
Case studies –		
Ellen MacArthur Foundation	'Repair'	42
Global Database –	(('Repair') AND OrgType limited to ('SME' OR 'Start-up' OR 'Education' OR 'Government' OR 'Non-profit' OR 'Other' OR 'Support'))	100
Circle Economy Club		
Knowledge Hub Circle Lab –	'Repair'	102
Circle Economy		

References

Ahmed, S.I., Jackson, S.J., Rifat, M.R., 2015. Learning to fix: knowledge, collaboration and mobile phone repair in dhaka, Bangladesh. In: Proceedings of the Seventh International Conference on Information and Communication Technologies and Development, ICTD '15. Association for Computing Machinery, New York, NY, USA. <https://doi.org/10.1145/2737856.2738018>, 9781450331630, 10, doi: |let@tempa|bibinfo@X@doi 10.1145/2737856.2738018; URL.

Alexandris, K., Douka, S., Papadopoulos, P., Kaltsatou, A., 2008. Testing the role of service quality on the development of brand associations and brand loyalty, Managing Service Quality. Int. J. 18 (3), 239–254. <https://doi.org/10.1108/09604520810871865>. ISSN 0960-4529, URL.

Andaleeb, S.S., Basu, A.K., 1998. Do warranties influence perceptions of service quality?: a study of the automobile repair and service industry. J. Retailing Consum. Serv. 5 (2), 87–91. ISSN 0969-6989, doi: |let@tempa|bibinfo@X@doi; URL. [https://doi.org/10.1016/S0969-6989\(97\)00072-6](https://doi.org/10.1016/S0969-6989(97)00072-6). <http://www.sciencedirect.com/science/article/pii/S0969698997000726>.

Antikainen, M., Valkokari, K., 2016. A framework for sustainable circular business model innovation. Technology Innovation Management Review 6 (5–12). ISSN 1927-0321, doi:|let@tempa|bibinfo@X@doi; URL. <http://doi.org/10.22215/timreview/1000>. <http://timreview.ca/article/1000>.

Behrendt, S., Pfitzner, R., Kreibich, R., 1999. Wettbewerbsvorteile durch ökologische Dienstleistungen: Umsetzung in der Unternehmenspraxis. Springer, Berlin, Heidelberg. 978-3-540-66475-8, doi:|let@tempa|bibinfo@X@doi10.1007/978-3-540-66475-8.

Blessing, L.T.M., Chakrabarti, A., 2009. DRM, a Design Research Methodology, first ed. Springer Publishing Company, Incorporated, ISBN 1848825862.

Bloemer, J., de Ruyter, K., Wetzels, M., 1999. Linking perceived service quality and service loyalty: a multi-dimensional perspective. Eur. J. Market. 33 (11/12), 1082–1106. <https://doi.org/10.1108/03090569910292285>. ISSN 0309-0566, URL.

Boehnke, R.F., Hoppe, T., Brezet, H., Blok, K., 2019. Good practices in local climate mitigation action by small and medium-sized cities; exploring meaning, implementation and linkage to actual lowering of carbon emissions in thirteen municipalities in The Netherlands. J. Clean. Prod. 207, 630–644. ISSN 0959-

- 6526, doi: [10.1016/j.jclepro.2018.09.264](https://doi.org/10.1016/j.jclepro.2018.09.264), URL: <https://www.sciencedirect.com/science/article/pii/S0959652618330038>.
- Bowen, G.A., 2009. Document analysis as a qualitative research method. *Qual. Res. J.* 9 (2), 27–40. [doi:10.3316/qrj0902027](https://doi.org/10.3316/qrj0902027).
- Brusselselaers, J., Bracquene, E., Peeters, J., Dams, Y., 2019. Economic consequences of consumer repair strategies for electrical household devices. *J. Enterprise Inf. Manag.* 33 (4), 747–767. <https://doi.org/10.1108/JEIM-12-2018-0283>. ISSN 1741-0398, URL.
- Bulkeley, H., Kern, K., 2006. Local government and the governing of climate change in Germany and the UK. *Urban Stud.* 43 (12), 2237–2259. <https://doi.org/10.1080/00420980600936491>. [URL: https://www.sciencedirect.com/science/article/pii/S0959652618330038](https://www.sciencedirect.com/science/article/pii/S0959652618330038).
