Impact of the EU Right to Repair Directive on Independent Repairers

A case study on the impact of the EU Right to Repair Directive on operations strategy for independent repairers

Master's thesis in Quality and Operations Management

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Gothenburg, Sweden 2026
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Gothenburg, Sweden 2026

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SUMMARY

This thesis studies how the EU Right to Repair directive affects independent repairers, with a focus on the implementation of operations strategy. The background is the increasing amount of e-waste and the need to move from a linear to a circular economy. To achieve this, repairing and reusing products plays a crucial role.

The study consists of a qualitative case study of a Swedish independent repairer. Data collection includes interviews with employees at the case company, as well as external businesses and stakeholders. It is further based on an observation, a workshop, and a literature review. An abductive approach has been applied to enable an iterative analysis between theory and empirical data.

The results show that the Right to Repair directive creates both opportunities and challenges for independent repairers. Opportunities are mainly identified as improved access to spare parts and information, which can strengthen competitive advantage and increase demand for repair services. Furthermore, it may enable collaboration and increased market visibility. Meanwhile, challenges such as intellectual property rights, product design, and market dynamics remain, in combination with dependency on original equipment manufacturers. Administrative burdens and uncertainty in inflow remain key challenges.

Furthermore, the study highlights that independent repairers will need to adapt their operations strategies to handle increased complexity, variability in inflow, and changes in customer behaviour. Strategic implementations include adapting operations by closely monitoring manufacturers and market developments, as well as offering differentiated service offerings. The breadth of the business should be reassessed to ensure a clear focus, transparency, and alignment with core values. Selective automation should be tested on a small scale to manage increasing demand efficiently. Overall, the directive is unlikely to fundamentally transform the market on its own but rather reinforce existing trends while gradually reshaping competitive dynamics.

Keywords: Right to Repair (R2R), independent repairers, repairability, electronic waste, Electrical and Electronic Equipment, operations strategy, circular economy.

Acknowledgement

First and foremost, we would like to express our gratitude to Patricia van Loon, being both our supervisor and examinator during this project. We greatly appreciate all guidance, advice and connecting us with valuable contacts. A special mention also to Sina Behzadifard for acting as an extra supervisor and providing his support.

Of course we want to express our appreciation towards Alfa, for opening their doors to their organisation and providing resources towards our research. We greatly appreciate the opportunity to learn about your business, be able to conduct interviews and observations as well as receiving support. Furthermore, we would like to acknowledge all external parties for their valuable perspectives.

Thank you!

Klara Gundahl Larsson & Matilda Sternhufvud
Gothenburg, June 2026

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1. Introduction

This chapter presents the context of the study by including background information on the topic and calls attention to the need for further research within the field. The company chosen for the case study is also presented. Moreover, the purpose and objective are presented together with the established research questions. Finally, limitations are addressed to clarify the boundaries of the study.

1.1 Background

The current consumption patterns revolve around a throw-away culture contributing to a linear economy, where products with minor defects are replaced by new ones. This raises concerns about the utilisation of the world's resources. Actions must be taken to align with the plan of the European Green Deal, which aims to reduce the emissions until year 2030 with 50% and promises to obtain a climate neutral Europe by year 2050 (European Commission, n.d.). A circular economy requires that resources are utilised effectively and that waste is reduced, which puts high requirements on governments, manufacturers and the mindset of consumers.

Since 14.4 million tons of Electrical and Electronic Equipment (EEE) yearly gets put on the market, whereas 5 million tons of electronic waste (e-waste) was collected in 2022 (*Waste from Electrical and Electronic Equipment (WEEE) - Environment*, n.d.), this is a critical area in need of urgent attention. Obtaining a circular economy is challenged by the massive amount of e-waste that gets generated every year. The e-waste includes EEE like smartphones, refrigerators and washing machines that reach their end of life (Baldé et al., 2024). The largest share is created by countries with a wealthy status, however, e-waste ends up in low-and middle-income countries due to exportation of EEE with the purpose of re-using the products (Heacock et al., 2016). The related problem is that the exported EEE does not need to obtain a functioning standard, resulting in a diverse collection of products, with different standards creating exported waste that cannot be repaired, due to a limited infrastructure in the receiving countries (Baldé et al., 2024; Heacock et al., 2016). This means that valuable resources are discarded despite having the potential to be repaired or recycled under the right circumstances (Baldé et al., 2024; Dave et al., 2016).

However, it can be challenging for consumers to understand which repair possibilities exist and to find cost-effective alternatives. Part of the products on the market cannot be repaired due to the design and assembly parameters such as glued parts, special tool requirements and breakable cases (Hernandez et al., 2020). This stresses the relationship between the choice of product design and the environmental impact as well as cost and social aspects (Mestre & Cooper, 2017). Consumers must therefore be able to access transparent information about the products on the market and be able to repair their products at a reasonable cost. Diverse movements that advocate repair rights have requested that manufacturers should provide resources to allow for both third-party and self-repairs (Lloveras et al., 2025). Repair possibilities and better product designs that result in less new consumption for consumers would not only be beneficial from environmental perspectives but also economically.

To improve consumer rights in practice, a directive addressing Right to Repair (R2R) was set by the Union in 2024 (Directive (EU) 2024/1799). The directive extends the customers' possibilities to repair their products at a reasonable price and timeline while also increasing the availability of information to allow for conscious decisions. The directive applies in practice on national levels from 31 July 2026 meaning that the true results of the directive are unknown. In 2025, the market for the global electronic equipment repair service was estimated to approximately 152 billion USD with an expected growth to approximately 293 billion USD by 2035 (Narayan, 2026). The expected growth is driven by an increasing demand for electronic devices in combination with the need for cost-effective solutions and alternatives to prolong the lifespan of products. The market consists of multiple actors, making it a competitive playground where manufacturers have a crucial role in the segment of warranty service (Narayan, 2026). Independent repair shops are present, alongside authorised service providers as well as global repair chains (Narayan, 2026). The authorised third-party repairers are those that have a license or certificate to use original spare parts for reparations and can thereby handle warranty issues (Chowdhury & Verma, 2024). Independent repairers on the other hand, are those separated from manufacturers and without authorisations, meaning they are using third party spare parts as well as available original parts on the open market. The repair ecosystem includes stages such as spare parts manufacturing, diagnostics, repair service, refurbishment and recycling (Narayan, 2026).

Manufacturers currently hold a monopoly on the repair market and a change in the requirements of transparency directly impact their profitability (Jin et al., 2023). The sector argues that such requirements would lead to an increased risk of company-specific information getting leaked and Ballardini et al. (2025) investigate how patents should be handled in relation to repair regulations. It is shown that there is a trade-off between company secrets and environmental impact, which is the basis of the discussion (Ballardini et al., 2025). Moreover, manufacturers try to avoid stronger repair rights for consumers by blaming safety reasons and limited innovation. Further arguments against open access to repair are based on fear that it could damage the quality of products and the reputation of the brand itself if independent repairers lack knowledge, technique or training (Svensson et al., 2018).

The risks and opportunities for the independent repairers connected to the directive are the focus of this report where a case study will enable an in-depth understanding of the company's operations. Hereafter, ´repair´ refers to fixing something that is broken in a product, while ´refurbishing´ refers to cosmetic modifications to make a product look better or to look as new as possible. ´Configure´ refers to making an addition or modification to the product.

1.2 Presentation of Case Company

The Case Company, hereafter referred to as Alfa, is a Swedish independent repairer of electronic products such as computers, laptops, smartphones, TV screens and tablets. This means that they handle existing products for both remanufacturing and sales on the second-hand market. They have their production in the Nordic region but are selling worldwide. Alfa manages more than a quarter million products per year, saving 87 300 tons of carbon dioxide annually. They both repair, reuse and refurbish products, but they do not engage in material recycling themselves.

Alfa operate both in business to business (B2B) and business to consumer (B2C) contexts where their biggest type of suppliers are hardware leasing companies and other large Swedish firms, although they source worldwide as well. The company does not know the product type and quantity they will receive from their supplier beforehand, so the products are assessed according to predefined evaluation criteria during sorting and testing, which then form the basis for setting the payment to the supplier. The products that they buy are sorted, tested and graded to either be repaired, refurbished, configured, scrapped or go directly to sales. After processing, the electronics are sold downstream to both businesses and private customers, in Sweden and worldwide. When selling their products outside of Sweden they are sold in bulk through B2B, while Swedish customers can buy in optional quantity (mostly applicable to private consumers). Alfa has contracts with recycling companies that handle the scrapped products, usually 20% of the inflow.

The Nordic production consists of the inflow, processing and outflow of products. Alfa separate the inflow of international delivery of products and spare parts, which is stored in a next-door warehouse. A process map of the internal stream can be seen in Figure 1. Additionally, Alfa operates a rescue station where components are extracted from irreparable products and reused in the repair of other products. In recent times, a pilot project has been tested focusing on maintenance services for companies. This was developed because of customer requests for low volume repairs of their electronics, with specific repair needs for each asset expecting to retrieve the same unit.

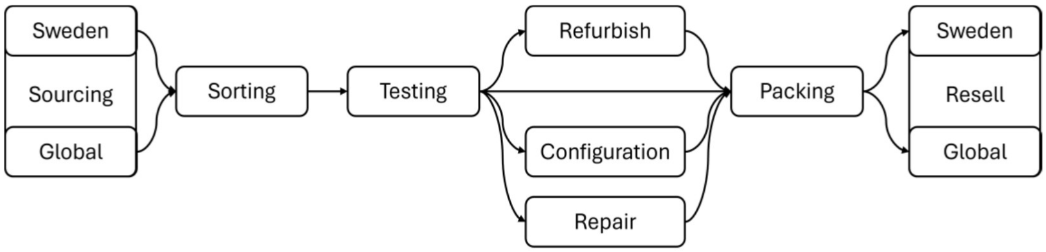

Figure 1. Process map of the internal processes at Alfa

The company expresses several challenges in their circular production. Product and software design, process variability, reverse logistic and manual processing. Today, the company experience challenges within product and software design regarding access to product information, disassembly challenges and parts compatibility. 15% of the units they receive from source customers are digitally locked, where 70% that have an iCloud lock will remain locked in that way. Moreover, the experienced process variability challenges are mostly due to the extended product portfolio and the low control of quantities in the inflow.

Currently, the processes are solely manual and performed by operators. This implies high labour costs and faults as well as inconsistencies due to the human factor. Furthermore, Alfa needs to balance two different market needs at the same time, the suppliers and the end customer. The first mentioned has a high variability, is volatile and non-standardised while the customers downstream are more predictable with even quality preferences.

Table 1 contains a collection of operational metrics, provided by Alfa. It gives an overview of key processes and performance indicators within Alfa's operations. Important to notice is that several of the following metrics are based on estimates and should therefore be interpreted as indicative rather than precise values.

Table 1. Summary of Operational Metrics

Metric	**Value**	**Notes**
Scrap rate	20%	Rule of thumb
Products entering rescue process	5%	Partially recoverable products
Products sold to end customer (private customer)	30%	Swedish market
Price difference third-party vs original parts	60-90% cheaper	Varies depending on part
Average lead time	~30 days	From receipt to ready for sale

1.3 Aim

The aim of this thesis is to examine how independent repairers will be impacted by the R2R directive. Although it is expected that the directive will affect these actors, there is limited research on how independent repairers can adapt their operations to comply, hence the study will investigate potential challenges and opportunities for these firms. Through a case study, the thesis aims to provide practical recommendations regarding strategic adaptation, for independent repairers to comply with R2R. The findings should be applicable for similar European independent repairers.

The research questions are established with a focus on independent repairers, since they may be affected by the R2R directive and are a critical actor in the supply chain to enable a circular economy. There are multiple operational challenges that independent repairers are currently facing, such as high variability in product inflow and manual processing while managing both suppliers and end customers. By researching operations strategy, it is possible to find how resources, processes and capabilities can be aligned to address previously mentioned challenges in the context of R2R regulations and provide practical insights. Therefore, the following research questions are formulated:

What business challenges and opportunities do Right to Repair regulations create for independent repairers?

How may independent repairers adapt their operations strategy in response to the identified challenges and opportunities?

1.4 Limitations

Due to the time constrains of one-semester of this master thesis, the study only conducts a case study at one independent repairer of electronic products where a selection of relevant staff and individuals are chosen for empirical data collection. However, the findings and recommendations provide insights to companies with similar characteristics and challenges. Additionally, five interviews with external parties are conducted to provide multiple perspectives. The external sample is limited to participants who voluntarily take part in the research. Consumer behaviour is considered, however, not investigated through direct interviews because of the width of analysis it would require. It is therefore considered suitable as its own research area, whereas this study focuses on the supply perspective. While Alfa also operates on the global market, this thesis is limited to focus on their business on the Swedish market.

2. Frame of Reference

This chapter presents the theoretical foundation for the thesis creating a contextualising description of the current situation. It includes legal aspects such as EU directives and other similar initiatives in the world. The chapter also covers previous research on R2R and independent repairers. Moreover, it addresses theoretical concepts of relevance to the topic. Circular economy is included to describe the environment of circulation and repairs, while automation in production as well as B2B and B2C, are described to substantiate business contexts. Finally, both risk management and the operations strategy matrix are presented to describe managerial challenges and the framework utilised in the study. These are particularly relevant in this study as the R2R directive is introducing uncertainties and could give rise to a need for strategic adjustments.

