A Work Project, presented as part of the requirements for the Award of a Master's degree in Management from the Nova School of Business and Economics.

ASSESSING *WORTEN REUSE*'S SUSTAINABLE GROWTH: HOW CAN THE BRAND BE COMPETITIVE WHILE TACKLING ELECTRONIC WASTE

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Abstract

This thesis examines the importance of rethinking business models in terms of sustainability. The case of Worten, a Portuguese electronic retailer, and its brand for refurbished devices is used to understand the importance of incorporating circular economy into the business model to establish long term growth. Obstacles and achievements of the program are analyzed, while current and possible future challenges to extend the project and to maximize its impact are explained. Research was conducted to get further insights, including 3 interviews and a survey with 197 respondents. Finally, solutions to the current challenges are proposed, and subsequent recommendations are shared.

Emerging perspectives in the market for refurbished devices will be analyzed, taking into account the competitive environment including direct and indirect competitors.

Keywords

Sustainable Development, Circular Economy, Consumer Electronics, Refurbishment, Competitive Strategy

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209

Making use of circular economy as an accelerator for sustainable growth: A case study on *Worten Reuse*

In October 2022, Ana, Concept and Sustainability Manager at Worten, and Maria, Commercial Manager of *Worten Reuse*, met to discuss the progress and future of *Worten Reuse* after its introduction one year earlier. *Worten Reuse* was established as a strategic choice to access the growth promising market of refurbished consumer electronic devices, after a problematic first attempt at accessing this market in 2019. They agreed that *Worten Reuse* was a great success. Not only was it contributing positively to reducing the ecological footprint of customers to improve environmental sustainability and promote circular economy, but it also was contributing to social sustainability. Most importantly, it also allowed for further growth opportunities for Worten, the Portuguese market leader in consumer electronics. Allowing customers to buy high-end consumer electronic devices from the brand Apple including all functionalities but at a price reduced by up to 50% compared to the same device brand new, was greatly in accordance with the company's mission: "to bring the best of technology to everyone, with no exception, today and always." (SONAE SGPS n.d. - a). In addition to that, approximately 163 grams of waste is avoided when a product is refurbished by Worten.

Studying the financial numbers and the demand Worten experienced for refurbished devices, it was obvious that even though the brand was performing well, there was some room for improvement and some challenges that still needed to be solved. Ana and Maria wondered what measures could be taken to improve the performance of *Worten Reuse*. A central question was raised – How can the brand be scaled up to maximize impact and growth in the long term?

Worten: The Company and its Business Model

The company Worten is part of the Sonae group. The Sonae group, founded in 1959 in Porto (SONAE SGPS n.d - b), is a multinational company "managing a diversified portfolio of businesses in retail, financial services, technology, real estate, and telecommunications"

(SONAE SGPS n.d. - c) *(please refer to Appendix A for an organizational chart of Worten).* Worten is a retailer specializing in electronics with two major brands: Worten (consumer electronics and entertainment) and Worten Mobile (mobile telecommunications). Worten operates in Spain and Portugal with more than 230 stores, to provide a range of products from appliances to sound and image, from computers and communication to entertainment and culture, including beauty, wellness, and health (Worten n.d. – a). The first store was opened in 1996 and e-commerce launched in 2001 *(please refer to Appendix B for a timeline of the history of Worten).*

In 2021, Sonae achieved great results, with the company's revenues exceeding seven billion Euro for the first time - a growth of 5.3% compared to the prior year. A significant part of Sonae's growth was due to MC (one of the other brands of Sonae) and Worten, largely contributing to Sonae's results in the fiscal year 2021 (SONAE SGPS 2022).

Worten's revenue amounted to 1.1 billion Euro in this same year. Online sales were the main growth factor, reaching values of over 200 million Euro – a triple increase of revenue since 2019, making up 17.5% of Worten's overall revenues (SONAE SGPS 2022). The enormous increase in online sales can be explained by the pandemic that started in 2020, since businesses had to close their physical stores and consumers increasingly bought online. Even though Worten had invested massively into their E-Commerce section already, they experienced an increase in online orders of 100% and had to adapt their infrastructures for this increased amount of sales. Worten was thereby able to reduce the average delivery time to half and provide an in-store pick-up of online purchases after just 15 minutes. Furthermore, they launched services like *Tele-Resolve* and *Recolhe & Repara* to improve the online experience by integrating the perks associated with in-person shopping, like repair services and consultation, to online shopping (Ferreira 2021).

Being the Portuguese national leader in electronic retails, progress and further growth were

important topics that had always guided them in their strategy and implemented actions. Worten's position in the market was established, but room for further growth in the business area was limited.

This led them to explore further growth opportunities in 2019. While they discovered the importance of the market for refurbished devices and its growth opportunities (Watson, et al. 2017) relatively early, they also had to consider sustainability as a challenge since Sonae, started to push for sustainability actions in all of their businesses (SONAE SGPS n.d. - a). While exploring opportunities that ensure long-term growth, they had to reconsider the concept of being an electronics retailer facing several challenges (Murphy 2021).

The market for refurbished consumer electronics: A circular economy solution to tackle environmental challenges and ensure long-term financial growth

When Worten decided to enter the market for refurbished devices for the first time, they analyzed the market for consumer electronics in general, how it changed over the past years and what the resulting challenges were in 2019. Ana and Maria started to reflect upon the journey that helped Worten decide to enter the market for refurbished consumer electronics.

Consumer electronics are "electronic products that are bought by people for their own use", (Cambridge Dictionary n.d. - a), including devices like smartphones, computers, or televisions (Oxford Learner's Dictionaries n.d.). The global market for consumer electronics accounted for US$ 980 bn in 2018, representing an increase of approximately 4.5% compared to 2017 and an increase of approximately 10% over the past three years since 2015, when revenues amounted to US$ 895 bn. The market is expected to grow even further in the future, mainly resulting from changing consumption trends (Statista Research Department 2022).

This constituted a great opportunity for Worten, since a growing market would likely lead to organically growing revenues. They realized that if they would approach the market strategically, the company would maintain or could even expand their market share. In 2019,

they were well aware that even though the market appeared promising, they had to consider whether this development could be sustainable in the long term and what the opportunities were.

What could explain this market growth and will the growth be sustainable?

Market growth in the consumer electronics industry can be mainly explained by increasing consumer demand which is influenced by several factors. Access to the internet has increased drastically over the past years and more consumers require consumer electronics. Likewise, the lifecycles of precisely these have become shorter. While producers invest heavily in the research and development of new models, older models become obsolete more quickly, or are even designed to become obsolete. Since options for repair are often missing or economically not reasonable, consumer electronics are replaced faster. Faster replacement is also influenced by the consumers desire to own the newest products with the latest design and technology, even if improvements are only minor, which means that products are often replaced even though they are still functioning (Ala-Kurikka 2015, European Environment Agency 2020).

Analyzing the drivers for growth, it appeared that the expected growth in the market might be conflicting with the concept of sustainability. While this change provides favorable conditions for retailers to generate revenue, the increasing number of consumer electronics lead to several environmental challenges, including the production of e-waste and the need to extract further materials.

What is e-waste and why is it so problematic?

The term *e-waste* covers "items of all types of electrical and electronic equipment (EEE) and its parts that have been discarded by the owner as waste without the intention of re-use" (Step Initiative 2014, 4-5). It includes electronic devices such as washing machines, smartphones and computers at the end of their lifecycle. (European Commission n.d. - a). E-waste is one of the fastest growing waste streams; in 2016, approximately 44.7 million tons of e-waste were generated. Not only is the production of e-waste problematic, but the low collection rates for e-

waste also constitute another challenge. Only 20% of e-waste is documented to be collected and properly recycled to reduce environmental harm and threats to health (Baldé, et al. 2017, 38-39). While consumer electronics have developed to play an important role in everyday life, the waste generated and discarded is harmful to the environment. It potentially contains materials that severely damage the environment, and pose a threat to the health of people who have to deal with the e-waste (European Parliament 2020). If not managed accordingly, the hazardous materials contained in e-waste can lead to environmental and health problems. If instead, e-waste is collected and recycled, it can contribute to improving sustainable production and consumption, as well as increasing resource efficiency (European Parliament 2020).