- Chang, M.-Y., Chen, K., Pang, C., Chen, C.-M., Yen, D.C., 2013. A study on the effects of service convenience and service quality on maintenance revisit intentions. *Comput. Stand. Interfac.* 35 (2), 187–194. ISSN 0920-5489, doi: [10.1016/j.csi.2012.08.002](https://doi.org/10.1016/j.csi.2012.08.002). [URL: https://www.sciencedirect.com/science/article/pii/S0920548912000906](https://www.sciencedirect.com/science/article/pii/S0920548912000906).
- Charter, M., Keiller, S., 2014a. Grassroots innovation and the circular economy: a global survey of repair cafés and hackerspaces. In: *Tech. Rep. The Centre for Sustainable Design, University for the Creative Arts, Farnham, UK*. URL: <http://research.uca.ac.uk/2722/1/Survey-of-Repair-Cafes-and-Hackerspaces.pdf>.
- Charter, M., Keiller, S., 2014b. The second global survey of repair cafés: a summary of findings. In: *Tech. Rep. The Centre for Sustainable Design, University for the Creative Arts, Farnham, UK*. URL: <http://research.uca.ac.uk/3140/1/TheSecondGlobalSurveyofRepairCafes-ASummaryofFindings.pdf>.
- Chen, H.-L., Burns, L.D., 2006. Environmental analysis of textile products. *Cloth. Text. Res. J.* 24 (3), 248–261. [doi:10.1177/0887302X06293065](https://doi.org/10.1177/0887302X06293065), URL: [10.1177/0887302X06293065](https://doi.org/10.1177/0887302X06293065).
- CPU Reuse, 2020. CPU Reuse — center ponovne uporabe. URL: <https://www.cpu-reuse.com/>.
- Creswell, J.W., Plano Clark, V.L., 2017. *Designing and Conducting Mixed Methods Research*, third ed. SAGE publications, Thousand Oaks, California, ISBN 9781483344379.
- Cronin, J.J., Taylor, S.A., 1992. Measuring service quality: a reexamination and extension. *J. Market.* 56 (3), 55–68. <https://doi.org/10.1177/002224299205600304>. [URL: https://www.sciencedirect.com/science/article/pii/S0959652618330038](https://www.sciencedirect.com/science/article/pii/S0959652618330038).
- Dalhammar, C., 2019. It is never too late to give up, or is it? Revisiting policies for sustainable consumption. In: *A Research Agenda for Sustainable Consumption Governance*. Edward Elgar Publishing, Cheltenham, UK, 9781788117807, 137–155. URL: <https://www.elgaronline.com/view/edcoll/9781788117807/9781788117807.00019.xml>.
- Dindarian, A., Gibson, A., Quariguasi-Frota-Neto, J., 2012. Electronic product returns and potential reuse opportunities: a microwave case study in the United Kingdom. *J. Clean. Prod.* 32 (22–31), ISSN 0959-6526, doi: [10.1016/j.jclepro.2012.03.015](https://doi.org/10.1016/j.jclepro.2012.03.015). [URL: https://www.sciencedirect.com/science/article/pii/S0959652612001497](https://www.sciencedirect.com/science/article/pii/S0959652612001497).
- Dinnie, E., Holstead, K.L., 2018. The influence of public funding on community-based sustainability projects in Scotland. *Environmental Innovation and Societal Transitions* 29, 25–33. ISSN 2210-4224, doi: [10.1016/j.eist.2017.08.003](https://doi.org/10.1016/j.eist.2017.08.003). [URL: https://www.sciencedirect.com/science/article/pii/S2210422417300138](https://www.sciencedirect.com/science/article/pii/S2210422417300138).
- Duval, L., McIntyre, K., Opsomer, T., 2016. Empowering Repair, Tech. Rep. Ellen MacArthur Foundation. URL: www.ellenmacarthurfoundation.org/assets/downloads/ce100/Empowering-Repair-Final-Public.pdf.
- Dyson, R.G., 2004. Strategic development and SWOT analysis at the university of warwick. *Eur. J. Oper. Res.* 152 (3), 631–640. ISSN 0377-2217, doi: [10.1016/S0377-2217\(03\)00062-6](https://doi.org/10.1016/S0377-2217(03)00062-6). [URL: https://www.sciencedirect.com/science/article/pii/S0377221703000626](https://www.sciencedirect.com/science/article/pii/S0377221703000626).