2.1 Right to Repair directive

The Directive (EU) 2024/1799 on common rules promoting the repair of goods, referred to as the R2R directive, was set by the European Parliament and the Council of the European Union in June 2024. The aim is to internally enhance the market within the Union and secure protection for consumers while contributing to a circular economy (Directive (EU) 2024/1799). To allow affected parties to adjust, the directive applies to sales contracts that will be executed after 31 July 2026, which is also the latest date for member states of the EU to translate the directive into national laws. The directive states that in order to allow consumers to prolong the life of their products, it is considered necessary to ensure that repairs are available at an affordable cost within a fair timeframe. The directive stresses that the importance of repair possibilities is connected to sustainable consumption through waste reduction, less emissions and a reduced resource usage connected to production and energy. Environmental benefits are predicted as a result of the increased repair, re-use and refurbishment of goods (Directive (EU) 2024/1799).

The directive aims to address both the supply and demand perspectives with the main focus being to ensure that suppliers and product designers create sustainable goods that last long and are repairable. This means that spare parts must be offered at a reasonable price for the goods sold, including products like smartphones, vacuum cleaners and electronic displays. Spare parts must be available for multiple years, as determined by the Union, even if the product expires from the product portfolio. The directive in particular emphasises that manufacturers shall not hinder or deny independent repairers the use of second-hand parts, third-party spare parts, 3D-printed parts or any other compatible part

(Directive (EU) 2024/1799). The only requirements are that the parts need to comply with requirements under Union or national law.

Moreover, the sales process is affected by encouraging availability of information to consumers about product durability and possibilities for repair to allow for conscious decisions. Finally, the directive aims to influence the aftersales market by encouraging sellers to prioritise repair over replacements with new products within the liability period. Repaired products within the guarantee period will result in an extension of the warranty with one additional year to further encourage a prioritisation of repair over new products (Directive (EU) 2024/1799).

The directive includes a form named the ‘European Repair Information Form’ to ensure that consumers get access to clear information about the repair possibilities to allow for comparison with other repairers (Directive (EU) 2024/1799). The form should include a timeframe for the repair, a description of the character of the defect, the price of the repair and potential extra services such as transport. Moreover, the form should be offered free of charge and provide a binding condition for a minimum of 30 days. In other words, the details provided in the form can be used in comparison with other repairers within the timeframe without risking any changes in costs. To ease the finding of different repair services, a ‘European online platform’ is said to be created where consumers through free access can find national information about repair services. In addition, the consumer should be able to demand the information form from the repairer through the online platform. These national online platforms should be accessible no later than 31 July 2027 (Directive (EU) 2024/1799).

2.2 Additional initiatives

As of July 2024, a new EU regulation framework on Ecodesign for Sustainable Products Regulation (ESPR) applies. ESPR focuses on regulating requirements for design of products to improve durability and repairability, while R2R is a complementary directive aiming to make the repair process easier for consumers (Regulation (EU) 2024/1781). This regulation concerns all physical products, as well as components, and only excludes food, medicinal products, living organisms and motor vehicles. The framework states that Ecodesign requirements should include performance requirements (energy efficiency, durability and reparability) and information requirements such as environmental footprint disclosure. Products on the second-hand market do not need to comply with the requirements if the product is already on the market at the time of implementation (Regulation (EU) 2024/1781). Furthermore, remanufactured products need to comply since they are considered new products.

Moreover, ESPR introduces multiple mechanisms that specifically will apply to electronic products because of their short product life span, complex structures and high levels of resource utilisation. The Union will progressively introduce product-specific Ecodesign requirements and consumer electronics are expected to be prioritised (Regulation (EU) 2024/1781). The specific requirements at product level will be decided by the Commission in delegated acts. It will also be possible to apply horizontal requirements regarding properties which will be applicable to multiple product groups (Regulation (EU) 2024/1781).

A crucial part introduced in ESPR that will come to affect the electronic market is the introduction of Digital Product Passport (DPP). A DPP initiates that products should include accessible digital information regarding content of material, repairability opportunities and environmental impact (Regulation (EU) 2024/1781). The idea is that with the help of a DPP, information regarding component composition, repair and spare parts will become more transparent and thereby simplify reparation and recycling. This information should be available for all actors in the supply chain and enhance end-to-end traceability. Since the information provided in the DPP will be available for multiple actors across the value chain, the expectation is that it will support more informed decisions by customers (Regulation (EU) 2024/1781). To fulfil this, it is also stated in the ESPR that it is important that the DPP is user friendly and contains accurate and updated data. Furthermore, ESPR states requirements to prevent planned obsolescence in products, by applying requirements on durability, reliability and reparability (Regulation (EU) 2024/1781). By designing products so that parts can be replaced and at the same time keep parts available over a longer period of time, the lifespan of products can be extended.

However, the R2R movement started long before the EU directives came into place and initiatives to promote repairs have been taken on both national and international levels (Dalhammar et al., 2025). It started in 1920 as a response to attempts of automotive manufacturers to complicate the repair process, to increase new purchases (Biscontini, 2024). From there, the movement expanded into new areas like cameras and eventually electronics. The R2R movement demand a consumer ownership where they can repair and upgrade their products with ease and efficiency (Biscontini, 2024). Numerous coalitions have been created as a part of the R2R movement. The Right to Repair coalition named Right to Repair Europe exists, and similar coalitions are found in the U.S., such as The Repair Association (repair.org, n.d.; Right to Repair Europe, n.d.). The coalitions include businesses working with repair and refurbishment, spare part distributors, communities and citizens, everyone aiming for greater access to repairs at accessible prices making it the standard to repair.

An additional response to the repair limitations created by manufacturers is iFixit, which emerged in 2003 (iFixit, 2026). The business enables repairs through spare parts, tools and manuals that they provide to overcome the hurdles created by manufacturers. In addition to the provided manuals, iFixit grade the repairability with scores that have been used globally to rank the difficulty of the repairs.

France has served as a pioneering country for regulations on a national level where they established a framework to increase the information towards customers regarding spare parts availability (Maitre-Ekern & Dalhammar, 2016). Moreover, they also implemented a law that prohibits planned obsolescence by criminalising it (Maitre-Ekern & Dalhammar, 2016). These two came into practice already in 2014 and 2015, and France kept on promoting repair and implemented a repairability index in 2020, where products similar to the ones mentioned in ESPR must be graded according to their repairability (Dangal et al., 2025).

Further initiatives have been implemented to promote repairs on national levels. Firstly, private consumers in Austria can apply for compensation up to 50 percent of the repair or service cost for electrical appliances and electronic devices (Bundesministeriums für Land- und Forstwirtschaft, Klima- und Umweltschutz, Regionen und Wasserwirtschaft, 2025). The compensated cost is financed by the Federal Ministry of Agriculture, Forestry, Climate and Environmental Protection, Regions and Water Management meaning that neither consumers nor repairers lose economically on the initiative. It is rather an initiative to prolong the lifetime of products through environmentally friendly decisions. Similar initiatives are implemented in Sweden, where private consumers can receive up to 30 percent tax reductions for repairs of home appliances (Skatteverket, n.d.-a). Sweden also implemented a tax on chemicals in certain electronics which has been valid since 2017 (Skatteverket, n.d.-b). The tax aims to limit the existence of dangerous chemicals in people's living places. It affects both manufacturers, importers and receivers in Sweden for electronic units. Since 2020 this also applies to imported units from other EU countries, regardless of whether the purpose is for the business of the buyer or not. The result is higher prices for electronic products in Sweden, both from manufacturers and repairers.

On EU level, the European Parliament implemented a regulation referred to as 2023/1542 addressing batteries and their waste (Regulation (EU) 2023/1542). It aims to create a more sustainable and safer environment connected to batteries, where manufacturers must take responsibility for the waste of batteries and be transparent about performance metrics in their product passports. Moreover, it states that end-users should be able to exchange batteries themselves with the use of "Do It Yourself" kits (Regulation (EU) 2023/1542).

The EU initiatives have been criticised for not being sufficient and missing out on important perspectives. Dalhammar et al. (2025) present five future aspects of relevance to regulate the market. Firstly, introduce responsibility fees that are adjusted fairly, so products with a shorter life cycle cost more. Secondly, taxation could be connected to the resource usage to reduce overconsumption of raw materials. Thirdly, they propose that online shops should be responsible for the products sold meaning that they must follow EU laws and similar. Fourthly, economic parameters could be utilised to increase the quality of products by prohibiting destruction which in the long run promote repair. Lastly, companies should need to comply with sustainable and value-adding activities rather than maximising short-term wins.

2.3 Academic research on Right to Repair and independent repair

This subchapter presents the findings from the literature review. Three main themes were identified and are presented below, addressing institutional and regulatory barriers for independent repairs, market-based responses and competitive dynamics, product design and repairability constraints.

2.3.1 Institutional and regulatory barriers for independent repair

Previous research identifies that there are institutional and regulatory barriers for independent repair. Manon (2025) highlights the impact of IP law on the R2R directive. They also discuss ESPR and Data Act and their respective impact. They conclude that IP rights could significantly impact and limit the effect of the R2R directive, since IP rights open a possibility for manufacturers to keep control over the repair market by limiting access to repair information, tools, spare parts, embedded software and technical documentation. As a result, while the R2R directive and ESPR aim to ensure that manufacturers provide access to spare parts and repair information, manufacturers could keep this under their control and limit the access while increasing the price since they would be protected by IP rights (Manon, 2025). Furthermore, software copyright is an example of a clear institutional barrier for independent repair. The manufacturer could prevent an independent repairer from accessing software in a product, which could make the diagnostics, repair or testing process an obstacle (Manon, 2025).

Lopez-Bermúdez and Vence (2025) conduct a critical assessment of the R2R directive and state that it fails to address the true barriers for repair, especially regarding independent repairers. They argue that the directive might end up improving the business for original equipment manufacturers (OEM) and authorised repairers while making it more challenging for independent repairers. This is because of the lack of addressing structural barriers such as access to spare parts, repair information and price structure (López-Bermúdez & Vence, 2025).

R2R can cause more administrative work for repairers without guaranteeing any economic wins since EU fails to attach the price perspective. Lopez-Bermúdez and Vence (2025) conclude that the repairers on the market are provided with limited support, while the already existing power asymmetries could be reinforced.

In the article *The European Directive on Common Rules Promoting the Repair of Goods. A Critical Assessment of its Drafting Process*, Bermúdez and Deza (2024) highlight multiple initiatives taken by member states to promote repairability, with extra emphasis on France. Similar to Lopez-Bermúdez and Vence (2025), they argue that the regulatory framework fails to address key institutional and regulatory barriers affecting third-party repairers. The study states that during the development of the R2R directive, economic considerations as well as stakeholders had a great influence. Although consultations with stakeholders have shown to have had a significant role in the development of the regulations, the outcome reflects the preferences of highly influential manufacturers (Bermúdez & Deza, 2024). Emphasis is on the directive not focusing enough on structural barriers such as IP rights, agreeing with arguments by Manon (2025), as well as access to spare parts and tools. A lot of emphasis is further put on the lack of information and struggle of planned obsolescence. The conclusion states that the directive might hinder member states from implementing greater initiatives on their own (Bermúdez & Deza, 2024).

Recker et al. (2024) research the aftermarket, specifically the aftermarket for iPhones. Their study demonstrates that institutional and regulatory mechanisms have been central for Apple to keep control of the aftermarket for their products. The company has been using contractual agreements with suppliers, IP protections, trademark enforcement and warranty policies, which has made it challenging for independent repairers to access original Apple spare parts, tools and their documentation (Recker et al., 2024). The study also describes that Apple cooperated with law enforcement in the US to prevent imported refurbished or third-party spare parts from entering the market, arguing protection of IP or trademark, largely impacting independent supply chains. This gives a clear example of how institutional and regulatory barriers create power asymmetries on the aftermarket for electronic products, illustrated by a company whose products are circulating globally around the world.

In addition, previous research suggests that the existing EU consumer law framework interacts with and builds conditions for R2R but was not originally designed to support the objectives of R2R (Loos, 2024). It is incorporated in the EU consumer law that repair is not seen as an independent right, but instead as a solution when a product is broken. Implicitly, this makes repair a reactive option rather than an option of actively supporting the circular economic goal (Loos, 2024). Furthermore, the existing EU consumer law framework, particularly the

Sale of Goods Directive, does not clearly and explicitly support independent repairers. Repair is mainly regulated between the consumer and the seller, whereas repair services and third-party repair are unaddressed at EU level (Loos, 2024).

2.3.2 Market based responses and competitive dynamics

Market based responses and competitive dynamics is a topic also brought up in previous research regarding R2R. Jin et al. (2023) analyse in their paper *Right to Repair: Pricing, Welfare, and Environmental Implications,* whether the R2R directive and movement consequently benefit the environment and the consumer. Most commonly in the debate regarding R2R, it is only considered that the outcome of more convenient and cheaper repairs is that the manufacturer does not respond with an increase in sales price. In that case, consumers get the possibility of affordable repairs which leads to a reduction in e-waste. By applying an analytical model in their study, Jin et al. (2023) challenge the discussion and highlight that R2R legislation might lead to a price response from manufacturers with negative consequences for consumers and the environment. It is concluded that depending on the production costs for a product, the outcome will differ. As repairs become more affordable, a manufacturer with low unit production cost could likely respond by lowering their sales price so that customers would rather buy a new product than choose the repair alternative. For those products with a higher production price per unit, the manufacturer's strategy might turn out to be to increase the sales price or lower the quality of the product, benefiting neither the consumer nor the environment (Jin et al., 2023).