In 2019, Worten had to handle e-waste for bigger electronic equipment. However, the treatment of e-waste was outsourced to a specialized company. They were well aware of the problem but had found a temporary solution. Resource extraction and efficiency was a challenge they had not considered so far. They needed to analyze it better, in order to understand whether it implied a significant challenge they had to prepare for.

Do companies in the European Union (EU) have to worry about the extraction and efficiency of natural resources?

Natural resources are defined to be "natural assets (raw materials) occurring in nature that can be used for economic production or consumption" (OECD 2001). They include minerals, coal, oil, forests etc. (Cambridge Dictionary n.d. - b). Several problems related to resources have developed and are exacerbated with the increasing number of electronic devices: firstly, the extraction and supply of resources, and secondly, the efficiency of the extracted resources.

In order to manufacture electronic devices, materials need to be extracted. The extraction of materials requires energy and leads to the emission of greenhouse gases, contributing negatively to the ecological footprint (European Parliamentary Research Service 2018). Additionally, the increased extraction of resources contributes to resource scarcity in the long term (European

Environment Agency 2020). The EU imports half of the resources it consumes, but the import of resources is associated with some uncertainty and risk like the availability of resources, price volatility as a result of demand-supply functions, and overall, the resulting dependency on resource-rich countries (European Parliament 2020, European Parliamentary Research Service 2018).

Another problem relating to resources is resource efficiency, which also refers to e-waste. If e-waste is discarded, the materials used for production are disposed of as well. Collecting and recycling this e-waste could increase resource efficiency. It is assumed that raw materials worth approximately US$ 55 bn could have been collected and recycled from e-waste in 2016 (Baldé, et al. 2017, 7). This indicates that it is economically viable to recover the resources, but it is also highly important to avoid scarcity of resources in the long term.

In order to minimize the environmental impact of electronics and contribute to a more sustainable future, product lifetimes need to be prolonged. A solution that is often suggested in order to guarantee the use of products and its spare parts for a longer time, while still being able to financially profit from them, is the economic model of circular economy. After Worten had realized that e-waste and resource extraction are indeed challenges that the consumer industry had to face, they looked into the often suggested solution of circular economy and how it could be applied to the specific case of Worten.

What is circular economy and can it be applied to the consumer electronics industry?

Circular economy refers to a sustainable model that aims to extend the lifecycle of a product. It is “a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible” (European Parliament 2015). The goal of a circular economy approach is to reduce waste, by keeping the product and its materials within the economy as long as possible (European Parliament 2018). The product, or if at the end of its life, the materials of the product, will be used again to create

further value. The circular economy model stands in contrast to the traditional linear economic model, which is "based on a take-make-consume-throw away pattern" (European Parliamentary Research Service 2018) *(please refer to Appendix C for a visual illustration of linear and circular economy).*

There is a need to switch from a linear economy to a circular economy to accommodate for the recent changes and the challenges resulting from it (European Parliamentary Research Service 2018). Circular Economy promotes the reduction of waste and the reduction of extraction of raw materials, and hence positively contributes to the reduction of greenhouse gas emissions. Next to the environmental aspects, it aims to increase competitiveness, stimulate innovation and boost economic growth. To achieve a transition from linear to circular economy, the EU has been promoting this shift since 2018 (European Parliamentary Research Service 2018).

For this shift to be successful, one of the most relevant aspects is to rethink consumption. This causes a duality and challenge for a company such as Worten, an electronic retailer, which is usually concerned with selling new products that consumers will use and finally dispose of. Changing this consumption behavior to recycling and reusing products requires a change in the consumers' mindset but also the business practices of Worten. While they were convinced about incorporating circular economy into the business, they had to analyze how the concept could be applied. In 2019, they realized that there was a market with growth potential: the market for refurbished electronic devices.

<u>Circular Economy Applied – The market for refurbished consumer electronic devices</u>

The electronics industry provides ample opportunities for circularity (European Parliamentary Research Service 2018, Murphy 2021). One method to introduce circularity to the electronics industry is the refurbishment of electronic devices. A refurbished device is a used device, but in comparison to a second-hand device, which is mostly sold by individuals, a refurbished device is mainly sold by retailers. Before selling the used device, it will be diagnosed, all data will be

deleted, it will be repaired and checks will be run by the refurbished to ensure a certain standard and quality. Furthermore, the retailer will most likely provide a warranty on the refurbished device. A refurbished device is restored to have all functionalities and often placed into quality grades to indicate the aesthetics of the device (Toogood 2021).

The global refurbished market size was estimated to be at US$ 10 bn in 2014, and expected to grow further in the future (Rallo 2014). The demand for refurbished devices is greatly driven by affordability, meaning customers buy refurbished products mainly because of economic reasons. They receive a high-quality device from an established brand, but at a significantly lower price with an average selling price up to 60% lower compared to the price of the same device brand-new (Transparency Market Research 2022).

Looking at the promising numbers of the market and the relatively easy competitive environment in the market in Portugal in 2019, Worten decided to enter the market for refurbished electronic devices fast in order to maintain a first-mover advantage over its competitors. It was a growth-promising market that helped them to improve sustainability and solve the challenges they had identified.

By collecting more used phones to refurbish them, e-waste is reduced. Simultaneously, resource efficiency is increased by reusing the resources. It helps to solve the challenge of dependence on resource-rich countries and supply chains for resources since resources are extracted from used devices (European Parliamentary Research Service 2018). This has a positive effect on environmental sustainability, as less energy is needed to recycle the materials compared to extracting virgin materials (European Parliamentary Research Service 2018). Furthermore, it contributes to the social pillar of sustainability, as human rights abuse and armed conflicts, which are often present along the supply chain, are not supported (European Parliament 2020).

After analyzing how and why Worten decided to enter the market for refurbished consumer electronics, Ana and Maria were very confident that the decision to enter the market for

refurbished electronics was the best solution to combat the problem of growth while improving sustainability. What they recognized is that their first attempt at entering the market failed. While they had tried to enter the market as fast as possible, they had failed to recognize that they might have to approach this market differently compared to other areas of business.

Entering the Market for Refurbished Electronic Devices: The first attempt

As discussed prior, Worten had decided to enter the market fast to secure a first-mover advantage. However, selling used products appeared to be more difficult than they had expected. Starting by simply buying refurbished devices from distributors from all over the world in large quantities and reselling them without any treatment or quality control, they realized that the demand in Portugal was high. While sticking to their business model of being a retailer that buys and sells products, a higher level of risk was recognized for used products. Being used to buy and sell brand new products, Worten experienced complaints at an industry-standard unacceptable level. In 2019, Worten worked with two suppliers, both with very low quality standards and conditions were basically unknown before receiving the devices. This resulted in excessive call rates; 50% of the customers buying these refurbished devices activated their warranty for problems with the device due to the inferior quality of the refurbished device. Therefore, the problem they had to address was the quality of the devices. Thus, they introduced their so-called green loop, a new business model for refurbished electronic devices. The main challenge in order to improve the quality of devices was to find a supplier that would agree to the conditions that Worten set up for quality. In order to find a way out of that, they developed a new idea: the buy-back and trade-in program. The goal of the program was to buy back used devices from the customer and refurbish them themselves in the Technical Service Center (TSC). This had two advantages: firstly, the dependence on the distributors was reduced, and secondly, profitability increased by up to 20%. Profitability increased, since they had more security on the quality of the phone and because of a specific Value Added Tax scheme

"marginal VAT" that applies to second-hand products that were sold in the EU. The product was taxed at 23% in Portugal when it was originally sold, the 23% rate then only applies to the difference between the cost of purchase for the used device and the price that was charged, once the refurbished product was sold again (Tax and Customs Administration n.d.).