- Eisenhardt, K.M., 1989. Building theories from case study research. *Acad. Manag. Rev.* 14 (4), 532–550. URL: <http://www.jstor.org/stable/258557>.
- Engert, S., Baumgartner, R.J., 2016. Corporate sustainability strategy — bridging the gap between formulation and implementation. *J. Clean. Prod.* 113 (822–834), ISSN 0959-6526, doi: [10.1016/j.jclepro.2015.11.094](https://doi.org/10.1016/j.jclepro.2015.11.094). [URL: https://www.sciencedirect.com/science/article/pii/S0959652615018259](https://www.sciencedirect.com/science/article/pii/S0959652615018259).
- European Commission, 2018. Behavioural Study on Consumers' Engagement in the Circular Economy. Report for Directorate-General for Justice and Consumers. URL: https://ec.europa.eu/info/sites/info/files/ec_circular_economy_final_report_0.pdf.
- European Commission, 2019. Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products. URL: <http://data.europa.eu/eli/dir/2009/125/2012-12-04>.
- European Parliament, 2017. Making durable, repairable goods for consumers and tackling planned obsolescence. URL: <https://www.europarl.europa.eu/news/en/press-room/20170530IPR76313/making-durable-repairable-goods-for-consumers-and-tackling-planned-obsolescence>.
- Eurostat, Dataset on Structural business statistics (SBS): computer and personal and household goods repair statistics - NACE Rev. 2. URL: https://ec.europa.eu/eurostat/statistics-explained/index.php/Computer_and_personal_and_household_goods_repair_statistics_-_NACE_Rev_2.
- Eurostat, 2019. Computer and personal and household goods repair statistics - NACE Rev. 2. URL: https://ec.europa.eu/eurostat/statistics-explained/index.php/Computer_and_personal_and_household_goods_repair_statistics_-_NACE_Rev_2. access on 15th October 2020.
- Faure, M.G., Dalhammar, C., 2018. Principles for the design of a policy framework to address product life cycle impacts. In: Maitre-Ekern, E., Dalhammar, C., Bugge, H.C. (Eds.), *Preventing Environmental Damage from Products: an Analysis of the Policy and Regulatory Framework in Europe*. Cambridge University Press, pp. 57–86. [doi:10.1017/9781108500128.003](https://doi.org/10.1017/9781108500128.003).
- Fixit Clinic, 2020. Fixit clinic. URL: <https://fixitclinic.blogspot.com/>.
- Gellmann, U., Hammerl, B., 2015. Integrative re-use systems as innovative business models for devising sustainable product-service-systems. *J. Clean. Prod.* 97, 50–60. ISSN 0959-6526, doi: [10.1016/j.jclepro.2014.01.104](https://doi.org/10.1016/j.jclepro.2014.01.104). [URL: https://www.sciencedirect.com/science/article/pii/S0959652614000171](https://www.sciencedirect.com/science/article/pii/S0959652614000171).
- Hielscher, S., Jaeger-Erben, M., 2021. From quick fixes to repair projects: insights from a citizen science project. *J. Clean. Prod.* 278, 1–11. ISSN 0959-6526, doi: [10.1016/j.jclepro.2020.123875](https://doi.org/10.1016/j.jclepro.2020.123875). [URL: https://www.sciencedirect.com/science/article/pii/S0959652620339202](https://www.sciencedirect.com/science/article/pii/S0959652620339202).
- iFixit, iFixit, 2020. The free repair manual. URL: <https://www.ifixit.com/>.
- Iritani, D., Silva, D., Saavedra, Y., Grael, P., Ometto, A., 2015. Sustainable strategies analysis through Life Cycle Assessment: a case study in a furniture industry. *J. Clean. Prod.* 96, 308–318. ISSN 0959-6526, doi: [10.1016/j.jclepro.2014.05.029](https://doi.org/10.1016/j.jclepro.2014.05.029). [URL: https://www.sciencedirect.com/science/article/pii/S0959652614004892](https://www.sciencedirect.com/science/article/pii/S0959652614004892).
- Izogo, E.E., Ogbia, I.-E., 2015. Service quality, customer satisfaction and loyalty in automobile repair services sector. *Int. J. Qual. Reliab. Manag.* 32 (3), 250–269. ISSN 0265-671X.