The aftermarket for Apple products is a clear example of how competition arises between OEMs and independent repairers (Recker et al., 2024). A highly profitable value stream has been protected by Apple by using certified partners and controlling access to repair resources. This has led to a response from independent repairers who have produced and used alternative spare parts from third-parties and competing on price (Recker et al., 2024). It has also been shown that Apple has shifted from controlling their position on the market through these types of actions, and instead are relying on digitally embedded control architecture in their products (Recker et al., 2024).

Similarly, Chowdhury & Verma (2024) further add to the discussion regarding market-based responses and competitive dynamics by analysing how firms respond to third-party repair competition and how profitability and consumer welfare are affected by strategic decisions such as pricing, repair policies and services. They find that firms within product centric industries fear losing revenue because of the R2R directive (Chowdhury & Verma, 2024). This is because many firms offer both repair and service support to customers. The study also highlights the importance of differentiating authorised and non-authorised third-party repairers. For the OEM's, authorised third-party repairers are a source of revenue from the margin on the spare parts (Chowdhury & Verma, 2024). Closely linked to the argument of Jin et al. (2023), this study shows that a pro R2R policy is suitable when an OEM has a cost-efficient repair process and thereby can lower their price for their products (Chowdhury & Verma, 2024). These are the firms that will benefit from the policy. When following the R2R policy, it is beneficial to optimise the price for spare parts since lower prices will increase market share. It is also crucial to understand the trade-off between profitability and consumer welfare (Chowdhury & Verma, 2024). Usually, consumer welfare declines when profitability inclines and the other way around. This will be especially true when pricing spare parts and therefore needs to be considered. These findings emphasise the importance and need to consider responses from firms when analysing the consequences that could evolve from the implementation of the R2R directive.

2.3.3 Product design and repairability constraints

Research done on the R2R directive is in some studies closely linked to the design of products. Barros & Dimla (2023) are connecting repairability with decisions regarding the design of the products, in this case smartphones which have a short product life span. Their research identifies several design choices that directly limit third-party repairers and consumers possibilities to repair products themselves. In their study, Barros & Dimla (2023), analyse the use of indexes of repairability, the iFixit and the French-legislation index of repairability. The French index is a legislated label which informs the consumer about the product's repairability at point of sale. The findings say that a high index score does not necessarily mean that the product is more sustainable in the way that it is more easily repaired (Barros & Dimla, 2023). This is because the index also considers the price of spare parts, extended documentation and good service. It is concluded that in order to show a more correct index, the weight of disassembly and accessibility of spare parts and tools should be increased as well as adding criteria for firmware and software obsolescence (Barros & Dimla, 2023).

Recker et al. (2024) contribute to the discussion regarding repairability constraints by highlighting the control of the market that Apple has achieved by their strategic product designs. Glued components, soldered parts, the need for specific tools for repair and digitally embedded control are choices that have increased the difficulty of repair for independent repairers (Recker et al., 2024). Chowdhury & Verma (2024) also argue that product design is essential for how effectively the R2R policy can be implemented. However, firms would need to balance the trade-off between profitability and consumer welfare once again when designing ease of repairability of products, since a complex product design might increase the profit and vice versa (Chowdhury & Verma, 2024).

2.4 Circular economy

The legal response of the EU Directive is based on the environmental and social factors originating from circular economy. With EEE being the fastest growing waste stream, change is required to move from a linear to circular economy (Neves et al., 2024), where repair and refurbishment are examples of crucial processes to achieve more sustainable operations through circular principles (Leitão et al., 2023).

Circular economy as a concept consists of multiple perspectives, making it challenging to guarantee the meaning in different contexts (Kirchherr et al., 2017; Korhonen et al., 2018). Korhonen et al. (2018) have conducted a summarised definition based on three perspectives. From an environmental perspective, the aim is to limit the input of energy and raw materials in production and consumption patterns as well as reducing emissions and waste generation through cycles and renewable sources. In relation to this, the objective of an economic perspective, is to reduce the costs related to the inputs and outputs and highlight the risks related to legislation and reputation, creating opportunities for new innovations. Finally, the social perspective includes a shared economy with employment possibilities, involvement and efficient physical material usage.

The lifetime of a product is dependent on more factors than breakage because of consumer usage. For example, it is influenced by the product design where manufacturers ensure that consumers buy new products due to planned obsolescence (Malinauskaite & Erdem, 2021). Planned obsolescence can involve a shortening of the product life to force consumers to buy a new model through software updates that either impair the battery or limit the functionality by not providing updates for older models (Barros & Dimla, 2021). Moreover, aesthetic factors can influence consumption through the release of new models of the same product that utilise trends and brand loyalty together with strong marketing (Barros & Dimla, 2021; Malinauskaite & Erdem, 2021). In addition, manufacturers can limit the repairability of their products through company-specific assembly parts and glued parts that prohibit external parties from repairing the products (Barros & Dimla, 2021).

When manufacturers own their repair process, they use financial aspects to favour new consumption over repair since consumers, despite owning the final decision, get pressured to buy new when the price for repair is similar (Barros & Dimla, 2021). In other words, the repair barriers lie in both technical and economic aspects and for a circular economy to be feasible, manufacturers must offer spare parts and favour a collaborative environment through modular product structures (Barros & Dimla, 2021).

2.5 Automation in production

Process technology refers to the technology that assists in, for example, assembling a product and performing the steps in a production setting. Over the last century, production has been moving gradually away from manual processes towards automated processes with the help of process technology (Slack & Lewis, 2020). Infrastructural and information technologies are also commonly used in operational settings. Technical feasibility, enhancement of strategic capabilities, operations benefits, labour market dynamics and social and regulatory acceptability are some factors that impact the speed and extent to which a new process technology can be adopted (Slack & Lewis, 2020).

Manual labour is often used in settings with high variety in demand and products and cannot always be interchanged with automation (Bitterling et al., 2022). The combination of manual and automated labour is crucial to maximise efficiency in production. Robotic Process Automation is a type of automation where robotics is used to perform repetitive and rule-based activities. It is shown that in comparison to manual processes, the implementation of robotics leads to shorter process time, decreased costs, more effective resource utilisation and higher quality (Jaafar et al., 2024). However, the integration can be complex and call for technical competence and maintenance. Compared to manual processes, robotics is not as flexible and is thereby more suitable for standardised processes (Jaafar et al., 2024).

2.6 Business market structures

Whether a business operates in a business-to-business (B2B) or business-to-consumer (B2C) context has a significant impact on organisational decisions, especially relevant for Alfa which operates in both. B2B is often characterised by larger order volumes where marketing is more targeted and limited to a specific group, since the volume of customers is smaller compared to within B2C (Josan, 2018). B2C demands a larger focus on marketing towards a broader customer group consisting of individuals. Purchases made by individuals are often at lower volumes, emotion-driven and a quicker process. Purchases from a business have a larger impact on their organisation and are thereby more complex, time-consuming and demands for greater analysis (Josan, 2018).

Perceived value is commonly discussed in relation to the concepts of B2B and B2C. In B2C, perceived value is often defined as individual and subjective, where quality, price, emotions and social aspects influence the decision of the customer

(Mencarelli & Rivière, 2015). In contrast, B2B often includes a more rational view on value with focus on cost, utility, effectiveness and the relationship between the two actors. Moreover, perceived value is dynamic and changes depending on context and time for B2B as well as B2C (Mencarelli & Rivière, 2015). When making organisational decisions, insights from both perspectives can be beneficial to consider. The B2C perspective can contribute with insights regarding understanding for emotional and experience-based value, whereas B2B contributes with a focus on building relationships and long-lasting value (Mencarelli & Rivière, 2015).

2.7 Risk management

Risks can be found in any organisation and supply chain. Chopra and Sodhi (2004) highlight the importance of proactive decisions to handle the risks. It is stated that the problems in supply chains can be caused by numerous factors such as global issues, economic factors and disputes (Chopra & Sodhi, 2004). In addition, they explain that the potential consequences of supply risks can lead to larger problems since they consist of a variety of different risks. Some risks mentioned relate to the company system and to forecasting, connected to demand in relation to projection and product variation. Zsidisin (2003) agrees that supply risks exist in all organisations and emphasises that the perception of the risk differs between industries. The definition of supply risk describes the relationship between the input affected by supplier operations and customer demand and safety (Zsidisin, 2003).

Guidelines to allow for improved performance and value building for organisations through risk management and decision making are presented in accordance with ISO 31000:2018. Risk management is stated as a crucial factor for leadership in organisations (*ISO 31000:2018(En)*, n.d.). It includes both internal and external perspectives with cultural aspects and human behaviours included. The process is described as follows, with focus on communication and review in parallel (*ISO 31000:2018(En)*, n.d.). Firstly, the scope and criteria must be identified, followed by the risk assessment consisting of risk identification, risk analysis and risk evaluation. Thereafter, risk treatment follows and finally, recording and reporting of the process. Supply risk identification aims to detect the type of risk and factors causing it, which can be done through both quantitative and qualitative methods (Ho et al., 2015). The analysis on the other hand focuses on the probability of occurrence and the severity if it occurs while evaluation focuses on grading (Cagliano et al., 2012).

Since management and proactive decision-making aims to identify, analyse and act on potential risks, a continuous improvement process is a beneficial tool to use. A widely used model is the PDCA cycle which is a continuous process of questioning a process or activity (Deming, 1986). PDCA stands for plan, do, check and act. The stage of planning aims to identify and study problems or areas of improvement and define objectives. Moving on to the do stage, focus should be placed on implementing the plan. In the stage of checking, the data and results should be analysed and evaluated in comparison to the expected outcome. The last stage, act, includes standardising and implementing the change if successful, or refining of the approach and starting a new cycle if not.

3. Methodology

The primary method utilised in this empirical thesis was a study at the case company Alfa, investigating the implications of R2R on their operations. In addition, external perspectives were collected to further understand the context. This section describes and motivates the methods used for this empirical study and to generalise the findings.

3.1 Research approach

Based on the limited research that had been conducted within the area earlier and the fact that the directive was yet to go into practice, an exploratory approach was applied. Bell et al. (2022) recommend an exploratory research strategy when the area is unknown, as in this case and state that it opens for a qualitative approach. Qualitative research is based on written and spoken data and images rather than numerical data which instead would be considered as quantitative research (Bell et al., 2022). A qualitative research approach was therefore used to complement the available theoretical information with the nuanced picture provided by Alfa.

Abductive reasoning was applied to allow for the identification of unknown challenges and opportunities. This method was chosen to overcome some of the limitations associated with inductive and deductive reasoning. According to Bell et al. (2022), empirical data alone cannot generate theory independently, while deductive reasoning involves uncertainty regarding which theoretical framework to base hypotheses on. Abductive reasoning on the other hand allows for an iterative process where both theoretical frameworks and real world scenarios are considered back and forth to fill the unknown gaps by providing the best prediction (Bell et al., 2022).

A case study design was selected since it is a well-known research design for business research to study an organisation in detail to fully understand its operations (Bell et al., 2022). Additionally, case studies tend to be suitable for a qualitative research approach since it allows for multiple qualitative methods with relevant stakeholders such as interviews, observations and workshops.

3.2 Data collection

The data collection was conducted in multiple steps as visualised in Figure 2. It started with the aim to understand the topic by interacting with employees at Alfa through an observation and informal interviews. In parallel, a literature review was conducted. This laid the ground for the following data collection where additional literature was reviewed in combination with exploratory interviews with both employees at Alfa and external parties. Additionally, desk research was conducted to include perspectives of dominant external actors, unable to participate in interviews (Gupta, 2024). The final part consisted of a workshop with representatives from Alfa. This triangulation of methods ensured that the findings were cross-checked and allowed for a more nuanced picture of the situation (Bell et al., 2022).

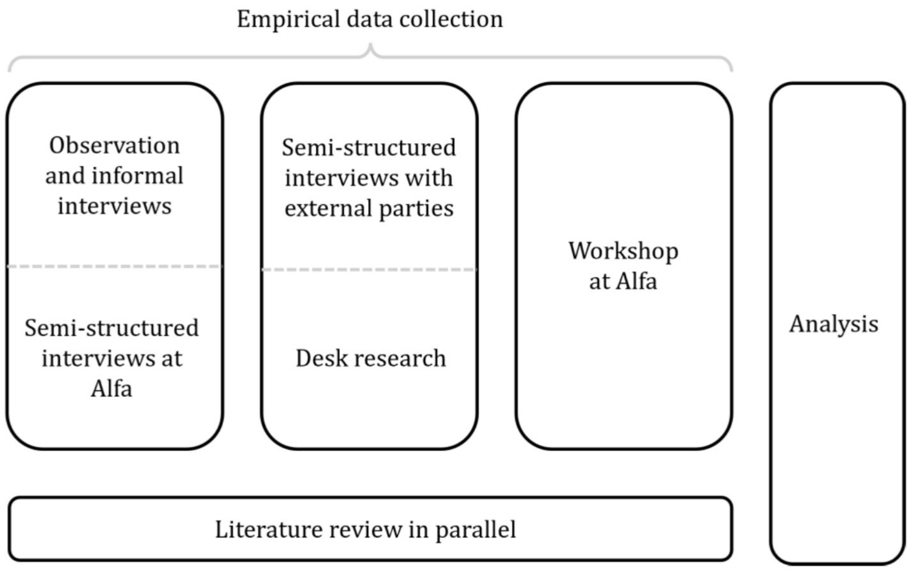

Figure 2. Structure of the data collection

3.3 Literature review approach

To gather a frame of reference, Google Scholar, Scopus and Chalmers library were used to gather books, academic journals and conference papers. Conference papers were studied because of the limited availability of peer-reviewed articles and reports on R2R. Since the topic has gained increasing attention in recent years and it were therefore of interest to address the most recent perspectives within the area. Theory regarding what was known, related processes, key actors, opportunities and challenges were gathered.