By establishing this second source of supply, Worten was able to gain independence from suppliers, while tackling the problem of quality. However, as they had to refurbish the phones themselves, a different business model was needed. Worten had changed from being a retailer to becoming a manufacturer and hence, deliver services to the customer. In order to do so, they had to develop a facility, acquire expertise and finally develop the refurbishment A separate area in their newly established TSC was built to accommodate the team that would be tasked with developing the refurbishment process and finally doing the refurbishment. They introduced a production line, which they had never done before. Building the processes and mindsets for production was completely different and difficult for a retail company without information systems related to the issue. Establishing *Worten Reuse* was comparable to setting up a start-up in a big established company, they had to adapt to new tasks they had never done before, and do many things differently compared to what they were used to. Moreover, they had to establish a completely different business model which was more complex and thus, required increased agility.

The Concept of *Worten Reuse*

After developing the green loop and the whole refurbishment process, they decided to create a brand for their refurbished devices, *Worten Reuse*. The brand was created in 2020 but only launched in 2021 after the successful implementation of the refurbishment process.

What is Worten Reuse's strategy and approach to the market?

Ana and Maria had already analyzed the initial situation, the challenges Worten faced, the solution they had discovered, as well as the first attempts to cater to the market. Following, they

discussed how *Worten Reuse* was developed. To be able to analyze opportunities to scale up and improve, they had to analyze the current status of the brand and how they approached the market.

Competition

The market for refurbished devices developed into a highly competitive environment with competitors including big retailers, telecommunication operators, marketplaces and e-commerce businesses. Some of these competitors focused on online channels, where they sell a diversity of products. Main direct competitors include Fnac, as well as Swappie and Forall Phones, two retailers focused specifically on refurbished devices. While Worten had a first-mover advantage pursuing their first attempt to the market, the establishment of *Worten Reuse* was rather a reaction to the market. A first mover advantage cannot be identified since Swappie and Fnac entered the market in 2020 and 2015, respectively (Grande Consumo 2022, Swappie n.d. - a). Overall, information on processes, detailed sources of supply etc. are not publicly available due to the intensity of rivalry.

Product portfolio

At the beginning of the project, only iPhones were refurbished. The portfolio has since been extended to cover Apple Watches iPads and MacBooks (please refer to Appendix D for an overview of the product portfolio). The different refurbished devices being sold are classified into four grades according to their state of use. The evaluation system is subdivided into a scale ranging from grade A+, equivalent to an almost new product, with signs of use barely visible, to grade C, equivalent to a device with marked signs of use and some imperfections. Worten strongly invests in devices of grade A+ as those are most frequently desired, although this strategy is highly dependent on the available stock of used devices (Worten 2021).

Channels

The channels used to sell refurbished devices are in-store sales and online sales through their website (*please refer to Appendix E and F for pictures of how Reuse is presented in-store and*

online, respectively). Until now, most of the sales generated by *Worten Reuse* are made in-store, while the target for 2022 is to increase the share of online sales. However, this poses a challenge since customers value the ability to see the condition of the device before they buy it.

Brand

The brand communication strategy is based on three pillars: Quality, since *Worten Reuse* only offers certified refurbishment devices; Safety, by offering a warranty of three years; Price, given that consumers can take advantage of a price reduction for refurbished devices of up to 50% compared to the brand-new device. *Worten Reuse* has its own logo, which can be found in stores, online, and on the packaging of the refurbished device.

Pricing and Target Market

Worten Reuse pricing strategy takes three factors into consideration: the cost of spare parts, the cost of the transformation process, and the competitor analysis. Price reductions can go up to 50% compared to the price of the same, brand-new model. For the most recent models, however, the discount will be around 20% compared to the price of the same model brand-new.

The main clients of *Worten Reuse* can be segmented into two groups: consumers who want high-end devices but don't have the financial resources to acquire them at the original price and young people, whose parents acquire refurbished devices as a present.

How is the refurbishment process conducted at Worten Reuse?

Besides the strategic approach to the market, Ana and Maria also needed to analyze the program and its processes in general *(please refer to Appendix G for an overview of the process).* In order to properly predict the stock of refurbished devices needed, the team uses the sales forecast for the next three months provided by the commercial team. This prevents that demand for refurbished devices is not met due to a lack of stock. Having the stock plan thoroughly developed, the next step is to negotiate and to buy used devices to refurbish them, which happens on a weekly basis. Taking into account projected sales, available used devices and available

spare parts, the number of devices to be refurbished is planned and evaluated weekly in a meeting with the sales, sourcing, and production team.

Sourcing of used devices

As described earlier, the supply of used devices is guaranteed through two different sourcing methods. One option for clients is to trade in their used devices in a Worten store and receive a voucher as compensation. Additionally, Worten buys used electronic devices from contracted suppliers that acquire them in big auctions or international trade-ins.

When the used devices arrive at the TSC, they can enter according to two different flows: "ready to sell" or TSC Reuse. The sourcing of the devices that enter by "ready to sell" is done by two specific suppliers that guarantee the quality criteria aligned with Worten. Hence no further action is needed, and they can be sold to the customer without further treatment.

The TSC Reuse process consists of three stages: diagnosis, refurbishment and certification. The devices that enter through this flow are first assessed during the diagnosis stage. They are subject to control tests, and aesthetics and functionality will be assessed. After this assessment, they will be classified as *ready* or *not ready*:

- If a device is considered *ready*, it successfully passes the diagnosis stage, indicating that it does not have any functional defect continuing right away with the certification.
- If a device is considered *not ready*, it needs treatment and enters the refurbishment phase.

Sourcing of spare parts

To have accurately estimate the need for spare parts, Worten implemented a sales and operation planning process in July 2021, that ensures monthly planning. It is "a process for better matching a manufacturer's supply with demand" during which sales and operations teams work together to develop a production plan based on predictions of demand and availability (Essex n.d.).

Treatment

In case a device was considered not ready in the diagnosis phase, a technician will diagnose the

device. This means he or she will indicate how much money is needed in order to repair the device, and then specifically how much it will cost to refurbish it to a specific grade. Subsequently, the information will be transmitted to sales and an answer will be requested. Then, the sales team decides whether the phone should be repaired and what grade the phone should be classified as in the end. After answering the request, the phone and the diagnosis automatically enter the process, which means that the spare parts needed for the required repair measures are automatically requested from the warehouse, transmitted to the TSC, and then packed together with the device. Afterwards, the device will enter the refurbishment process and the different stages, where different technicians treat and repair the device, in order for it to be tested for quality one final time and sent to the store to be sold.

Expertise

The refurbishment process is certified according to *ISO 9001:2015*, reinforcing the confidence of customers in the entire process. This is also a competitive advantage for Worten, since no other retailer has this certification in Portugal (Worten 2021). The Technical Service Centre currently refurbishes iPhones, Apple Watches, iPads and notebooks.

***Worten Reuse* – Scaling up for a sustainable future or just a pilot project?**

Towards the end of the meeting, Ana and Maria decided to reflect on the current challenges of *Worten Reuse*. While taking the progress of the project into account, it appeared to be a success as they were able to establish themselves in the market. Nevertheless, they were not really able to express the success in quantitative terms, since they were lacking performance indicators for *Worten Reuse*. Ana and Maria discussed how they could measure the success and started by looking at the utilization of the TSC. They realized, that the utilization was low at only 37.5%. Six technicians refurbish approximately 1000 phones each week, while the capacity would allow for 16 technicians to refurbish more than 2500 phones each week. Three underlying reasons were identified: the lack of technicians, the reduced supply of spare parts and, most

importantly, the low supply of used devices to refurbish.