- Jick, T.D., 1979. Mixing qualitative and quantitative methods: triangulation in action. *Adm. Sci. Q.* 24 (4), 602–611.
- Kannengieser, S., 2017. I am not a consumer person—political participation in Repair Cafés. In: Wimmer, J., Wallner, C., et al. (Eds.), *Mis)understanding Political Participation. Digital Practices, New Forms of Participation and the Renewal of Democracy*, vols. 78–94. Routledge, London.
- Kemmis, S., McTaggart, R., Nixon, R., 2014. *The Action Research Planner Doing Critical Participatory Action Research*. Springer, Singapore, ISBN 9789814560672.
- King, A.M., Burgess, S.C., Ijomah, W., McMahon, C.A., 2006. Reducing waste: repair, recondition, remanufacture or recycle? *Sustain. Dev.* 14 (4), 257–267. doi: [10.1002/sd.271](https://doi.org/10.1002/sd.271), URL: <https://onlinelibrary.wiley.com/doi/abs/10.1002/sd.271>.
- Kissling, R., Coughlan, D., Fitzpatrick, C., Boeni, H., Luepschen, C., Andrew, S., Dickenson, J., 2013. Success factors and barriers in re-use of electrical and electronic equipment. *Resour. Conserv. Recycl.* 80, 21–31. ISSN 0921-3449, doi: [10.1016/j.resconrec.2013.07.009](https://doi.org/10.1016/j.resconrec.2013.07.009). [URL: https://www.sciencedirect.com/science/article/pii/S0921344913001572](https://www.sciencedirect.com/science/article/pii/S0921344913001572).
- Köppel, A., Loretz, S., Meyer, L., Schratzenstaller, M., 2019. Effekte eines ermäßigten Mehrwertsteuersatzes für Reparaturdienstleistungen. no. 61957 in WIFO Studies, WIFO, URL: <https://ideas.repec.org/b/wfo/wststudy/61957.html>.
- Kumar, A., Mangla, S., Luthra, S., Rana, N., Dwivedi, Y.K., 2018. Predicting changing pattern: building model for consumer decision making in digital market. *J. Enterprise Inf. Manag.* 31, 674–703.
- G. Lechner, M. Reimann, Reprocessing and repairing white and brown goods - the R.U.S.Z case: an independent and non-profit business, *Journal of Remanufacturing* 5 (3).
- Llorente-González, L.J., Vence, X., 2020. How labour-intensive is the circular economy? A policy-oriented structural analysis of the repair, reuse and recycling activities in the European Union. *Resour. Conserv. Recycl.* 162, 105033. ISSN 0921-3449, doi: [10.1016/j.resconrec.2020.105033](https://doi.org/10.1016/j.resconrec.2020.105033). [URL: https://www.sciencedirect.com/science/article/pii/S0921344920303505](https://www.sciencedirect.com/science/article/pii/S0921344920303505).
- Mayring, P., 2014. *Qualitative Content Analysis: Theoretical Foundation, Basic Procedures and Software Solution*. SSOAR, Klagenfurt.
- McCullough, J., 2009. Factors impacting the demand for repair services of household products: the disappearing repair trades and the throwaway society. *Int. J. Consum. Stud.* 33 (6), 619–626. [doi:10.1111/j.1470-6431.2009.00793.x](https://doi.org/10.1111/j.1470-6431.2009.00793.x), URL: <https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1470-6431.2009.00793.x>.
- McCullough, J., 2010. Consumer discount rates and the decision to repair or replace a durable product: a sustainable consumption issue. *J. Econ. Issues* 44 (1), 183–204. [doi:10.2753/JE10021-3624440109](https://doi.org/10.2753/JE10021-3624440109).
- Métropole de Lyon, 2020. Les donneries - La Métropole de Lyon. URL: <https://www.grandlyon.com/services/les-donneries.html>.
- Monier, V., Tinetti, B., Mitsios, A., De Prado Trigo, A., Ax, C., Medhurst, J., 2016. Study on Socioeconomic Impacts of Increased Repairability — Final Report. Prepared for the European Commission. DG ENV, Luxembourg. [doi:10.2779/463857](https://doi.org/10.2779/463857).