The literature review on previous research was conducted by using specific key words in the Scopus database. The keywords were narrowed down to "right to repair" AND ("independent repair*" OR "third-party repair*"). These were chosen to align closely with the research aim. “right to repair” captures the regulatory and policy context of the study, while “independent repair*” and “third-party repair*” ensure coverage of the actors of interest. The use of (*) allowed for variations of the terms, thereby broadening the search. The search resulted in 23 published articles and book chapters. All abstracts were reviewed to assess relevance to the study based on geographic relevance and connection to the scope of R2R, resulting in 8 selected articles. These 8 sources were read thoroughly and key findings and conclusions were summarised. A synthesis of the common themes and findings identified in the articles was then conducted, consisting of *Institutional and regulatory barriers for independent repair, Market based responses and competitive dynamics* and *Product design and repairability constraints.* This resulted in the base for the literature review.

3.4 Sampling strategy

The sampling strategy that was used for this thesis was mainly purposive sampling, which is a commonly used strategy for qualitative research (Bell et al., 2022). It means that the sampling was conducted with the research questions in mind and ensured that the sampled population was of relevance to the research (Bell et al., 2022). There were multiple reasons for choosing purposive sampling. Firstly, it ensured that the resources provided by Alfa were utilised wisely. Secondly, it ensured that the findings related to the research questions of interest. In a similar manner, external parties were contacted based on the criteria of relevance to repair, refurbishment and electronics to bring relevant perspectives. At Alfa, the sample size was based on saturation, meaning that interviews were conducted until no new information occurred. This involved collecting input from different roles at the company until saturated results were obtained. For external viewpoints, a variation in perspectives was collected from different actors related to the repair industry.

3.5 Empirical data collection

The empirical data collection was divided into three parts, where the first one included an on-site introduction and online interviews with employees at Alfa. The second part of the empirical data collection included online interviews with external parties and the final part consisted of an on-site workshop at Alfa.

3.5.1 Exploratory phase

To broaden the understanding of Alfa and the business segment, the empirical data collection began with an introduction on-site, including informal interviews and an open, unstructured observation of the production site. The open unstructured observation ensured that relevant interview questions for the exploratory interviews could be formulated suitable for the context (Bell et al., 2022). In addition, it provided insights regarding the company culture and the workflow.

The following exploratory interviews were held online with employees at Alfa to collect perspectives on how firms might be impacted by R2R and to explore different perspectives, see Table 2 for participants. The format of these interviews was semi-structured and included both open-ended and closed questions. Interview questions can be found in Appendix 1. This format allowed the interview leader to have a distinct list of questions as a guide but still allowed for flexibility to follow up on interesting responses (Bell et al., 2022). Semi-structured interviews further provided the possibility to compare responses while still being able to gain new findings. The interviewees received an introduction to R2R via email together with representative questions before the interview.

To prevent variability, the interviews were recorded via Teams and transcribed through the built in function and thereafter manually corrected from the audio recording. The interviews were conducted in Swedish since it was the preferred language of the interviewees. All citations presented in the study have been translated to English. To ensure that the participants felt comfortable, the recording was started after the introduction and when permission to record was obtained from the interviewees.

Table 2. Participants in the exploratory data collection

Primary data collection - Alfa				
Nr.	*Interviewee*	*Position*	*Format*	*Time*
1.	Alfa 1	Operations Manager	Presentation & observation	120 min
2.	Alfa 2	Compliance Manager	Semi-structured interview	55 min
3.	Alfa 3	Production Manager	Semi-structured interview	40 min
4.	Alfa 4	Purchasing	Semi-structured interview	45 min
5.	Alfa 5	Operating repairer	Semi-structured interview	45 min

3.5.2 External perspectives

The second phase focused on external perspectives and started in parallel with the exploratory interviews. The aim was to contextualise the situation and identify similarities and differences between Alfa and other European actors within the broader business segment, see Table 3 for participants. In a similar manner as the interviews at Alfa, they were semi-structured with the utilisation of an interview guide. The questions were adjusted depending on the interviewee's business area to maximise the outcome of the interview (Appendix 1). All interviews were conducted online and the audio recording and transcribing function in Teams was used after approval from the interviewees. The language of the interviews was English or Swedish, depending on the native language of the interviewee.

Table 3. Participants in the external data collection

Data collection - External					
Nr.	*Interviewee*	*Business type*	*Position*	*Format*	*Time*
1.	External 1	Spare parts distributor	Marketing	Semi-structured interview	35 min
2.	External 2	Independent repair shop	CEO	Semi-structured interview	30 min
3.	External 3	Reseller	CEO	Semi-structured interview	45 min
4.	External 4	Researcher within environmental policy	Associate professor	Semi-structured interview	45 min
5.	External 5	Repair coalition	Representative	Semi-structured interview	30 min

The participants were contacted via email and identified through online research of companies operating within related business sectors. The participants received an introduction document to R2R before the interview together with an informed consent form, specifying how the data would be handled and used. No questions were sent out before the interviews to minimise the time required by the external parties to participate. The included perspectives were of a large spare parts distributor, an independent business with repair shops, a reseller of electronic units as well as an associate professor researching within environmental policy and a representative from a coalition. Other parties that were contacted but chose to not participate in the study were manufacturers and representatives from the EU parliament.

3.5.3 Workshop

Since the study was conducted with abductive reasoning, the workshop served as a combining activity of the identified data from literature and interviews conducted at Alfa and externally up to the date of the workshop. The purpose was to verify the data that had been collected previously while new perspectives and data points were collected in parallel. Six employees took part for two hours. The participants as seen in Table 4, were from various departments at Alfa with different experience levels. Each participant received an introduction to the workshop via email with the agenda and topics that were included to ensure that they were informed about the topic of the workshop. However, details were excluded in the send-out to save inputs for the workshop itself.

Table 4. Participants in the workshop

		Workshop - Alfa		
Nr.	*Participants*	*Position*	*Format*	*Time*
1.	Alfa 1	Operations Manager	Workshop	120 min
2.	Alfa 2	Compliance Manager	Workshop	120 min
3.	Alfa 6	Sales and procurement	Workshop	120 min
4.	Alfa 7	Inventory Manager	Workshop	120 min
5.	Alfa 8	Project Manager	Workshop	120 min
6.	Alfa 9	Head of rescue	Workshop	120 min

The discussions were audio recorded with approval from participants, which allowed for verification of the collected data afterwards. The introduction of the workshop included a description of the research objective followed by a presentation of the R2R directive to ensure that all participants were informed about its content. Thereafter followed three interactive activities to present the collected data and collect inputs.

The structure of the workshop can be found in Table 5, where the first activity focused on differences and similarities between internal perspectives at Alfa and external perspectives. Five main themes were discussed separately based on the provided questions. The second activity highlighted the research findings from the previous research, focusing on the three main themes. Participants were encouraged to discuss the topic and asked to write down their thoughts on sticky notes after each theme was presented. These sticky notes were placed under each theme on a whiteboard.

To structure the final activity, the operations strategy matrix was applied where a short description of performance objectives and decision areas was provided at the start in accordance with the description from Slack and Lewis (2020). Following this, a prefilled operations strategy matrix was presented with inputs for each intersection based on the exploratory interviews. This step was included to verify that the previously collected data was correct. Thereafter, the participants were asked to fill in the intersections of an empty operations strategy matrix on paper, based on their perception of Alfa's position five years after the implementation of the directive. This was done to identify more perspectives from employees at Alfa with external and literature viewpoints in mind.

Table 5. Structure of workshop and included activities

Nr.	*Activity*	*Purpose*	*Method*	*Content*
1	Internal and external perspectives	Verification of findings and identification of differences	Discussion of questions in group	How would Alfa handle warranty cases where a customer has failed in self-repair? What is Alfa's view on the quality of non-original spare parts? How could Alfa compete with short lead times if they expanded to offer repair services? To what extent do Alfa expect change in customer behaviour among their business customers? How do Alfa believe they should manage a situation where demand for repairs increases, particularly regarding inventory and lead times?
2	Discussion of previous research findings in the context of Alfa	Contextualisation of research and application to Alfa	Discussion between participants and individual writing on sticky notes	Institutional and regulatory barriers for independent repair Market based responses and competitive dynamics Product design and repairability constraints
3	Operations strategy matrix in both present and futuristic perspectives	Verification of findings and gathering of future operations strategy actions	Filling out printed matrixes on paper and open discussion	Operations strategy matrix (Slack & Lewis, 2020)

The operation strategy matrix is a well-established and used tool for organisations to align their operations resources (capacity, supply network, process technology and development and organisation) with their market requirements (quality, speed, dependability, flexibility and cost) (Slack & Lewis, 2020). It helps managers to see the impact of strategic decisions on the performance objectives. Although some of the intersections between operations resources and performance objectives will be of greater importance, the matrix ensures comprehensiveness (Slack & Lewis, 2020). The entire organisation is considered in the operation strategy matrix with its related parties, in contrast to operations management that focuses on resource management between departments and similar.

The factors affecting the operations resources are referred to as decision areas and despite some different definitions existing in the literature, this study will use the descriptions provided by Slack and Lewis (2020). Firstly, capacity refers to the maximum level of productivity that can be achieved over a period of time with predicted conditions. In other words, it is not the same as the actual value-adding activities conducted since demand can be lower than what is feasible. Secondly, supply network refers to the surrounding impacts on the organisation where they together create value. These decisions are considered critical for the operations strategy and by some, seen as the most critical. Next up is process technology, which refers to the impact science can have on the operations process and is separated from product and service technology when possible. Lastly, development and organisation emphasise the improvement possibilities to allow strategic development.

Slack and Lewis (2020) also illustrate the five performance objectives and state the importance of performance on the operational level in relation to strategic objectives. The performance objectives are relevant for all operations and relate to identification of requirements for the customers. Quality refers to the extent to which the needs are met, both the level of the product itself and the conformance to set specifications. Speed can be viewed either internally or externally focusing on lead times. An external focus is the most common considering operations strategy. Moreover, dependability refers to delivering according to promises which relates to the delivery speed. It is explained by the difference between the set delivery time and the actual time required. Flexibility refers to the possibility to handle different states and the ease to move between these. Lastly, cost is addressed and stated to be of largest importance, where low cost generally is seen as attractive.

3.6 Data analysis

Due to the research being qualitative, it resulted in large amounts of data in the format of transcripts and notes which caused a high pressure on the analysis structure. The data was therefore analysed according to thematic analysis standards that focus on identifying patterns within the findings (Braun & Clarke, 2006). The process involved back and forth movement between data and analysis where a six-step procedure proposed by Braun and Clarke (2006) was implemented. The procedure revolved around codes and themes in the data and consisted of the following steps: got to know the data, established codes, identified potential themes, verified the applicability of themes, defined themes and created report (Braun & Clarke, 2006). Thematic analysis is commonly used within qualitative research and was therefore considered relevant for this study (Bell et al., 2022).

3.7 Research Quality

To ensure that the conducted research was relevant and valuable, the quality of the study was guided by the concept of trustworthiness which is stated to be of high relevance for qualitative studies (Bell et al., 2022). While quantitative studies focus on reliability, replicability and validity, the concept of trustworthiness rather addresses credibility, transferability, dependability and confirmability. With the aim of achieving a high research quality through regular communication with Alfa and a continuous reflection of the research methodology, the trustworthiness was addressed as follows.

Credibility links with internal validity and verified that the findings represented the real world and that the research has been conducted according to good norms (Bell et al., 2022). To provide credibility in this study multiple qualitative methods were used to allow for triangulation. Moreover, a steady communication between the research team and Alfa took place to identify potential misunderstandings early in the process to limit the consequences.

Transferability on the other hand, links with external validity and to what extent the findings from a qualitative study could be applied in another context, since the main focus typically is more narrow than for a quantitative study (Bell et al., 2022). For this thesis, transferability was obtained through a clear description of the case company Alfa to ensure that other parties that read the thesis can determine the applicability for similar situations.

Dependability relates to reliability in quantitative research and was required to verify that the results presented can be trusted (Bell et al., 2022). In this study it was obtained by saving all documentation from the start of the data collection to the final data analysis. In a similar manner, interviews were recorded and transcribed.

Confirmability links to objectivity and highlights the importance of aiming for objective findings based on the data where the researchers do not let personal values bias the results (Bell et al., 2022). This was obtained through a structured research process and regular input from supervisors.

3.8 Ethical considerations

There are four main areas of consideration to ensure ethical business research. These are harm to participants, lack of informed consent, invasion of privacy and deception (Bell et al., 2022). To avoid harm to participants in this study, it was ensured that interviewees and observed employees were referred to anonymously and it is thereby not possible for them to be identified through citations or descriptions.

To ensure consent, participants were clearly informed of the purpose of the study and how the collected data would be used. Participants voluntarily decided to participate in any activity related to the study and could withdraw at any time. Participants were asked and informed about their potential contribution ahead of time. This also ensured that deception was avoided by clearly communicating the nature and aim of the study. Interviews strictly covered only the subject of the study, and no personal information regarding employees at Alfa was collected. Related recordings were handled only by the researchers in a secure manner and deleted after the project.

Considering the ethics related to the impact of the study rather than the research technique, there was a clear ethical relevance of the R2R topic. R2R addresses social sustainability through consumer empowerment by having the right to repair owned products and by potentially supporting local repair economies. Furthermore, from an environmental perspective, R2R is a clear incitement to reduce electronic waste by extending product lifecycles which aligns with the principles of circular economy.