While the first problem was already being tackled by establishing relationships with professional technical schools and allowing students to do internships, the two other problems appeared to be more difficult to solve. As elaborated earlier, resource scarcity was an ongoing problem for the overall electronics industry. Ana and Maria agreed that *Worten Reuse* constituted a first step towards reducing resource scarcity. The third problem, the low supply of used devices, is being tackled by diversifying the collection methods: collecting used phones in the stores and buying them from suppliers. However, these efforts appeared not to be sufficient, given that demand and capacity were still exceeding supply.

Having started with refurbishing iPhones only, the product line was extended to Apple Watches, then iPads and MacBooks. Further extensions were planned to improve the utilization and profitability of the TSC. However, Ana and Maria were dreaming of extending this pilot project by providing customers with more high-quality electronic devices available at achievable prices. The opportunity to expand the project to other brands would result in opening up to a new market while contributing to a more sustainable future. Still, it was questionable whether this business could be profitable given the market size and the residual value of consumer electronic devices of other brands.

Their main goal was to scale up the project, supply needed to be guaranteed, and as the demand appeared promising, they want to attract more possible buyers, e.g. via increasing the number of sales made online. The thought was intriguing: generating additional and diversified income streams while contributing to sustainability. Ana and Maria needed to consider some questions to convince the CEO to scale-up the project: Is the market for refurbished devices attractive in the long-term? Does Worten have a competitive advantage over other players?

Evaluation Report *Worten Reuse*

1 Introduction

The following research question is guiding the Master's thesis: How can businesses make use of circular economy to tackle the challenge of sustainable growth in the long term? The case study has demonstrated how Worten has implemented a project contributing to sustainability by promoting circular economy. However, some challenges remain to be solved by Worten to be able to scale up the project and contribute to a long-term shift towards incorporating circular economy in the electronic retailer business.

In order to provide meaningful recommendations on different aspects of the project, the first part of the Evaluation Report will consist of a literature review, a market assessment and an assessment of the competitive environment. To give an insight into how recommendations have been derived, the methodologies used to get further insights and ideas will be described. Following, recommendations will be given based on the research results. The evaluation report will conclude with a summary of the key findings and limitations.

2 Consumer Behavior

Consumer Behavior is the term used to describe "Those acts of individuals directly involved in obtaining, using, and disposing of economic goods and services, including the decision processes that precede and determine these acts" (Engel, Kollat and Miniard 1986, 5).

It is critical for manufacturers and service providers to study consumer behavior to understand how customers decide purchase. It is useful to gain a broader understanding of the buying and discarding process as it can result in a significant advantage over competitors, if the product or service is produced and marketed according to the factors influencing consumer behavior. Therefore, drivers for consumer behavior are identified and used to guide the recommendations. Different models have been developed to study and explain consumer behavior and there is no scientific consensus on which specific drivers shape consumer behavior. Summarizing existing research, the following categories have been derived by the European Environment Agency

(2020) *(please refer to Appendix H for a visualization of the drivers)*:

2.1 Economic factors

In general, economic include the buying price including associated costs, the disposable income, as well as the perception of uncertainty and risk associated with buying the product or service. It also includes the perception of value that the consumer associates with the product and the valuation of benefits and costs now versus the benefits and costs in the future. Oftentimes, economic factors are referred to as being the most important driver for consumer behavior (European Environment Agency 2020).

2.2 Fit between needs and offering

This category refers to the fit between the needs and desires of the customer and the extent to which these can be met by the service or product. Often, aspects such as the quality, performance and general characteristics of the product, but also availability are included in this driver. It is essential to study the needs of the customer to provide services and products that meet these needs (European Environment Agency 2020).

2.3 Information used for choices

The consumer wants to make informed decisions. The information that is needed to make an informed buying decision includes for example information about the distinctive characteristics of a product or service, information on the availability of the product or service, but also the impact that their decision will have. It is essential that the information is not only available, but that the customer can understand the information for the decision-making process (European Environment Agency 2020).

2.4 Preferences and beliefs

Preferences and beliefs include additional aspects of needs, that are not directly associated with the use of the product or service. Convenience, prestige, brand loyalty, personal values and environmental impact can influence consumer behavior. Preferences and beliefs are difficult to

change, since they are often rooted in cultural norms (European Environment Agency 2020).

2.5 Social factors

Social factors are rooted in practices and social norms by the respective group that a consumer is part of. These can include examples made, decisions made and beliefs communicated by role models or reference groups. Changing social factors is difficult as well, since they develop through individual psychology and the way that a personality is developed (European Environment Agency 2020).

While economic factors are often perceived to be the most important in influencing consumer behavior, marketing techniques often refer to social factors and preferences and beliefs, even though these are more difficult to influence. The terms do overlap and it is possible that other factors contribute to the decision-making (European Environment Agency 2020).

3 Market Analysis

In the case study, the market for consumer electronics and refurbished devices is described from the perspective of when Worten first entered the market of refurbished devices in 2019. To be able to provide recommendations, an analysis of the market in 2022 is needed. This analysis includes the market for consumer electronics, the market for refurbished devices and the competitive environment. Developments of e-commerce and circular economy are presented.

3.1 The Market for Consumer Electronics

The market for consumer electronics has been growing since 2019. While revenues in 2019 amounted to US$ 1,020 billion (bn), they continued to increase to US$ 1,112 bn in 2021, indicating an increase of over 13% since 2018. Comparing the two time spans 2015-2018 (an increase in market revenue of 10%) and 2018-2021 (an increase in market revenue of 13%), it is evident, that growth has increased even more in the second period. For 2022, a small decrease in revenue of approximately 2.2% is expected compared to 2021, however, the market is expected to grow further in the future. In 2025, global revenues of US$ 1,132 bn are expected,

indicating an increase of almost 7% over a time period of 3 years since 2022. This indicates that even though the market is expected to grow further, growth will slow down compared to the growth experienced in the past (Statista 2022) (*please refer to Appendix I for historical data and a future outlook on the market of consumer electronics).*

3.2 The Market for Refurbished Electronics

The global market for refurbished electronic devices amounted to revenues of US$ 85.42 bn in 2021 and is expected to grow in the future. Over a time period of ten years, the market is expected to grow at a compound annual growth rate of 12.1% and will reach an approximate market size of US$ 272.91 bn in 2031 (Transparency Market Research 2022).

High market growth rates are expected, as demand is driven by the affordability and sustainability of refurbished devices. Devices are made available at an up to 60% reduced price compared to the price of the device brand new. Furthermore, warranties are provided, which increases the attractiveness of refurbished devices (Transparency Market Research 2022). Recent market analysis by sellcell.com, published on Statista, shows that around 80% of refurbished phones sold are from Apple, with the iPhone XR accounting for 10% in the United States of America (USA). Out of the 20 models mentioned only 6 are not by Apple with the Samsung Galaxy S9 Plus being the most successful, accounting for 4.5% of refurbished phones sold. The ranking mentions only three brands: Apple, Samsung and Google (Laricchia 2022).

3.3 The Competitive Environment

To provide meaningful recommendations, the competitive environment and practices of competitors need to be assessed. The main competitors in the market are presented, their practices are analyzed in the analysis part of the recommendations. Many practices across competitors are alike, while others differ. While for example all competitors classify their devices into grades according to their condition, the grades vary *(please refer to Appendix J for detailed information about the grades among competitors).*

Swappie is a Finnish company that specializes in refurbishing and selling iPhones. The company started operating in Portugal in June 2020, distributing iPhones only online via their website (Swappie n.d. - a). By doing the refurbishment process in-house, the company can ensure the quality of all goods offered on its website, cutting down on costs and environmental impact while boosting consumer satisfaction (Durand 2020).