- Newman, M., 2010. *Networks: An Introduction*. Oxford University Press, Inc., USA, ISBN 0199206651.
- Noyan, F., Şimşek, G.G., 2014. The antecedents of customer loyalty. *Procedia - Social and Behavioral Sciences* 109, 1220–1224. ISSN 1877-0428, doi: [10.1016/j.sbspro.2013.12.615](https://doi.org/10.1016/j.sbspro.2013.12.615). [URL: https://www.sciencedirect.com/science/article/pii/S1877042813052543](https://www.sciencedirect.com/science/article/pii/S1877042813052543), 2nd World Conference on Business, Economics and Management.
- Open Repair Alliance, 2020. Open repair alliance. URL: <https://openrepair.org/>.

- Özlem Sürücü, Öztürk, Y., Okumus, F., Bilgihan, A., 2019. Brand awareness, image, physical quality and employee behavior as building blocks of customer-based brand equity: consequences in the hotel context. *J. Hospit. Tourism Manag.* 40, 114–124. ISSN 1447-6770, doi: [10.1016/j.jhtm.2019.07.002](https://doi.org/10.1016/j.jhtm.2019.07.002). <http://www.sciencedirect.com/science/article/pii/S1447677018303978>.
- Parajuly, K., Wenzel, H., 2017. Potential for circular economy in household WEEE management. *J. Clean. Prod.* 151 (272 – 285). ISSN 0959-6526, doi: [10.1016/j.jclepro.2017.03.045](https://doi.org/10.1016/j.jclepro.2017.03.045). <http://www.sciencedirect.com/science/article/pii/S0959652617304808>.
- Parasuraman, A., Zeithaml, V.A., Berry, L.L., 1988. SERVQUAL: a multiple-item scale for measuring consumer perceptions of service quality. *J. Retailing* 64, 12–40. ISSN 1873-3271 (Electronic), 0022-4359 (Print).
- Pérez-Belis, V., Braulio-Gonzalo, M., Juan, P., Bovea, M.D., 2017. Consumer attitude towards the repair and the second-hand purchase of small household electrical and electronic equipment. A Spanish case study. *J. Clean. Prod.* 158, 261–275. ISSN 0959-6526, doi: [10.1016/j.jclepro.2017.04.143](https://doi.org/10.1016/j.jclepro.2017.04.143). <http://www.sciencedirect.com/science/article/pii/S0959652617308715>.
- Phadermrod, B., Crowder, R.M., Wills, G.B., 2019. Importance-Performance Analysis based SWOT analysis. *Int. J. Inf. Manag.* 44, 194–203. ISSN 0268-4012, doi: [10.1016/j.ijinfomgt.2016.03.009](https://doi.org/10.1016/j.ijinfomgt.2016.03.009). <http://www.sciencedirect.com/science/article/pii/S0268401216301694>.
- Political, T.N.S., Social, 2014. Flash eurobarometer 388 - attitudes of Europeans towards waste management and resource efficiency. In: Tech. Rep., European Commission. Directorate-General for the Environment. URL: https://ec.europa.eu/commfrontoffice/publicopinion/flash/fl_388_en.pdf.
- Quadt, A., Dirlenbach, H., Garg, A., Weidemann, M., Stich, V., 2004. Knowledge based virtual communities for mobile and collaborative work in European vehicle repair networks. *IFIP Adv. Inf. Commun. Technol.* 149, 349–356. URL: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-84902495683&partnerID=40&md5=c7777c9aef8070144c24f537d8ed8af6>.
- Raihanian Mashhadi, A., Esmailian, B., Cade, W., Wiens, K., Behdad, S., 2016. Mining consumer experiences of repairing electronics: product design insights and business lessons learned. *J. Clean. Prod.* 137 (716–727). ISSN 0959-6526, doi: [10.1016/j.jclepro.2016.07.144](https://doi.org/10.1016/j.jclepro.2016.07.144). <http://www.sciencedirect.com/science/article/pii/S095965261631040X>.
- Rasheed, F.A., Abadi, M.F., 2014. Impact of service quality, trust and perceived value on customer loyalty in Malaysia services industries. *Procedia - Social and Behavioral Sciences* 164, 298–304. ISSN 1877-0428, doi: [10.1016/j.sbspro.2014.11.080](https://doi.org/10.1016/j.sbspro.2014.11.080). <http://www.sciencedirect.com/science/article/pii/S187704281405900X>. International Conference on Accounting Studies 2014, ICAS 2014, 18-19 August 2014, Kuala Lumpur, Malaysia.