4. Result

This chapter presents the findings from the interviews conducted with both employees at Alfa and external parties, as well as workshop findings. All citations from interviewees are anonymised and participants are thereby referred to as Alfa 1-9 or External 1-5.

4.1 Exploratory interview findings at Alfa

This section revolves around the key themes identified during the initial data collection. The focus was on identifying the current operations strategy together with challenges and opportunities occurring today and the potential impact R2R regulations will have in relation to these. The identified themes from the thematic analysis were the purpose of independent repairers, independent repairers' way of working, vital factors for conducting repairs, business parameters for independent repairers and both external and internal consequences of future regulations impacting independent repairers.

4.1.1 The purpose of independent repairers

With the purpose to prolong the lifetime of existing products, the work of independent repairers revolves around circular economy. Alfa 3 stated that they aim for a future where nothing in the factory should end up as waste. Something that Alfa 2 states as impossible today, clarifying that some products are sent to recycling, where they are handled with security standards for products carrying digital information. A method that was brought up by several interviewees to minimise waste and utilise the incoming resources is the internal circularity, where Alfa reuse functioning parts from products that otherwise would have ended up as waste. This is a factor that Alfa 3 believes could be of great value in the future.

> *"Circular parts, meaning the parts we recycle from units, is something which I also believe will be a success factor. That we circulate them primarily within our own production."* - Alfa 3

Other factors that were brought up as important during the interviews were the quality of their products and especially the importance of their customers, who are their main priority. To be able to offer an overall solution that suits their customers, several interviewees highlighted the importance of multiple input flows where collaboration with other independent parties is one sourcing option. This implies that Alfa can fulfil customer demand for specific products in large quantities despite an unpredictable inflow of products. Established networks and experience are described as key factors for smooth operations.

4.1.2 Independent repairers' way of working

As stated in the description, Alfa's current processes are mainly manual, although the working procedures are constantly developing due to the high variation in incoming products. Interviewees commonly emphasise the importance of flexibility within their operations. Flexibility is enhanced both externally towards customers by adapting their offers and inflow of products, which thereby puts higher pressure on internal flexibility to adapt production after inflow and resources.

> *"The production process is quite organic today so we can try to help each other out there (...) and in that way there is great internal flexibility to jump in on what's currently flowing in."* - Alfa 2

In addition to the flexible production factors the process flow builds on manual work resulting in a labour-intensive business. It was stated that the employees are Alfa's biggest asset and resource, which was further brought up by Alfa 2 who mentioned that the aim is to automate as much as possible to benefit the employees' working conditions. However, the automating solutions that have been tried out in production previously, resulted in a slower process with lower precision according to Alfa 1. The automation was therefore reduced again to ensure high quality and speed. Alfa 3 explained that the wide variation in incoming products hinders a standardised process, which was confirmed by the other interviewees. It was referred to as a bottleneck, meaning that the access to variety in models determine the process flow and therefore creates unstable lead times.

> *"The structure also differs in linear production where they only have a certain number of factors. We work with a wide range of both brands and models so it's very difficult to standardise this process."* - Alfa 3

4.1.3 Vital factors for conducting repairs

To enable repairs and refurbishment at Alfa, they must be able to access spare parts and material to conduct the procedures. The choice between original and alternative parts was discussed in multiple interviews where price and customer perception were mentioned as important factors.

> *"Original parts sound good so I think there is a sense of safety for the customer to use original parts when something is repaired."* - Alfa 2

> *"Some customers require only original parts but that is also much more expensive and, in our branch, where we need to keep the costs down and the product margin is lower than a new unit, that is where we need to go to third parties."* - Alfa 4

Interviewees from Alfa stated that the difference in quality between original and alternative parts often is minimal while price is the biggest difference. However, Alfa 4 clarifies that this is thanks to their established relationship with trustworthy third-party producers and implies that there are all types of quality levels on the market. Therefore, independent repairers need to identify the reliable ones. Moreover, Alfa 5 describes the difficulties that can occur when identifying which spare part that is needed in a unit and exemplifies it with batteries.

> *"Just the thing about finding out which battery model that works in which computer, that can be a very difficult task."* - Alfa 5

Similar examples that aired during interviews connected to the product design were that model numbers can be hidden inside of units, demanding extra manual work to access the information. In other words, it requires manual process time to identify the type of product before the repair or refurbishing process can start. Another example was a brand that provides two different model numbers for the same unit, one on the actual product and another one connected to sales. Because of this, repairers struggle to identify the required spare part due to lack of information.

The design of the product brings more barriers than the availability of model information. It was stated for multiple ends that manufacturers sometimes design and assemble products for a linear process and limit the repair possibilities. Two examples that were provided were plastic parts on top of screws, hindering access and the need to dismount the motherboard to change the keyboard of a laptop. It was highlighted that Alfa would benefit from a pattern where manufacturers earlier in the supply chain design units with dismantling and reuse in mind.

> *"Well, the biggest problem that we have is that the product isn't really adjusted for recycling, repair or dismantling..."* - Alfa 3

Another aspect that was mentioned was authorisation where Apple was brought up as a brand that earlier has contributed to struggles in repair operations due to soldered components and requirements of specific tools. Similarly, Alfa 3 discussed the value of information from manufacturers, stating that it is easier to conduct repairs if they know how the unit functions.

4.1.4 Business parameters for independent repairers

Multiple parameters were identified as important for independent repairers to consider. Both inventory and cost aspects were brought up by all interviewees. The importance of inventory was discussed from two perspectives. Firstly, storage of repair material such as spare parts, where Alfa 5 stresses the significance of inventory to ensure that Alfa can absorb unpredictable incoming units. In addition, Alfa 3 explains that the importance of storage possibilities increases in relation to the service solutions offered by Alfa. There is a difference between the inflow of units that companies want to dispose of, which Alfa repairs and resells, and units that companies want repaired and then returned. Alfa 4 described that the purchasing flow builds on forecasts that indicate what will be needed in production. From these they determine what they already have in stock and what new components are needed to be bought, in combination with sourcing of already repaired products. Depending on the type of unit and parts required, they buy from different suppliers and Alfa 4 states that the lead time can differ between two days and three weeks.

> *"We never know how much [inflow of devices] we will receive, we have forecasts, but they are very estimated."* - Alfa 4

Another inventory perspective concerns finished products, where both Alfa 4 and Alfa 5 emphasised the importance of selling finished units as quickly as possible in order to release tied-up capital. Alfa 3 underscored that the process costs are very resource-intensive due to the large amount of manual work. Additional costs that were mentioned are the expensive parts such as storage and memory media, which affect many business segments, and the fact that virgin material often is cheaper which works against the repair business.

4.1.5 External consequences impacting independent repairers

Future impacts of the repair regulations were discussed from numerous perspectives. With an external viewpoint, Alfa 3 brought up potential collaboration possibilities where the general perception presented by the interviewees was that the actions of manufacturers will determine the baseline of what will happen in response to the regulations. For example, if manufacturers try to dominate the repair market by offering the services themselves or outsourcing them to independent repairers or similar parties. In a similar way, manufacturers and resellers were mentioned as potential collaboration partners.

> *"If they are unwilling to conduct repair operations themselves, they could make a strategic partnership with an independent actor"* - Alfa 3

> *"It will hopefully facilitate new partnerships and integration in different parts of the value chain that can be investigated."* - Alfa 3

A large manufacturer of electrical devices was brought up as an example of a business that has already considered whether in-house repairs or outsourcing is the most suitable option. These actions were referred to as an opportunity for new collaborations. In relation to this, it was also noted that a locked strategic partnership would require that large volumes could be guaranteed from the manufacturer, which was highlighted as potentially challenging. Another challenge that was mentioned by both Alfa 3 and 4 was the obligation to be fully transparent with information, meaning that they would need to provide details about their products and share their information. This was considered a challenge due to the additional work required to compile relevant information in a correct way and the difficulty in estimating the lifetime of a second-hand electronic product. However, it is also mentioned that transparency towards customers is a good thing despite the initial hinders. Alfa 2 emphasised that this increased information towards customers can lead to greater knowledge about their possibilities connected to repairs rather than throwing away. Moreover, this increased awareness can then put pressure on affected companies.

Another external perspective that was brought up was the formulation of the regulations, where interviewees stated that the interpretation of the directive will impact the outcome. "Excise duty on chemicals in certain electronic goods" was provided as an example of a regulation that created hinders for repair operations when implemented. This regulation aimed to limit the existence of dangerous chemicals but simultaneously lead to increased prices of batteries and thereby negatively affecting margins in the repair business.

> *"If stuff like this isn't formulated correctly people will find ways to get around it so it won't lead anywhere. Or as sometimes said, stricter requirements can be misleading."* - Alfa 5

4.1.6 Internal consequences of future regulations

In addition to the external consequences there were numerous internal actions mentioned in connection to the regulations. The most mentioned factor was competitiveness in relation to other repairers, where speed and quality were mentioned as well as cost and efficiency to achieve future success.

> *"There will especially be a fight between the repairers regarding their offerings of quickest service and the best quality, it's probably that actor that private individuals will turn to."* - Alfa 4

For the cost parameter, Alfa 3 mentioned that it is both about cost-efficient offerings and the potential result of an increase in advanced repairs. This due to the R2R directive leading to increased labour costs because of more qualified technicians. An increased demand for repairs was also stated as a potential factor for broadening the business area by investigating whether more repair offerings or service solutions are relevant. One example of a potentially growing market regarded the interest from companies that would like to get their devices wiped out of information as a service. In addition, the risk of losing volume of incoming units was discussed with the potential of companies repairing their products themselves. Alfa 4 believed that laziness will be the determining factor in those cases. The general perception of repair regulations in the EU was that it will impact repairers and the industry in one way or another. Alfa 3 focused on an increased demand for refurbishment and repairs, leading to a growing market and an increase in incoming units. This would result in larger quantities of material. Alfa 4 and 5 further emphasised an increase in repair businesses.

> *"I would say that it will probably be of relevance for the entire industry if there will be more actors that handle reparations."* - Alfa 4

As a result of a growing business and demand for repair both Alfa 2 and 3 mentioned the requirement to provide spare parts quickly and see it as a risky and competitive situation. In addition, both mentioned the need for an upgraded inventory strategy to meet the needs. It was also noted that the spare parts market is immature and in need of development such as new sites to buy and sell parts.

4.2 Empirical findings from external parties

This section presents the findings from external parties by dividing them into four identified themes. These are the accessibility of spare parts and repair information, the economics of repair, the complexity of warranty policies and demand for repair and market conditions. The external interviews were conducted with actors without connection to Alfa. External 1 was a company working with spare part distribution, External 2 was an independent repairer, External 3 a reseller, External 4 an associate professor and External 5 a representative for a repair coalition. In addition, findings from desk research are presented.

4.2.1 Accessibility of spare parts and repair information

A central theme from interviews with external parties was the accessibility of spare parts and technical information. This was described as essential for repairs according to External 2 and External 3. External 1 emphasised their role in the supply chain as crucial for making spare parts accessible for repairers by storing and distributing parts from manufacturers. External 1 further highlighted that the R2R directive might increase the demand for spare parts and thereby further strengthen their role in the supply chain. Simultaneously, External 1 also mentioned that some manufacturers actively chose not to share technical information, something that the directive could improve. HP, a global manufacturer of computing and printing products, emphasise the value of the directive for end users who will gain access to information that only authorised parties have had before. They state that consumers will have access to all information and parts needed to do repairs independently at home, at a lower price (HP, 2026). External 1 also discussed that depending on how easily understood and well explained the technical information is shared, the outcome will vary. Similarly, External 3 emphasised the importance of clear specifications towards consumers and External 4 stated that consumers need clear instructions with limited administrative burden in relation to decision making.

> *"I hope that they will make it like that so people can easily read the information and it's not something very technical because then it will just be something that people will overlook and not take into consideration when they are buying a new appliance."* - External 1

Similarly, External 4 stated that the formulation of the R2R directive can be questioned and considered vague since it only applies to products regulated by ESPR or the battery regulation. Thereby, it functions more like an extension to these regulations. Likewise, External 5 mentioned it as a weakness that only products regulated by these directives will be impacted at first. The uncertainty in the directive was also addressed by External 4 who questioned whether it will have any noticeable impact at all considering the formulation of a reasonable price and time without exemplification. External 5 also brought up the lack of a definition of reasonable prices for spare parts. The participant also highlighted the importance of legislative formulations on national level to ensure desirable impact. Whether the R2R directive will have any significant impact was touched upon by all external parties running businesses and they shared similar views that the directive will have a very limited impact on their operations. The EU discussions regarding indicative pricing models were brought up and External 4 stated that an explanation from the commission of the term reasonable would be required. External 5 agreed and stated that they hope for a clarification of the term reasonable in ESPR and further proposed that a cap on spare part prices would be desirable. An example provided was that when a customer buys a new smartphone at a reseller, they should be able to guarantee that for five years the spare parts cost will not rise above this price.

"The directive states that each member state must take action to foster repairs, in other words a policy instrument. Which is a very strange legislative technique, but it will of course drive and support the repair sector, including independent repairers. However, to what extent remains unknown."
- External 4

Furthermore, some OEMs already provide repair information and access to spare parts to some extent. Samsung offer their "Self-Repair-service" which includes guidance, repair tools and access to original spare parts for some of their Samsung products. This service is only intended for products and faults not covered by the warranty (Samsung, 2026). Similarly, Dell offers this type of service for products where the warranty have expired (Dell, 2026). Lenovo is also an OEM that provides end users with self-repair guides on how to step by step repairing an Lenovo product (Lenovo, 2026). However, these guides only exist for selected products.