Forall Phones, a Portuguese company established in 2015, is another competitor that operates in the circular electronic devices economy (Forall Phones n.d. - a). Forall Phones sells its products in physical stores and online (Rodrigues 2020). This company aims to facilitate access to the best technology at a cheaper price, selling used smartphones and other technological equipment up to 50% cheaper compared to the price for a new device, through an experience close to the customer (Forall Phones n.d.- b).

Fnac, originally from France, started operating in Portugal in 1998 and is recognized for its offer of cultural and technological products available in 36 stores in Portugal. In addition to the diversity of products available in its stores, FNAC offers numerous services to its customers, including the FNAC laboratory, the FNAC Clinic and the MarketPlace (Fnac n.d. - a). Fnac Restart a program to refurbish devices launched in 2020. It is a program that aims to give a second life to used equipment, promoting savings of more than 60% in the purchase of technological equipment, when values are compared to new products (Grande Consumo 2022).

Apart from direct competitions, *Worten Reuse* competes with indirect competitors like *online marketplaces.* These are e-commerce sites that connect sellers with buyers, where transactions are managed by the website owner. Companies and sellers use online marketplaces to reach customers who want to purchase their products and services (Sana n.d.). Companies like *Amazon, eBay and OLX* are examples of relevant marketplaces operating in Portugal (AICEP 2022). In addition to the previously mentioned companies, *Back Market* a leading online marketplace for refurbished devices operates in Portugal since 2021 (Back Market n.d.). Worten

itself also provides a marketplace, where in addition to *Worten Reuse* devices, refurbished devices by other brands are sold *(please refer to Appendix K for a competitor overview)*.

3.4 Circular Economy in the European Union

While the EU has already promoted the transition to the sustainable model of circular economy in 2018, the efforts have increased more recently. In December 2019, the Commission has presented the New European Green Deal, already aimed at promoting circular economy (European Commission n.d. - b). In addition to that, the European Commission has launched the new Circular Economy Action Plan in March 2020, which will require businesses to rethink their business practices, especially industries that are mainly linear, like the electronics industry (European Commission 2020c, Gerhardt and Ageyeva-Furman 2022). Most recently, in March 2022, the European Commission presented a package of proposals, including a proposal on "making sustainable products the norm" (European Commission 2022a). This proposal reinforces the importance of circular economy in the consumer electronics industry, by promoting the extension of the eco-design directive to include more products and extend the requirements for products concerning aspects like durability, reparability, and recyclability. Furthermore, it is mentioned that the Commission is analyzing options to incentivize the collection and return of small electronics that are often stored at home when replaced. The Commission aims to prolong lifetimes, increase collection rates and finally boost circular economy (European Commission 2022a, European Commission 2022b, European Commission 2020) (*please refer to Appendix L for more detailed information on actions taken by the EU).*

3.5 E-Commerce

The global consumer electronics e-commerce market experienced growth at a compound annual growth rate of 14% from US$ 473.21 bn in 2021 to US$ 539.46 bn in 2022. Further growth at a compound annual growth rate of 11.2% is expected, amounting to US$ 825.39 bn in 2026. This growth can be explained by changing consumer behavior, as consumers are shifting from

offline to online shopping. Almost 53% of the global population is connected to the internet. Internet connectivity has presented an opportunity for convenient shopping anytime and anywhere. Internet accessibility, mobile technology, and digital innovations are changing consumers' shopping experiences and even high-value products like electronics are increasingly bought online (The Business Research Company 2022).

In Portugal, information technology and electronic devices constitute the category with the second biggest demand among e-buyers, attracting up to 50% of online consumers. Moreover, consumers tend to conduct online research before buying in store. This especially applies to household appliances and electronic devices like mobile phones (CTT 2022).

The described developments not only confirm that the challenges described in the case are still valid, but their importance has amplified over the past years. A shift from linear business models to circular business models is required, not only to enable economic growth for corporations in the long term but to improve the circulation of resources and prolong lifespans, which contribute to environmental sustainability (Murphy 2021).

4 Derivation of Challenges for *Worten Reuse*

The aforementioned description of the development of the market and consumer behavior in general, result in several challenges for the refurbished market and *Worten Reuse* in specific.

4.1 The Market for Consumer Electronics

While the increasing demand for consumer electronics and the uncertain supply of precisely these present great opportunities for players that sell refurbished devices, some challenges can be identified as well. Companies that refurbish devices are less dependent on international supply chains, however, there is still a certain dependence due to the need of spare parts which are often difficult to source for refurbishers (Watson, et al. 2017). Disruptions of supply chains might exacerbate this challenge. Additionally, increasing energy prices also have an impact on the price of refurbished devices. Even though less energy is needed to refurbish devices than to

produce devices which also includes the extraction of resources, transportation etc. (European Environment Agency 2020, IPC 2022), an impact might be observed.

4.2 The Market for Refurbished Devices

One challenge that has been identified earlier in the case study itself is the limited supply of used devices, which finally leads to a limited supply of refurbished devices. Consumers are currently lacking interest in trade-in and buy-back programs and prefer to store their used devices at home or give them to relatives. This can be explained, amongst other reasons, by the lack of trust that consumers might have related to data security. Many consumers prefer to store used devices at home, as they are not sure whether all their data will be treated confidential and removed accordingly (Watson, et al. 2017).

This leads to the second challenge, the varying quality of used devices. Used devices that are in a good condition are easier to refurbish, which makes refurbishing them economically more viable (Watson, et al. 2017). Another challenge that should be considered is the consumers desire to replace older models to acquire and own a technically more advanced and new product. This could negatively impact the demand for refurbished devices since mainly older models are refurbished (Laricchia 2022, Toogood 2021).

In addition to the aforementioned challenges, a skilled workforce with knowledge around the refurbishment process is needed to enter the business of refurbishing devices. Companies need to devote significant resources to invest in facilities, machines and other assets needed for the refurbishment process, as well as logistics, planning etc. (European Parliamentary Research Service 2018, Watson, et al. 2017).

4.3 The Competitive Environment

Several new players have entered the market since 2019. Increased competition leads to challenge in terms of demand, but also supply. Even if demand for refurbished devices is expected to continuously grow over the next years, it is unclear whether more used devices will

be available to refurbish them. The arising challenge is to ensure to attract consumers by offering a competitive advantage over other players in the market, both, to sell refurbished devices and to attract sellers that trade in their used devices.

4.4 Regulations promoting circular economy in the EU

Not all measures that contribute toward a shift to a circular economy, are favorable for refurbishing devices. While regulations enforcing the right to repair contribute greatly to simplifying the process of refurbishing, a consequence might be that consumers first repair their devices before buying new devices. This could lead to a prolonged lifetime of electronics, thereby decreasing the availability of used devices to refurbish. Informing customers about the desired lifetime of a product might also influence them to use products longer, which intensifies the already persistent problem of supply of used devices to refurbish them (Chatterji 2022).

4.5 E-Commerce

One major issue impeding the expansion of this sector is the establishment of an integrated end-to-end logistics infrastructure for the delivery of products ordered online. Infrastructure, transportation, delivery modalities and warehousing work differently in different locations. Another logistical challenge for retailers is coordinating same-day and next-day delivery services, while simultaneously managing change requests for time slots (The Business Research Company 2022).

The challenges derived are used to develop recommendations. Other methods have been used to gain additional insights and contribute to solving the challenges identified by Worten.