- Reja, U., Manfreda, K.L., Hlebec, V., Vehovar, V., 2003. Open-ended vs. close-ended questions in web questionnaires. *Developments in applied statistics* 19 (1), 159–177.
- Repair Café, 2020. Repair café. URL: <https://repaircafe.org/>.
- Resta, B., Gaiardelli, P., Pezzotta, G., 2009. Sustainability in the auto repair industry: a life cycle assessment application. *Int. J. Prod. Lifecycle Manag.* 4 (1–3), 146–165. doi: [10.1504/IJPLM.2009.031671](https://doi.org/10.1504/IJPLM.2009.031671). URL: <https://www.scopus.com/inward/record.uri?eid=2-s2.0-77957100929>.
- Right to Repair Europe, 2020. Right to repair Europe. URL: <https://repair.eu/>.
- Rosa, P., Sassanelli, C., Terzi, S., 2019. Towards Circular Business Models: a systematic literature review on classification frameworks and archetypes. *J. Clean. Prod.* 236, 117696. ISSN 0959-6526, doi: [10.1016/j.jclepro.2019.117696](https://doi.org/10.1016/j.jclepro.2019.117696). <http://www.sciencedirect.com/science/article/pii/S0959652619325466>.
- Rosner, D.K., Ames, M., 2014. Designing for repair? Infrastructures and materialities of breakdown. Proceedings of the 17th ACM Conference on Computer Supported Cooperative Work & Social Computing. Association for Computing Machinery, New York, NY, USA. <https://doi.org/10.1145/2531602.2531692>, 319–331, doi: [10.1145/2531602.2531692](https://doi.org/10.1145/2531602.2531692), URL.
- RREUSE, 2017. Reduced taxation to support re-use and repair, Tech. Rep., RREUSE. URL: http://www.rreuse.org/wp-content/uploads/RREUSE-position-on-VAT-2017-Final-website_1.pdf.
- Rreuse, 2020. Rreuse — putting secondhand first. URL: <https://www.rreuse.org/>.
- M. Sabbaghi, S. Behdad, Environmental Evaluation of Product Design Alternatives: The Role of Consumer's Repair Behavior and Deterioration of Critical Components. *J. Mech. Des.* 139 (8), ISSN 1050-0472, doi: [10.1115/1.4036777](https://doi.org/10.1115/1.4036777); URL: <https://doi.org/10.1115/1.4036777>, 081701.
- Sabbaghi, M., Behdad, S., 2018. Consumer decisions to repair mobile phones and manufacturer pricing policies: the concept of value leakage. *Resour. Conserv. Recycl.* 133, 101–111. ISSN 0921-3449, doi: [10.1016/j.resconrec.2018.01.015](https://doi.org/10.1016/j.resconrec.2018.01.015). <http://www.sciencedirect.com/science/article/pii/S0921344918300168>.
- Sabbaghi, M., Esmailian, B., Cade, W., Wiens, K., Behdad, S., 2016. Business outcomes of product reparability: a survey-based study of consumer repair experiences. *Resour. Conserv. Recycl.* 109, 114–122. ISSN 0921-3449, doi: [10.1016/j.resconrec.2016.02.014](https://doi.org/10.1016/j.resconrec.2016.02.014). <http://www.sciencedirect.com/science/article/pii/S0921344916300349>.
- Sabbaghi, M., Cade, W., Behdad, S., Bisantz, A.M., 2017. The current status of the consumer electronics repair industry in the U.S.: a survey-based study. *Resour. Conserv. Recycl.* 116, 137–151. ISSN 0921-3449, doi: [10.1016/j.resconrec.2016.09.013](https://doi.org/10.1016/j.resconrec.2016.09.013). <http://www.sciencedirect.com/science/article/pii/S0921344916302464>.
- Stad Antwerpen, 2020. Antwerpen wordt proeftuin voor circulaire economie met Circular South. URL: <https://www.antwerpen.be/info/5a03128bca69bccdc216d7bb/antwerpen-wordt-proeftuin-voor-circulaire-economie-met-circular-south>.