Moreover, External 3 described that they historically have experienced that electronic products are designed in a way that makes them difficult to repair. Today they experience that products are designed in a more modular way, making repairs easier. External 3 specifically mentions Apple as a manufacturer that historically has made it difficult or impossible to repair their products without being an authorised repairer, something External 2 does not agree on while External 4 states that it has been the case previously, but that Apple has improved.

4.2.2 The economics of repair

A recurring theme throughout the external interviews was the economics of repair. It was a consistent argument that the economic factor often decides whether a product gets repaired or not. Where costs for both spare parts and labour work are crucial factors, External 4 believed that the repair industry will remain labour-intensive even though the combination of the directives most likely will make the process somewhat easier in combination with technical AI solutions. External 3 brought up that some spare parts from manufacturers are so expensive that repair would almost cost as much as a new purchase. Something that also External 1 and 5 confirmed, stating that spare part prices are crucial for repairs.

"We don't set the prices that's completely up to the manufacturers and there are differences and sometimes we also see that some of the brands choose to you know, kick off the prices like crazy for some specific spare part and then we see an increase in the alternative spare parts." - External 1

In relation to this, Electrolux offers repair services for various products at a fixed price, available at selected locations (Electrolux, 2026). External 4 brought this up and noted that this has led to an increased volume of repairs, as customers perceive the offer as providing a sense of security. However, while the fixed pricing model enhances demand, it may also result in varying economic outcomes for Electrolux, where External 4 clarified that for those repair offerings, certain repairs generate profits while others lead to losses depending on the specific product.

In a case where the repair price is close to the new purchase price, a repair gets hard to defend even though it technically would be possible, said External 3. At the same time, External 2 mentioned that alternative spare parts can be used for cost efficiency, especially for older products where original spare parts are expensive or difficult to access. External 4 further elaborated on the economic perspective and stated that the quality of products is a crucial factor determining the repair volume. The challenge is that consumers request sustainable product options while also refusing to pay more, which is considered reasonable to the extent that an investment in expensive products should guarantee a long lifespan something that consumers currently cannot trust. In other words, business models, product design and customer expectations have gradually developed together in relation to time where quality is stated to only be profitable over time. An example provided by External 4 was smartphones that are now considered very expensive while also belonging to a mature technology, leading to an increased demand for repairs and refurbished products resulting in increased circularity.

> *"If people start consuming quality, well then the business will increase for independent repairers as well."* - External 4

It was stated that established manufacturers strongly care about their reputation meaning that they will maintain high-quality products and not compromise on that factor to lower prices or affect the repair market. Based on the same reason, External 4 expressed the effect a potential repair ranking or index would have on manufacturers by stating that serious actors want to avoid bad rankings. In addition, External 4 said that this previously has been seen in practise when an environmental movement ranked manufacturers within electronics, which proved that serious actors did care.

4.2.3 Complexity of warranty policies

Warranty policies and relationships with manufacturers were brought up by the External parties as topics that affect repairs. External 2 described that their Apple certification makes it possible for them to use original parts as well as maintaining warranty after repair. At the same time, they described that warranty claims need to be handled by authorised repairers. However, they stated that this is not always followed by customers since the process time is often too long. For example, Elgiganten states that repair times can take approximately 2–3 weeks when their products are processed through their authorised channels (Elgiganten, 2026). External 2 described that customers often chose to repair their product in collaboration with an independent repairer instead, to get it done faster despite the payment outside of the warranty.

> *"Fast lead times are important, so that you are not without your phone for two weeks. If you can come in and have it repaired immediately, you chose that option."* - External 2

Furthermore, External 3 brought up that manufacturers might argue in a repair request that the fault is caused by previous repairs with third-party spare parts, even though the directive states that this shall be allowed. External 1 stated that as a distributor of spare parts, they do not see any noticeable difference regarding quality in third-party spare parts compared to original spare parts. Similarly, External 4 stated that the customers generally would be satisfied if they are provided with a good warranty for a cheaper third-party spare part and likewise with rescued parts. External 3 further discussed that the directive could lead to complications if private consumers repair themself and are not successful or further damage the product. It was pointed out that this could lead to potential issues and uncertainties regarding what this would implicate regarding warranty, something External 2 confirmed as well.

> *"One challenge is that customers may try to repair the product themselves and accidentally break something. In that case, whose responsibility is it?"*
> - External 3

As of now, LG, an OEM, states that if an end user self-repairs an LG product, this might invalidate the warranty (LG, 2026). An additional challenge with warranty errands in relation to repairs that was brought up by External 4 was that customers tend to throw away their receipts and in many cases be unaware of their warranty rights. The challenge regarding the replacement of products instead of repairs was also addressed where the extended warranty period of twelve months was mentioned as a positive factor that can promote repairs. However, it was still considered doubtful that the majority would change their preferences to repair over replacement based merely on that initiative. It was mentioned as more likely that the combination of multiple actions would be successful, where once again high-quality products were compared to cheap products, emphasising the perceived value by consumers. In relation to this, External 5 highlighted the importance of increasing the consumer trust to make repair the natural option, stating that consumers must be able to feel confident when handing in their products for repair.

4.2.4 Demand for repair and market conditions

External interviews also indicated that repairs are affected by multiple market conditions. External 2 described that their inflow of repair orders is steady in general, since the majority today own a smartphone or laptop. At the same time, they mentioned that some insurance companies have agreements with specific companies, which can control and direct customers. External 1 further emphasised that they are experiencing a lack of trained repairers, something that External 5 also touched upon. According to External 1, this results in long lead times and thereby new purchases instead of repairs due to geographical challenges.

Moreover, External 3 argues that it is the private consumers' attitude towards repairs that will have the greatest impact on the outcome of the directive. An increased interest for repairable products has been identified according to External 5 and emphasises that the trust from consumers grows. Similarly, External 4 expressed the importance of consumer behaviours and mentioned the provided customer experience as an important factor to promote repair operations. In addition, External 4 stated that the pricing and ESPR will have the greatest influence on repairers' businesses while R2R will contribute to the same direction. The joint impact of the regulations was also highlighted by External 5, stating that the combination of the directives will create the true results.

Since the R2R directive mainly focuses on consumer rights External 4 mentioned the online repair platform as the strongest implementation for repairers. The online repair platform was also mentioned as a benefit for repairers by External 5, describing it as an opportunity for consumers to find repairers and for repairers to share their service options. Moreover, it was described as a potential factor to increase the trust for independent repairers while addressing the difficulty consumers can experience while searching for a repair option.

> *"We don't want people to have to go through an ordeal to repair their products, we want it to be easy."* - External 5

However, a concern that has been raised in the electronic industry according to External 4 regards what type of independent repairers that can be found on the platform. If anyone can promote themselves as an independent repairer on the platform that will not include either rankings or reviews, there is a concern that repairs could be badly conducted. Something that would harm instead of promote repairs. It was therefore stated that the communication towards customers must be clear to ensure that serious independent repairers are the ones promoted on the platform. It was clearly stated that the responsibility should not fall on the consumers themselves to cross-check the repairers promoted on the platform since they could believe that they are verified by an authority. Similarly, it was mentioned that potential administrative work and similar tasks must be conducted by the repairers since consumers need repairs to be uncomplicated.

4.3 Workshop findings

This section focuses on the results of the workshop, aiming to verify previous findings and collect new perspectives. The three activities conducted compared internal and external perspectives, discussed previous research and addressed operations strategy at Alfa.

4.3.1 Internal and external perspectives

The five questions presented in Table 6 were asked during the workshop and discussed in an open setting by the participants. The outcomes from the discussions are presented below for each question.

Table 6. Questions asked during the first part of the workshop

Nr.	Questions
1	How would Alfa handle warranty cases where a customer has failed in self-repair?
2	What is Alfa's view on the quality of non-original spare parts?
3	How could Alfa compete with short lead times if they expanded to offer repair services?
4	To what extent do Alfa expect change in customer behaviour among their business customers?
5	How do Alfa believe they should manage a situation where demand for repairs increases, particularly regarding inventory and lead times?

1. *How would Alfa handle warranty cases where a customer has failed in self-repair?*

Alfa 9 stated that they would repair anyway, clarifying that Alfa is a supportive company and want to help the customers. However, it is hard to prove if a user has tried to repair by themself or if it is a production fault said Alfa 1, although the head of rescue (Alfa 9) said they do check if a damage is self-inflicted or not. If a customer wants to repair something it indicates that something is broken, raising the question of why they would not use the warranty in the first place. The group also discussed how the company could handle a case where a customer tries to do an upgrade or modification of a product, and something breaks. They concluded that it could be of relevance to specify terms regarding this in their purchase terms.

2. *What is Alfa's view on the quality of non-original spare parts?*

The products they receive through buyback are run through a program which gives a report and informs if any part of the product is non-original. Customers on their global market currently ask if parts are original or not. One reason is that customers may expect a discount when non-original parts are used. Furthermore, Alfa does not sell smartphones with third-party screens in the Swedish market. This is because testing can identify a non-original screen, which might be perceived as worse quality. Alfa 9 said that sometimes when a smartphone screen is repaired or changed, the product is no longer waterproof. Furthermore, the product software can sometimes tell that it is not an original part and then delete or deny access to some functions, such as Face ID. Regarding laptops it was stated that no problem with screens or other third-party spare parts occurs. However, they do see that third-party batteries for laptops are not of the same quality as an original battery.

3. *How could Alfa compete with short lead times if they expanded to offer repair services?*

The participants stated that Alfa do not want to offer a repair service for individual cases towards B2C and therefore considered it irrelevant to compete with these short lead times. Alfa would need to open a repair shop close to the customer with spare parts available to compete with short lead times for individual cases. They argue that this is irrelevant because of unprofitable volumes and a highly competitive environment. One main reason for their current longer lead times is the time of transport of products to and from Alfa.

It was stated that their business customers rarely request short lead times since they often have spare products inventory of electronics. Alfa also offers to give their customers a replacement product during the lead time. Furthermore, the participants discussed that if an individual customer chooses to go to another repairer instead of using their warranty at Alfa, it only reduces costs for Alfa. In these cases, it is only a risk of losing a customer in the long term in response to customer support.

4. *To what extent do Alfa expect change in customer behaviour among their business customers?*

The participants brought up their newly developed maintenance service that recently had been tried out as a pilot project where customer' requirements are personalised. What was explained to be unique about these cases is that the customer can have very specific and varied requests for each asset. It is therefore very difficult to standardise these types of services. The workshop participant could see some similarities with these cases compared to the B2C market.

From observations and discussion with a collaboration partner, Alfa stated that they see a trend from business customers wanting to hold on to a specific unit when handing it in for repair or maintenance. This could be because the asset contains a specific serial number or specific configuration. Other reasons could be increasing security measures and configurations being made on company-electronics, resulting in increasing workload and costs if assets are exchanged. Alfa has built its business based on customers sending in a product and retrieving an equivalent product already processed, something that the new customer trend can impact.

Alfa 6 further explained that they see an increase in requests for the maintenance service since companies today use their electronics for a longer time. Before, two to three years was a standard time before exchanging company-electronics, today more companies try to push this period towards four to five years. Alfa 6 has received requests where customers can not use their warranty, which often expires after 3 years at their supplier, thereby asking Alfa if they can help them to prolong the lifecycle of their products. It is a question of companies' sustainability reports as well as the economic factor. Alfa has competitors that have come further with this, although not on a huge scale. Another trend discussed was that sustainability managers are increasingly involved in IT-related decision-making. An example that was brought up was a customer who requested a language change of their keyboards, to allow transferring the products to their global offices.

5. *How do Alfa believe they should manage a situation where demand for repairs increases, particularly regarding inventory and lead times?*

It was expressed that keeping an inventory of old products and all existing products on the market could result in extremely high inventory levels. They discussed that it would not be reasonable to accept repairs for all products but set some kind of time span and focus on top-selling products. The largest part of suppliers of electronics to Alfa are larger businesses mainly using a few popular models from standard brands. This main inflow of products was mentioned as the focus if replanning would be necessary. It was concluded that it is of high importance to be attentive to customer needs and changes in behaviours.

4.3.2 Literature discussion in the context of Alfa

The workshop participants were presented with a summary of findings from previous research and literature (Section 2.3) and asked how the following subjects could be or not be relevant, connected or of importance to Alfa.

Legal and regulatory barriers to independent repair

In the context of legal and regulatory barriers, participants discussed that assets being locked due to IP rights or copyright, hinders Alfa to utilise extracted parts from defective units which end up being scrapped. This further led to a discussion regarding what will happen to spare parts being held as inventory for older products and never being used. This could also create more unnecessary waste. Holding this inventory could also imply the need for larger physical space, increasing cost and internal operations complexity. If there is a scenario with increasing demand for original parts among customers, this could impact Alfa's margins since these are lower for original parts compared to third-party spare parts.

Furthermore, the participants discussed that they would like to see clearer guidelines in the R2R directive regarding batteries and their handling and storage due to their high-risk characteristics. Additionally, it was brought up that there could be a situation where manufacturers only become transparent regarding information with their authorised or certified repairers.

Market-based reactions and competitive dynamics

The inventory manager, Alfa 7, started by stating that new products today, especially smartphones, are increasing in price and sold at a higher price than before. This is to some extent beneficial for Alfa, since it can impact customers to buy second-hand products, but it can in the long run indicate that customers are holding on to their assets for a longer time, decreasing the inflow of products to Alfa. On the other hand, if manufacturers lower their prices on latest generation products, Alfa needs to drop their prices on previous models to be able to sell these, leading to loss in margins. It was concluded that it varies a lot depending on product group, where the smartphone market, for example, is much more volatile than laptops.