5 Methodology

Different methods were used to conduct research: internal interviews were conducted, a literature review was performed, *Worten Reuse* was benchmarked compared to its main competitors and a survey was conducted. Quantitative and qualitative data were gathered using these methods, in order to gain a better understanding of consumer behavior, the market for

consumer electronics and the market for refurbished devices including the competitive environment.

5.1 Internal Interviews

In order to gain a deeper understanding of the development of *Worten Reuse* and the market for refurbished devices in general three detailed internal interviews were conducted. Two interviews were conducted online and lasted for one and a half hours each. One interview was done with Ana, responsible for the store concept and sustainability at Worten, and one interview was done with Maria, the commercial manager of *Worten Reuse*. Additionally, Rui, responsible for Worten's TSC, was interviewed in person. A visit to the TSC was made to conduct an interview and visit the manufacturing site of *Worten Reuse*, to understand processes better. During the time of the thesis Ana and Maria were available to answer questions via mail or call. The names used in the case are fictional.

5.2 Literature Review

An extensive literature review was conducted to gain a broader understanding of the market for consumer electronics and refurbished devices. While conducting the literature review several topics relevant to the thesis have been identified including the following: challenges for the consumer electronics market like e-waste or resource extraction and efficiency, regulations promoting circular economy and e-commerce. Furthermore, the competitive environment was analyzed, taking into account the buying and trading-in processes for each competitor. Results of the benchmarking will be presented and analyzed for each recommendation, respectively.

In addition, the theoretical framework of consumer behavior was analyzed, to be able to explain developments and backup recommendations.

5.3 Survey

Since the availability of information on the market for refurbished devices is limited, it was decided to conduct a survey to gain a better understanding of consumer preferences and

behavior concerning trading in consumer electronics and buying (refurbished) consumer electronics. A survey was conducted including 26 questions, out of which 6 were of demographic nature. The questions were of different style: single choice, multiple choice, five-point Likert scale, preference ranking, and open-ended. The survey was aimed at individuals that currently live in Portugal or have lived in Portugal in the past, since their consumption patterns are more relevant to analyze opportunities within the Portuguese market.

In total, 197 valid responses were collected and the analysis of the sample n=197 was conducted using Excel. Most respondents are aged between 18-24 years or 25-34 years, which indicates that the sample rather represents a younger population. Approximately 68% of the respondents identify as women, 31% identify as men, and 1% identifies as non-binary. Most respondents, almost 90%, indicate that they live in an urban area. On average, survey participants indicate that they are familiar with the topic of sustainability and with technological products in general. The majority of participants completed education of high-school level or higher, with 67% of the sample indicating they have a Bachelor's or Master's degree.

6 Analysis and Recommendations

The overarching goal of the report is to develop recommendations that can contribute to the scale-up of *Worten Reuse*. The main challenges that hinder further growth in the area, as identified by Worten, are the supply of used phones and spare parts, as well as the lack of a skilled workforce. While the second problem is already being tackled, the first problem related to supply still needs to be solved. Additionally, other aspects that could contribute to an improvement and scale-up of *Worten Reuse* are assessed. After a thorough analysis of *Worten Reuse* itself, the market it operates in, as well as a literature review, several challenges and opportunities were derived. These resulted in four main goals: 1) optimizing the trade-in process; 2) diversifying the sources of supply; 3) expanding the portfolio; and 4) improving the online customer journey. As a next step, research results are presented for each goal and

respective research methods, followed by recommendations on how to implement this goal.

6.1 Optimizing the trade-in process

As determined by Worten, more used devices are needed to scale-up *Worten Reuse* as currently demand exceeds supply. One important and profitable source for *Worten Reuse* to secure supply of used devices is the trade-in program. Improving and expanding precisely this could contribute to the profitability and expansion of the whole project.

6.1.1 Research results

Literature Review

According to the literature reviewed customers lack interest in trading in devices, because of missing trust, thus creating a barrier to do a trade-in for many customers. Instead, customers prefer storing their used devices at home since they are concerned for the security of the data (Watson, et al. 2017). Furthermore, if regulations change and the right to repair will be adopted, customers might decide to repair devices and keep them longer, which could lead to overall prolonged lifetimes of consumer electronics. In addition, if customers are informed about the lifetime they can make conscious decisions since more information is available, and also might decide to use devices longer instead of trading them in for a new device (Chatterji 2022).

Benchmarking

The players in the market conduct the trade-in process differently, and offer alternative options for rewards in return for the used device. While *Worten Reuse* only offers a voucher in return for the device traded in, at Fnac the seller can either decide for cash or a gift card that is valid for one year (Fnac n.d. - b). When trading in a device at Swappie, the seller receives money on its bank account. At Forall Phones and Apple, the seller can only trade in a device when buying a new device of higher value. The value of the trade-in will then simply be deducted from the purchase (Forall Phones n.d. – c).

Except for Swappie, where devices are traded in online via mail (Swappie n.d. - b), Worten,

Fnac and Forall Phones do the trade-in in a physical store (Fnac n.d. - b, Forall Phones n.d. - c, Worten n.d. - b). At Apple, the trade-in can be done in-store and via shipping.

Survey

The survey provides more detailed information on the trading-in of devices. Firstly, only 17% of participants (33 participants out of 197) have ever done a trade-in somewhere (*please refer to Appendix N for information on the devices that participants traded in)*.

Approximately 63% of consumers (123 participants) answer that they store their used devices at home, 39% (76 participants) indicate they give their used devices to relatives and 25% (50 participants) indicate that they sell used devices privately (please refer to Appendix M Q.10). Secondly, participants were asked where they did the trade-in of used devices. When studying these answers, it appears that 64% of the participants did the trade-in with other competitors, not included in the survey. When studying these answers in more detail, 27% of users traded in a device with Apple, outside of Portugal, since Apple itself does not allow for this option in Portugal (yet). The second largest group was people that traded in a device at Fnac, with 24%. Only 12% of those who ever did a trade-in, did it at Worten. A minority of respondents traded a device in at Swappie, Forall Phones, Back Market or Fairphone, while five persons indicated they traded a device in at a local store or within the community (*please refer to Appendix O for a list of how many people did a trade-in at which store).*

All participants that did the trade-in with Apple indicated convenience as a reason why they have done the trade-in there. Two out of nine also indicated that they did not know about other companies offering the trade-in option, and another two out of nine indicated that they did the trade-in as they were informed about it on the spot when they had bought a new device. The participants that did the trade-in at Fnac indicated that they did it because Fnac offered the best price, or because it was suggested by family members and friends. One person indicated that they did it at Fnac because they offered money instead of a voucher. Two of the four participants

that did a trade-in at Worten indicated that the main reason was the price, and the other two indicated that the main reason was convenience. Irrespective of where the trade-in was done, the main reason why people chose to do the trade-in where they did it was “Convenience”, followed by “It offered the best price” and “Suggestion of a friend/family”. The majority of participants (76%) would prefer to do the trade-in in-store instead of shipping it (please refer to Appendix M Q.25)..

6.1.2 Recommendations

R1: Convenience - From the survey and the benchmarking, several takeaways result in the recommendation to make the trade-in process more convenient and implement similar practices as Apple. This can be done by allowing consumers to transfer the data from the used-device to the new device, before doing the trade-in process. Consumers at Worten have to trade in their device first and receive a voucher afterwards. At Apple, the used device is evaluated, the customer is told how much the device is worth, and then continues to choose a new device. The data from the old device is transferred to the new device and the data on the used device is deleted in front of the customer as soon as it is transferred to the new device. The customer finally pays for the new device at the price reduced by the residual value of the used device. Offering a service like this, could greatly enhance convenience and motivate people to trade in a device at Worten. This appeals to the economic driver of consumer behavior, since maintenance costs, disposal costs and upgrade costs are reduced simultaneously, while considerably reducing time investment, as the device is fully functional when leaving the store.