- Stahel, W.R., 2010. *The Performance Economy*, second ed. Palgrave Macmillan Basingstoke, England, New York, ISBN 9780230584662.
- Stahel, W.R., 2016. The circular economy. *Nature* 531 (7595), 435–438. doi: [10.1038/531435a](https://doi.org/10.1038/531435a).
- Statista, 2019. Local enterprise units in the equipment repair sector by employees. URL: <https://www.statista.com/statistics/320093/local-units-in-the-repair-installation-of-machinery-equipment-sector-by-employment-size-uk/>.
- Svensson, S., Luth Richter, J., Dalhammar, C., Maitre-Ekern, E., Pihlajarinne, T., Mairret, A., 2018. The emerging 'Right to Repair' legislation in the EU and the US. In: *Going Green - Care Innovation*, vol. 19 conference date: 26-11-2018 to 28-11-2018, 2018.
- Sweeney, J., Swait, J., 2008. The effects of brand credibility on customer loyalty. *J. Retailing Consum. Serv.* 15 (3), 179–193. ISSN 0969-6989, doi: [10.1016/j.jretconser.2007.04.001](https://doi.org/10.1016/j.jretconser.2007.04.001). <http://www.sciencedirect.com/science/article/pii/S0969698907000355>.
- Tecchio, P., Ardent, F., Mathieux, F., 2019. Understanding lifetimes and failure modes of defective washing machines and dishwashers. *J. Clean. Prod.* 215, 1112–1122. ISSN 0959-6526, doi: [10.1016/j.jclepro.2019.01.044](https://doi.org/10.1016/j.jclepro.2019.01.044). <http://www.sciencedirect.com/science/article/pii/S0959652619300514>.
- The Repair Association, 2020. The repair association. URL: <https://repair.org/>.
- Urbact, 2017. The second chance: recovery and repair. URL: <https://urbact.eu/second-chance-recovery-and-repair>.
- Wagner, M.J., 2020. Analyse von Reparaturnetzwerken. Mit besonderem Fokus auf "GRAZ repariert", Master's thesis. Karl-Franzens-Universität Graz.
- Weissbrod, I., Bocken, N.M., 2017. Developing sustainable business experimentation capability – a case study. *J. Clean. Prod.* 142, 2663–2676. ISSN 0959-6526, doi: [10.1016/j.jclepro.2016.11.009](https://doi.org/10.1016/j.jclepro.2016.11.009). <http://www.sciencedirect.com/science/article/pii/S0959652616318431>.
- Whalen, K.A., Milios, L., Nussholz, J., 2018. Bridging the gap: barriers and potential for scaling reuse practices in the Swedish ICT sector. *Resour. Conserv. Recycl.* 135, 123–131. ISSN 0921-3449, doi: [10.1016/j.resconrec.2017.07.029](https://doi.org/10.1016/j.resconrec.2017.07.029). URL: <https://doi.org/10.1016/j.resconrec.2017.07.029>, (sustainable Resource Management and the Circular Economy). <http://www.sciencedirect.com/science/article/pii/S0921344917302082>.
- Wieser, H., Tröger, N., 2018. Exploring the inner loops of the circular economy: replacement, repair, and reuse of mobile phones in Austria. *J. Clean. Prod.* 172, 3042–3055. ISSN 0959-6526, doi: [10.1016/j.jclepro.2017.11.106](https://doi.org/10.1016/j.jclepro.2017.11.106). <http://www.sciencedirect.com/science/article/pii/S0959652617327798>.
- Wijkman, A., Skånberg, K., 2015. The circular economy and benefits for society – Swedish case study shows jobs and climate as clear winners. *Tech. Rep., Club of Rome*. URL: <http://wijkman.se/wp-content/uploads/2015/05/The-Circular-Economy-and-Benefits-for-Society.pdf>.
- Wu, P.C., Yeh, G.Y.-Y., Hsiao, C.-R., 2011. The effect of store image and service quality on brand image and purchase intention for private label brands. *Australas. Market J.* 19 (1), 30–39. ISSN 1441-3582, doi: [10.1016/j.ausmj.2010.11.001](https://doi.org/10.1016/j.ausmj.2010.11.001). <http://www.sciencedirect.com/science/article/pii/S1441358210000844>.
- Yin, R.K., 2009. *Case Study Research: Design and Methods*, fourth ed. Sage Publications, Los Angeles.