It was further discussed that the possibility that manufacturers lower the quality of new products would also indicate that they are harder to repair. It could create a negative spiral if manufacturers produce lower quality products and refer to R2R while selling spare parts. At the same time, it was discussed that the market will not accept even lower quality and will react to this. Especially since prices today are marginally higher and consumers are more aware of obsolescence.

Product design and limitations in repairability

During the discussion, it was concluded that software can be a great risk when protected by IP rights or copyrights, since it could stop Alfa from opening or repairing a product, even if the design is aligned with ESPR. In those cases where IP rights and copyrights are not an obstacle, design changes accordingly with ESPR are going to help Alfa repair more. Today they are closing the repair flow for some products because they are unable to access them without breaking them. Further, it was brought up by Alfa 9, the head of rescue, that there is an issue with a lot of software programs, making previous versions slower when updated. Desirably, this will change after the implementation of the R2R directive, according to the participants.

4.3.3 Operations strategy in response to R2R

The participants of the workshop were presented with the operations strategy matrix found in Table 7 that was pre-filled according to the results from the exploratory phase. While presenting the content and encouraging the participants to either verify its relevance or inform about faults. Alfa 8 highlighted the importance of a relationship between cost and quality and the general perception from the participants was agreement with the content, thereby verifying that previously collected data aligns with reality.

The insights collected for the operations strategy at Alfa with a vision of five years are presented in Table 8. The discussions circulated around the priorities needed to adapt to the R2R directive. Flexibility was mentioned as a priority to ensure that different types of repairs and services remain possible. Other areas that were discussed were the potential need for larger facilities and the importance of lowering costs to enable more types of repairs. Examples of ways to minimise the costs are repair and maintenance production in countries with lower labour costs to improve flexibility and cost aspects. However, the potential impact on quality with such actions was also mentioned as a consideration. The participants highlight that the quality strengths of Alfa also lie in their communication towards customers with a focus on transparency.

Moreover, the discussion was about what type of repairer Alfa wants to be in the future and the importance of lead words like flexibility and quality. It was stated that flexibility potentially could be of high relevance for the buy-back flow while reframing the flexibility connected to repair internally. The flexibility was brought up as a success factor that differentiates various repairers on the market where some sell a pre-set model, and others adapt after customer requests.

Table 7. Operations strategy matrix based on exploratory phase with italic text representing negative impacts

Quality	Co-located production flow	Established collaborations with suppliers Third-party suppliers	Technicians with special skills	Passionate staff *Implicit knowledge*
Speed	Nordic production *Few facilities – limits geographical spread*	Well-functioning collaboration with suppliers Local supplier	Experience *Manual processes*	Time buffer in relation to manufacturer's development
Dependability	30-day feedback period Morning meeting in production	Alternative suppliers	Fast delivery to customer	Strong corporate culture 12 months warranty
Flexibility	Need-based rotation of personnel Manages a broad product portfolio	Sourcing finished products after demand	Adjustable processes Broad product portfolio	Staff with broad knowledge Unique sales offers
Cost	Temporary possibilities to "close/open" stations in production	Bulk purchases	Rescue station *Labor-intensive process*	Finding new ways of working *Rapid technological development*
	Capacity	**Supply network**	**Process technology**	**Development & organisation**

Automation in the production and warehouse was also discussed and different opinions were raised. The general perception was that technology will have a greater influence and role, however some argued that robots can be utilised for providing the correct screw to a product, while others did not agree that it would go that far. Robots were also mentioned as a possible tool to analyse timeframes for different operations to determine true cost factors for repairs. In addition, the responsibility of quality of spare parts was discussed, where a proposal was to start with tests at distributors to ensure that they keep their promises. In that way Alfa moves the responsibility of spare part quality to the producer rather than carrying it themselves. This means that through contracts producers can be pressured to keep promised quality and thereby prevent losing Alfa as a customer.

Table 8. Operations strategy matrix with futuristic approach

	Capacity	Supply network	Process technology	Development & organisation
Quality	Clear and expandable processes	Testing audits and move responsibility Communication towards customers	Ensure that specific customer requirements are met	Different communication, how to sell repair Dialogue with customers and purchasing terms from customer service
Speed	Automated warehouse Established routines and clear processes	Access spare parts during high demand	Slower RS process due to increased demand for repairs	Utilise the possibility to be proactive and “see into the future”
Dependability	Increased inventory of spare parts	Contracts and follow-up Access to spare parts and inventory planning with the use of historic situations	Unclear how to technically measure repairability requirements	Communication
Flexibility	Larger inventory, more personnel, and selection of which products to repair	Closer to suppliers	Remains manual Adapt to customer needs – how?	Develop a flexible area, a so-called “slow lane”. Ensure clear expectations from sales We can look ahead and start analysing markets
Cost	All workstations can handle all tasks with the new technology Specialised personnel	Reduce costs through better planning in advance More expensive parts require better planning or bulk purchasing Shortage of spare parts leads to increased costs in general	Robots Time study vs costs	Analyse and follow the market to adopt inventory in advance to new launches from manufacturers

5. Discussion

This chapter analyses and discusses the result of the study by comparing it to the frame of reference. The content connects to the two research questions presented in the aim, addressing both challenges and opportunities for independent repairers as well as operations strategy in relation to these. Furthermore, principles from risk management are taken into account by highlighting identified risks and analysing their impacts. Finally, practical implementations are provided for Alfa.

5.1 Challenges and opportunities for independent repairers

Independent repairers can proactively handle risk management and utilise possibilities by analysing the challenges and opportunities identified in response to R2R. These perspectives are presented in this subchapter with the aim to answer the first research question: *What business challenges and opportunities do Right to Repair regulations create for independent repairers?*

The findings from the study highlighted both positive and negative perspectives in relation to the R2R directive. It was stated multiple times that manufacturers response to the directive will determine the impact on independent repairers like Alfa and other actors in the EEE industry. This also highlights a structural power asymmetry in the market, where OEMs retain significant control over critical resources such as spare parts, technical information, and warranty conditions. As a result, independent repairers remain dependent on manufacturers' strategic decisions, limiting their ability to fully capitalise on the opportunities that could be created by the directive. Independent repairers were mentioned as a business segment that needs to adapt to the market changes and thereby having less influence themselves. However, it was also mentioned that they have the possibility to adapt over time since the changes tend to affect independent repairers several years after the implementation in the traditional market, as second-hand and repair errands appear later. In other words, the branch has the possibility to wait for other parties' responses without falling behind in their niche. However, they must eventually adapt to remain relevant as competition emerges.

Moreover, employees at Alfa brought up the risk of an increase in low-quality products as a response by manufacturers to the R2R directive. Similar discussions were presented in the literature, suggesting that product quality may be reduced to shorten product lifetimes (Jin et al., 2023). On the other hand, external perspectives disagreed and stated that serious manufacturers want to preserve their brand reputation. The quality aspects in combination with higher market prices, were also mentioned as a factor that could lead to a decreased inflow of products to independent repairers, since consumers likely keep their products for a longer period. This could on one hand result in increased minor repair services to prolong the lifetime while on the other hand result in a longer rotation cycle of electronics at companies. Consequently, leading to decreased inflow of products aimed for reselling.

Similar assumptions were presented in the literature that discussed both manufacturers' influence on the formulation of the EU directive (Bermúdez & Deza, 2024) and how price structures will determine the customer's choice (Jin et al., 2023). This could mean that manufacturers gain a larger influence over the repair market in response to the R2R directive, creating a more challenging environment for independent repairers. Both internal and external parties agreed that customers are the ones who in the end have the largest influence. This means that their requests and behaviours determine how independent repairers must respond, whether that is connected to the R2R directive with an increase in repair services, or more personalised repair solutions. This raises the question of whether R2R as a regulatory initiative meaningfully could influence market outcomes, if consumer decisions continue to be primarily driven by factors like convenience, price and lead time. In other words, the independent repairers need to adjust their business in response to customers and as presented in the result, an increased request for more flexible solutions has already been identified. This creates a challenging environment for repairers to constantly adapt and determine to what extent consumers can influence their operations. By setting clear frameworks internally for what they want to provide to their customers, independent repairers can ensure that they obtain high transparency towards customers with suitable expectations.

Moreover, the influence of R2R on manufacturers could lead to new collaborative relationships. New opportunities appear for independent repairers if manufacturers respond to the requirement by outsourcing the repair service. As brought up by respondents from Alfa, this could imply that repairers increase their collaboration with manufacturers by focusing on their product inflow. On one hand, this could lead to a more standardised process, increasing the production speed and potentially lowering the costs creating opportunities to expand. In contrast, it would mean that the repairer relies more on the manufacturer's operations creating an increased sensitivity to external influence in a market that already depends on others (Jin et al., 2023).

In relation to this, it can be discussed how such a collaboration would differ from the authorised repair shops that currently exist. In one sense, this is already their current business area, as they collaborate with the manufacturers and handle their warranty errands by repairing with original parts (Chowdhury & Verma, 2024). However, it can be argued that authorised repair shops can lose part of their status since the R2R directive states that original spare parts should be easily available. This means that independent repairers should be able to access them as well, without certification or authorisation. This opens for new competitive possibilities for independent repairers who can offer both original and third-party spare parts. Since third-party spare parts are stated to be up to 90 percent cheaper than original, it competes both on price and quality. In other words, an increased accessibility to spare parts would expand the possibilities for independent repairers. However, the uncertainty remains of whether the access to spare parts will expand as much as anticipated by the directive. It is therefore important to also consider a scenario where the spare parts market remains challenging for independent repairers.

Additionally, the findings highlight the complexity of warranty structures as a critical factor influencing repair practices. While the directive aims to promote repair, existing warranty policies and the relationship between OEMs and authorised repairers may continue to restrict consumer behaviour. As a result, the extent to which the directive can shift repair patterns remains uncertain, particularly if warranty conditions discourage self-repair. The findings clearly question the strength and impact of the directive and argue that R2R may not be sufficient to transform market conditions. Furthermore, it becomes clear that several OEMs on the market already offer similar services to the ones the R2R directive wants to accomplish. This suggests that the incremental impact of the directive may be limited since part of the market already has adopted similar practices. Consequently, rather than driving radical change, the R2R directive may reinforce ongoing industry trends.

Employees at Alfa also brought up the importance of a correct formulation of the legislations to ensure that it serves the intended purpose. If not, it could lead to other consequences and in the worst case, worsen the situation. One example could be that repairers face a tougher legislation with increased prices or more administration, like the tax on chemicals in certain electronics, which resulted in increased prices for repairers. In the long run, this contradicts the sustainability aim by hindering repairs through increased prices instead of promoting the extended life of electronics. Correspondingly, IP rights were discussed as potential risk of a loophole for manufacturers that could lead to remaining challenges regarding trade secrets and spare parts accessibility. This highlights the importance of correct formulation of the regulations that the R2R directive results in. With the uncertainty of impact identified from both Alfa and external parties, it is difficult to predict the outcome. However, the results imply that transparent and well formulated communication to affected actors is necessary to ensure coherence and that the correct purpose is obtained.

Furthermore, the combination of multiple directives will determine the outcome, since R2R independently does not affect the diversity or the design of incoming products to independent repairers (Loos, 2024; Manon, 2025). In other words what was expressed as one of the biggest challenges for independent repairers, the diversity and uncertainty in inflow, is not addressed solely by the R2R directive and therefore remains unresolved. However, in combination with ESPR and battery design regulations on EU level, independent repairers will gradually receive an increasing number of products with better repair possibilities (Regulation (EU) 2024/1781). Thereby, the uncertainty in incoming volume will not be impacted by the regulations but rather determined by the market and specific operations strategy for each repairer. While the diversity of products and more specifically spare parts, like batteries, will become more suitable for repairs and disassembly and thereby facilitate the industry operations.

An additional challenge that was brought up by both previous research and from empirical findings is the administrative burden for independent repairers. This mainly relates to the 'European Repair Information Form' that despite being voluntary could lead to increased workload (López-Bermúdez & Vence, 2025). This is because independent repairers, as mentioned above, must adopt to the market to stay competitive. If the majority starts utilising the form, the rest must do the same to avoid losing customers. In that case, independent repairers would face an increased amount of administrative work that does not guarantee any increase in revenue since the form is provided free of charge and allows the customer to choose which repairer to use. On the other hand, a utilisation of the form could also increase the demand for repair services if customers realise that independent repairers offer a more cost-efficient and suitable service than manufacturers themselves. This can be seen already, since customers choose to pay for a repair service that is significantly faster, rather than utilising their warranty, according to external parties.

In addition to the information form, the R2R directive allows for an online platform where citizens can find repairers and their information in one place (Directive (EU) 2024/1799). This creates an opportunity for independent repairers to promote themselves in relation to other repair services. However, lack of marketing was never mentioned as a current challenge nor seen as a hinder for repairs. The emphasis was rather on tight economic margins making it challenging to compete with new products and designs. This results in a time-consuming and challenging repair and refurbishment process for the units. The R2R directive creates an opportunity to increase marketing and awareness about independent repairers, increasing competitiveness with other repair options, but does not address the largest challenges related to margins and product design. Furthermore, if the platform is open for anyone to register on, this could emerge as a challenge where unreliable actors are promoted next to reliable independent repairers. This would put pressure on reliant actors to find a way to differentiate oneself towards customers. Furthermore, it would become relevant for the EU Commission to ensure that only reliable businesses will have access to register on the platform.