R2: Reward - Another option to improve the process is to offer money in return for a trade-in instead of a voucher. This opportunity gives the seller freedom of choice regarding what the money is used for, and could also improve convenience since the customer can first buy the new device, complete the data transfer at home, continue to trade in the used device and receive some amount of money. Since consumer behavior is strongly influenced by economic reasons,

this could greatly contribute to the consumers' willingness to trade in a device.

6.1.3 Risks

Following these recommendations could help Worten ensure the supply of used devices that can be used to refurbish them. However, making the trade-in process more convenient and changing Worten's practices takes time to introduce and processes need to be established first. Having personnel deal with customers for a longer period of time will be more expensive.

If money is offered instead of a voucher, Worten could lose additional income, since the customer has the choice to spend the money received elsewhere. It is possible that a customer trades in a device at Worten and continues to buy a new device at another store that offers a slightly better price. It is crucial to do a trade-off between the advantages and disadvantages of the recommendations made.

6.2 Diversifying sources of supply

Next to the trade-in program, Worten should try to further diversify the sourcing of used devices to decrease dependency and risk, while enhancing the opportunity for growth. Different sourcing methods can contribute to a successful sourcing strategy.

6.2.1 Research results

Literature Review

Since literature indicates that consumers lack interest in trading in devices, it is reasonable to extend and diversify sources of supply (Watson, et al. 2017). Diversifying the supply options for used devices contributes to less dependency on a single company, which could greatly improve Worten's operations in the long-term. The sourcing of spare parts, which is often perceived to be difficult (Watson, et al. 2017), can be simplified by using other devices not suitable for refurbishment and dismantling them. Dismantling is likely going to be simplified with the introduction of the right to repair (European Commission 2022a).

Benchmarking

Competitors in the market have different approaches to the sourcing of used devices. In general, most competitors offer either a buy-back program or trade-in program to receive used devices. An alternative approach used by Fnac and Swappie is to buy used devices from international suppliers and further Fnac and Forall Phones are using devices that previously were displayed in stores (Blog FNAC Expert 2021). As described in the case, refurbishers like Worten and Swappie buy used devices from large corporations, that are working together with leasing companies and telecommunication providers, collecting used devices to then resell them in large amounts.

As opposed to other competitors, Swappie also makes use of devices that cannot be refurbished, by using single parts as spare parts for refurbishing other devices, fully integrating principles of circular economy (Swappie n.d. - c). Forall Phones further refurbishes devices that were returned during the immediate post-purchase phase or phones from determined corporate leasing contracts (Forall Phones n.d. - a).

6.2.2 Recommendations

R3: Partnerships – Worten Reuse could diversify their supply of used devices by cooperating with leasing companies directly, without having the beforementioned corporation as an intermediary. These partnerships might be difficult to establish since leasing companies mostly work together with these large corporations, where Worten, Fnac and Swappie buy the used devices now. Having a first mover advantage, these companies established relationships with these leasing companies and have a greater bargaining power. However, smaller leasing companies can be approached first which might be willing to work with *Worten Reuse* directly if better terms are offered.

R4: iServices – Worten has recently acquired iServices. Nevertheless, iServices' refurbished products are sold via the general marketplace that Worten provides online. Instead, refurbished products of iService could be included in Worten Reuse, if the same quality standards apply. If

organizational structures allow for the merger of the programs synergies can be achieved.

6.2.3 Risks

A risk that is entailed when partnering with external entities is the quality of devices, which would need to be guaranteed to avoid similar problems as those that Worten had faced earlier. Including iServices' devices within the green loop and *Worten Reuse* poses some risk as operations need to be handled in terms of logistics. In addition, the same problem related to ensuring the quality of devices applies. Nevertheless, devices that do not fit the criteria for refurbishment can be dismantled and used to generate spare parts. However, it could be a great opportunity to decrease bargaining power of international suppliers and reduce dependence.

6.3 Expanding the product portfolio

Currently, *Worten Reuse* only refurbishes products from Apple, and only a limited product range. Expanding this portfolio could greatly contribute to the attractiveness of *Worten Reuse* to different customers.

6.3.1 Research results

Literature Review

According to the literature analyzed consumers have a desire to replace their devices to own newer models, even if technological advancement is not significant (European Environment Agency 2020, Watson, et al. 2017). However, at Worten, mostly older models are refurbished and available to the customer.

In addition to that, the right to repair that could be applied to the EU in the near future. It will contribute to a simplified process for refurbishing devices, since producers need to construct devices for an easy dismantling and repair process (European Commission 2022) (European Commission 2022).

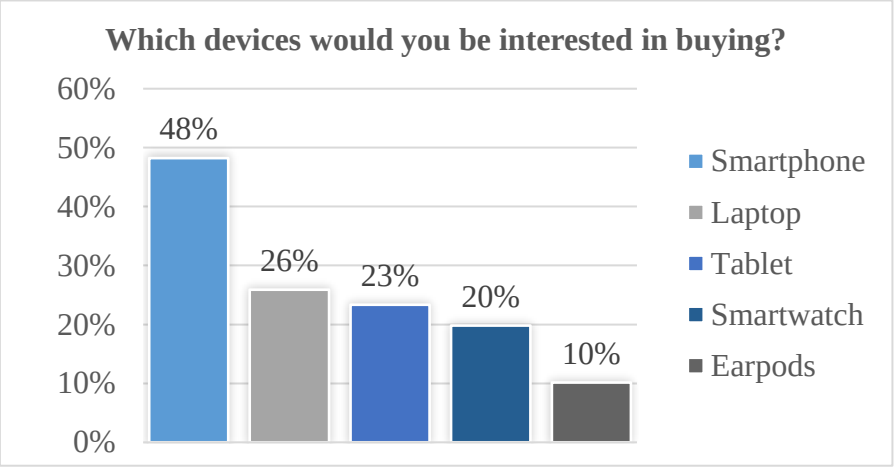
Benchmarking

The different competitors offer a variety of products. While all of the competitors refurbish

iPhones, they differ in product range. Swappie offers the greatest range of models ranging from iPhone 7 to iPhone 14 Plus. While *Worten Reuse* also focuses on Apple, they also offer other devices including Apple Watches, iPads and MacBooks. However, the models offered are more limited and less recent. In addition to an extensive offering of Apple products, Forall Phones also offers Kindles, the e-readers from Amazon. Fnac Restart offers the greatest variety of products. The customer can buy refurbished devices from Apple, but they also offer Samsung smartphones and Playstation game consoles. Even though Fnac Restart provides the greatest product range, options for models are very limited *(please refer to Appendix P for an overview).*