Moreover, since the implementation of the R2R directive aims to encourage consumers to choose repair over new production (Directive (EU) 2024/1799), it can lead to an increased repair demand. This in turn results in a growing market where existing repairers gain more customers but also face increased pressure, or as predicted by respondents, leads to new actors entering the industry and thereby increasing competition. The increased competition can also be seen as an opportunity since it can foster new innovations and technology that develop the repair industry. This is something that would address the current challenges regarding automatisation for processes with a high product diversity. More actors on the market can also lead to a growing interest and knowledge about repair possibilities, increasing the value and aligning with the R2R aim. However, the extent to which there will be a change in customer behaviour remains uncertain and questioned by external parties, raising doubts about the directive's actual impact in practice.

In addition, increased comparability intensifies competition, often resulting in lower prices as firms attempt to stand out. The question is whether this results in even lower margins than those currently existing in the repair industry, or whether spare part prices are forced down in parallel. However, the high labour costs remain if the repair process stays unchanged. Companies like Alfa that already have a stable position within the industry can then utilise their position and enhance their success factors such as experience and width. Because of the consumer focus applied in the R2R directive, independent repairers have the possibility to stand out and create solutions suitable for the target group in addition to the price.

5.2 Operations strategy in response to R2R

The results further indicate that the implementation of R2R will influence how independent repairers develop their operations strategy. According to the operations strategy matrix, it is a question of balancing the different performance objectives in relation to the different decision areas (Slack & Lewis, 2020). In the context of R2R, these considerations become especially clear since the result shows that both opportunities and challenges will emerge. This subchapter aims to answer the research question: *How may independent repairers adapt their operations strategy in response to the identified challenges and opportunities?*

A central insight from the results is that R2R will come with multiple built-in trade-offs. Costs could increase for independent repairs based on administration and potentially higher prices on spare parts and products, depending on manufacturers' reactions (Jin et al., 2023). This creates a paradox where increased demand does not necessarily result in higher profits and may require careful consideration regarding strategic positioning. Cost will remain a performance objective that shapes the others. The result indicates that strategic decisions from manufacturers will directly influence the economics for independent repairers. Furthermore, costs are affected by product prices, technological development and market demand. Independent repairers thereby need to position themselves in this competitive landscape where the cost structure is partly out of their own control.

Through the results, quality is expressed to be an important factor for competition. The use of original spare parts could signal high quality and safety towards customers, as mentioned by interviewees at Alfa. On the other hand, this would be a trade-off with costs since alternative spare parts have been described to be more cost-effective, with estimates suggesting they are 60-90% cheaper than original parts. While third-party parts offer competitive pricing it could include risks regarding customer perception and quality when competing with other firms. Furthermore, R2R can contribute to moving responsibility closer to manufacturers, regarding transparency, access and quality of spare parts.

The literature and results are coherent regarding lead times in Alfa's B2B segment, where short lead times offered by competitors operating in B2C are not currently requested by Alfa's customers. In contrast, this suggests a potential strategic opportunity, where independent repairers could take inspiration from the logic in B2C and apply on their customer segment (Josan, 2018), thereby strengthening speed as a performance objective in terms of responsiveness and lead times (Slack & Lewis, 2020). With the potential for a rising demand for repairs, the competition could also become more intense, making it important to stay updated with trends and changed customer behaviours. Offering a greater customer experience with shorter lead times for their business customers could put Alfa in a leading position. Furthermore, as brought up in the findings, greater focus could be put into customer interaction to provide higher value for customers, which closely links to dependability. The R2R directive will put pressure on companies to expand their communication and release information regarding repair processes and costs (Directive (EU) 2024/1799). This could enhance trust from customers, while also including operational challenges such as data accuracy and administrative workload.

Furthermore, Alfa's pilot project regarding their maintenance service has become more desirable and shows an increased need for flexibility. The results highlight an increase in variation regarding customer needs, which may require more individual handling and can increase operational complexity. At the same time, both technical development and changes in customer behaviours require that repairers adapt their processes and capabilities. This would suggest that flexibility may become a critical performance objective to enable companies such as Alfa to respond to increased demand and higher variability in requirements. In Alfa's current business model, there is a strong reliance on transparency and communication, as they also operate as a reseller. However, by placing greater focus towards repair activities, such as their maintenance service, this dependency could be reduced. The reliance would then lie in the repair process itself. This highlights the importance of making a clear strategic choice regarding what to offer.

Furthermore, automation is brought up as a relevant although complex, strategic option for Alfa. There was an expressed interest within the company for increased automation, however previous attempts have not been successful. This has primarily been due to high variability in both product types and repair requirements. This is aligned with the theory that suggests that automation is less suitable in environments similar to Alfa's where manual labour is still necessary (Bitterling et al., 2022). At the same time, literature addressed that automation could lead to increased efficiency, reduced process time and improved quality. For Alfa, labour is a major cost driver, and automation could therefore provide substantial economic benefits, although at a high investment cost. The findings further indicate that it is viewed as part of a future vision for the company and a strategically relevant decision. Therefore, it is important to identify areas with sufficient standardisation to justify investments in automation.

5.3 Practical implementations

Independent repairers like Alfa can adjust their operations in response to emerging challenges and opportunities. This subchapter presents practical implementations suggested as a result of the findings in response to the implementation of the R2R directive.

It becomes clear that repairers need to actively analyse and monitor manufacturer behaviours and developments. This would include product launches and spare part pricing. By proactive planning such as adjusting inventory and lowering product prices before a new launch, a competitive advantage could be created. The design of the offered services also needs to be evaluated. Repairers may need to differentiate between different types of services such as fast and standardised repairs, versus customised and flexible repairs. This could be done by creating a "slow lane" for complex repairs.

Alfa's current strategy revolves around a broad business portfolio that builds on experience, quality and customer perception where its broadness was mentioned as a strength. When adapting their operations strategy to handle increasing repair volumes and a new business environment in response to R2R, they need to determine whether to maintain breadth as a key strategic driver or instead be influenced by external actors who have described an overly broad business segment as inefficient and challenging. In other words, attempting to simultaneously provide spare parts, fast service, long-term service agreements and act as a reseller can be overwhelming and hinder growth. Considering the increasing demand and interest in maintenance services, Alfa is recommended to continue the development of this business offer. However, rather than only broadening their offers it is suggested to examine if other offers could be excluded or reshaped to ensure that the communication towards customers focuses on their core values and clearly states what operations can be adjusted according to preference and what follows a more standardised process. This leads to transparency towards customers while contributing to an efficient process that can grow on a stable ground to distinguish Alfa from other actors within circular economy operations.

Since the R2R directive allows further usage of third-party spare parts, there may be an increase in usage as indicated by the result. This further addresses the importance of choosing reliable and well-proven suppliers to ensure high quality, which also could become more complex if there is a greater width of suppliers. In addition, it would be valuable for Alfa to scan the market for suppliers offering original spare parts at a "reasonable price", after the implementation of R2R. A situation could arise where it would be reasonable to change to an original part depending on the price structure. Furthermore, instead of Alfa ensuring spare parts quality through internal inspections, the company could conduct on-site audits and random sampling at their suppliers. Thereby, they would place greater responsibility on the manufacturers and other suppliers within the supply network and thereby create a steady business structure.

In a practical perspective, automation should be approached selectively. One suggested area is warehouse operations, where automation could be implemented through technologies such as automated storage and retrieval systems or sorting solutions. This is particularly relevant since R2R expects to increase demand for repairs and can thereby increase inventory levels. A suggested approach is to try this in a smaller scale first, following a PDCA cycle. This would involve planning and testing automation in a selected area and evaluating the effects after implementation. This gives the opportunity to thereafter refine or scale the approach.

6. Conclusion

To conclude, this study aimed to identify challenges and opportunities for independent repairers in response to R2R and analyse how the operations strategy may be adapted. Based on the empirical findings and analysis, the conclusion aims to answer the research questions:

What business challenges and opportunities do Right to Repair regulations create for independent repairers?

How may independent repairers adapt their operations strategy in response to the identified challenges and opportunities?

6.1 Research question 1

The R2R directive creates a combination of opportunities and challenges for independent repairers, although the overall impact remains uncertain. A key challenge is the continued dependency on OEMs, specifically regarding access to spare parts, technical information and the price structure. Another main challenge is the potential increase in administrative workload and competitive pressure. At the same time, uncertainty regarding customer behaviour and OEM responses makes it difficult to predict the actual market outcome. Existing warranty structures and already established repair services from manufacturers further challenge the impact of the R2R directive. However, increased access to spare parts and repair information could strengthen the competitiveness of independent repair, particularly if third-party parts remain significantly cheaper than original components. The directive may also contribute to a larger repair market, increased collaboration opportunities with manufacturers and improved visibility through EU-supported platforms. Overall, R2R may reinforce existing trends rather than drastically transform the market. However, in combination with additional initiatives like ESPR and the battery regulation, the repair industry can expect greater impacts during the coming years, such as products more suitable for repairs and refurbishment.

6.2 Research question 2

In response to R2R, independent repairers are expected to adapt their operations strategy by balancing cost, quality, flexibility, speed and dependability in relation to the decision areas. The findings indicate that cost pressures will remain central, especially due to potential changes in spare part pricing and increased administrative requirements, while demand for repair services may increase and consequently affect capacity. To remain competitive, repairers need to differentiate their service offers by balancing standardised and flexible solutions, as well as improving customer communication and lead times. This emphasises the relation between speed and flexibility in combination with the development within organisations. Quality positioning, particularly through the use of original or trusted third-party parts, will remain a key strategic factor influencing customer perception. Strong supply networks are therefore crucial to guarantee high quality towards customers, where the responsibility for spare parts quality could be placed on each supplier to increase trustworthiness. Furthermore, flexibility will likely become increasingly important due to a growing variation in repair needs and product types. By selectively automating, particularly in standardised processes such as warehouse operations, it can support efficiency improvements. However, full automation is limited due to product variability and the need to ensure high dependability for customers. Overall, independent repairers will need to develop more adaptive and clearly defined operations strategies, where strategic trade-offs between cost efficiency, quality and flexibility become central in the evolving repair market.

6.3 Contributions & future research

Several contributions to both academia and independent repairers like Alfa emerged from this study as well as to circular economy practices. Operations strategies for independent repairers was addressed and thereby contributed to the literature and fulfilling the aim of the study. Moreover, thorough research was conducted regarding the potential effects of the R2R directive and how to tackle these, linking operational practices to regulatory compliance. The study provides thereby generalisable insights for other European, independent repairers who face similar challenges. Finally, the study highlighted proactive adaptation to regulatory changes, encouraging the sector to contribute to environmental sustainability and resource efficiency.

At the same time, the methodological approach affects the scope and result of the study. Since the study was based on a qualitative single case study, the results were aligned with the context and characteristics of Alfa. The chosen methodology enabled a thorough understanding of operational challenges and strategic perspective through interviews, observations, workshops and iterative analysis between theory and empirical findings. The triangulation of methods strengthened the credibility and trustworthiness of the study by allowing findings to be compared and verified across multiple data sources. For further research a broader study could be conducted by including multiple case companies and a wider market analysis. This would nuance the findings and thereby make them applicable to a broader range of businesses. It would be relevant to investigate which operations strategy aspects, if any, were changed in response to the R2R directive after implementation. Similarly, it is of interest to investigate the potential differences that independent repairers identify regarding spare parts and product design in response to the new regulations and whether the online platform generate increased business opportunities. This could indicate whether similar solutions could be applicable for future directives. Overall, the findings in this study highlight that proactive strategic adaptation to regulatory change will be crucial for independent repairers seeking to remain competitive, where success will depend on managing trade-offs between these factors in an increasingly dynamic repair market.

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Appendices

Appendix 1 - Interview guide

Introduction questions

1. Describe your role and main tasks at the company
2. How long have you been working here and in the industry?
3. How would you describe the company's position in the supply chain of electronics?
4. How would you describe the company's position in the circular economy?

Right to Repair

1. Just want to confirm that you have read the factsheet regarding R2R?
2. Based on this, how relevant do you believe R2R will be for this company?

If we start by discussing the availability of spare parts

3. What opportunities do you think could come out of the directive?
4. What challenges do you foresee?

Moving on to the availability of repair information and manuals

5. What opportunities do you think could come out of the directive?
6. What challenges do you foresee?

Finally, the fact that consumers should be informed about their repair rights at the point of purchase of products

7. What opportunities do you think could come out of the directive?
8. What challenges do you foresee?

Product inflow and variation

1. Could you describe the current variation in the product inflow?
2. How does the described variation affect your processes?
3. What type of strategies do you implement today to cope with these uncertainties in the inflow?

Processes (mainly for operators)

1. What are the main bottlenecks in your processes?
2. What are the main issues related to software design for reparation and refurbishment of products?
3. What are the main issues related to hardware design for reparation and refurbishment of products?
4. To what extent are your processes manual, and what explains this?
5. What do you think your processes will look like in 10 years?

Strategy (mainly for managers)

1. Do you believe there could be a change in customer behaviour because of the R2R?
2. Do you believe there could be a change in your relationships with your suppliers because of the R2R?
3. What operational changes do you believe could be necessary to implement?
4. What new knowledge and capabilities could be relevant for the company?
5. Could R2R affect your competitive position in the market? How?
6. Do you think R2R could affect the balance between your current buyback model and other service models and in that case how?
7. What do you think will be the key success factors for third-party repairers in the future?

Closing

1. Is there anything else you believe is relevant regarding R2R?

Thank you for your participation!

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