Survey

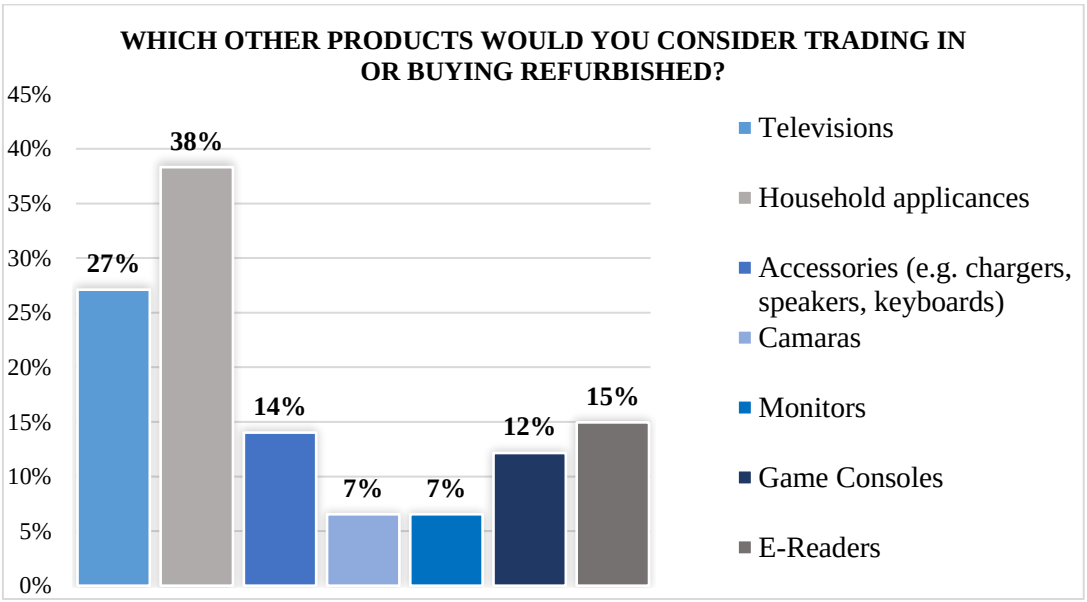
A total of 66% of respondents claimed that they would be interested in buying refurbished devices (please refer to Appendix M Q.17). When asked what products they would be interested in buying refurbished, given the option of choosing among five devices (smartphone, laptop, tablet, smartwatch and earpods) 48% of respondents chose smartphones, followed by laptops, tablets, smartwatches, and finally earpods in exactly this order of preference (refer to ex.1 for further details).



Ex.1: Interest in buying refurbished devices (*consult Appendix M Q.26 for more details*)

Participants were also given the option to indicate what other products they would consider buying refurbished, apart from the ones mentioned in the survey. Survey respondents indicated that they were mostly interested in household appliances and televisions, with 38% and 27%,

respectively. Additionally, interest in e-readers, game consoles and accessories (like speakers, chargers or keyboards) was voiced (please refer to ex. 2 for further details).



Ex2. Suggestions given by respondents on other products to buy refurbished (*consult Appendix M Q.26 for more details*)

More than 50% of survey respondents voiced an interest in buying products from brands other than Apple (please refer to Appendix M Q.19 for further details).

6.3.2 Recommendations

R5: Newer models – Worten Reuse's product portfolio can be expanded by adding additional and newer models of the devices already provided. This is especially relevant for refurbished smartphones since interest for them was voiced most frequently. Analyzing the competitive environment, all of the players offer more recent models of the iPhone. Fnac also stands out from the other competitors by offering high-end models of Samsung smartphones. *Worten Reuse* should therefore update its offer of iPhone models to more recent models.

The survey indicates that smartphones are replaced most frequently, which can according to literature be explained by the consumers desire to offer the newest device. Introducing more recent models could increase demand significantly. Since to refurbish devices first used devices need to be available, *Worten Reuse* could wait 2 years after the introduction of a new model to

then refurbish it. Consumers usually replace their smartphones after approximately 2 years, taking into account literature and the survey. This strategy can also be used with the other Apple products offered, as well as products of other brands where this rationale may apply.

R6: Additional brands - Another course of action would be to introduce high-quality products that are similar to the ones already being refurbished, like smartphones from other brands than Apple. The portfolio can be expanded to include devices like the Samsung Galaxy (models S9, S20 and S21). Models of the brand Samsung are already refurbished by competitors, which indicates that it is feasible to refurbish them and a certain demand exists. The models mentioned have a relatively high residual value and were identified amongst the mostly bought refurbished smartphones in the USA. Samsung was the second most mentioned brand when survey respondents had to indicate from which brand they usually buy smartphones. Therfore, starting with Samsung devices is reasonable.

R7: Different devices – Another solution to expanding the product portfolio would include refurbishing products of a different category. Survey respondents showed an interest in buying refurbished televisions and household appliances. Analyzing the product portfolios of competitors, other products like e-readers and game consoles are sold. *Worten Reuse* could therefore expand their portfolio to include devices like e-readers, game consoles, televisions and household appliances. However, knowledge for the refurbishment of such electronics needs to be acquired first. It is suggested that *Worten Reuse* firstly introduces game consoles and e-readers, since it appears to be feasible to refurbish them, as other competitors do it already.

In the long-term, Worten should identify what products can be easily refurbished and what products meet the needs of customers.

6.3.3 Risks

By following these recommendations, *Worten Reuse* could compete with broad range of products that direct competitors and marketplaces already offer. Additionally, they could pursue

a first-mover strategy to gain advantages in the area of household appliances and televisions. However, expanding the product portfolio to additional categories entails a significant risk. Substantial efforts need to be undertaken to acquire the knowledge to refurbish these devices and different machines and spare parts might be needed. It is also not clear whether the refurbishment of such products is technically feasible and economically profitable. Careful analysis of the market and practices is needed, monitoring developments closely. Furthermore, the survey results contradict the results of the literature review when analyzing the desire to own the newest model. Owning the newest model was the least important driving factor when buying a device for survey respondents, while price was considered the most important on average. A careful assessment is needed, how new the models should be and a trade-off with prices should be conducted.

6.4 Improving online costumer journey

When buying products online, ease of use of the website can greatly contribute to the customers buying decision. Simplifying the customer online journey could contribute to the goal to expand online sales.

6.4.1 Research results

Literature Review

As a result of the pandemic e-commerce has increased significantly, many offline customers have shifted to purchasing online (ChannelAdvisor 2022, McGillycuddy 2022). In most cases, shopping in online stores is selected for its convenience and simplicity (72%). It is influenced by several factors, two of them being a rational assessment of the price when you can compare the price of the same product or service in different stores, as well as prompt acquisition of product-related information. Companies should design their online strategies giving priority to customer orientation, particularly focused on the ease of use of online shopping (Baubonienė and Gulevičiūtė 2015). This assumption is supported, since one driver for consumer behavior

is the availability of information. Providing the customer with the needed information in an easily comprehensible form, can enhance the decision-making process for the customer (European Environment Agency 2020).

Furthermore, e-commerce businesses need to learn more about the discovery stage of the customer journey, adapting the page and offers to the customers accordingly (Sattler 2022).

Benchmarking

Assessing the websites of competitors, the website of Swappie allows for a very interactive and user-friendly customer journey. On the website, the customer is presented with all available models including as well as a picture and main characteristics *(please refer to Appendix Q for a picture)*. The customers can apply filters to find the specific product they need. When choosing a particular model, for example the iPhone 11, the customer can choose between different options, including the grade, color and capacity and can easily switch between the options. Possible changes in prices are indicated immediately *(please refer to Appendix R for a picture)* This feature allows customers to see what the price difference is when changing variables, simplifying the comparison and benchmarking process for the customer, by summarizing and making the information available on a single page. Forall Phones pursues a similar strategy, however limited in the variables, giving customers the option to choose between different condition categories only immediately *(please refer to Appendix S for a picture)*. If the customer wants to check price differences concerning the color or memory capacity, the customer needs to search for the device again.

Currently, *Worten Reuse* does not offer this option. On the websites, the different models in different colors, with different memory capacity and categorized into different grades are displayed individually, making it more difficult to compare prices. If the customer for example searches for an iPhone 11, several offers will be displayed, with changing variables.

6.4.2 Recommendations

R8: Simplify the webpage – By adapting a similar webpage like Swappie, Worten can enhance the customer online journey. Information are provided in a more comprehensible way, allowing the customer to assess the information more easily. On the webpage, *Worten Reuse* should just display different models. Only when clicking on the model they want to buy, the different options should be displayed, including the different options for the condition category of the refurbished device, the color options and the options for memory capacity. This allows the customer to make an informed decision *(please refer to Appendix R for an overview of how such a page could look like, compared to Appendix T for an overview of Worten's webpage).*

R9: On-site survey - Additionally, *Worten Reuse* could improve the costumer journey by making it more interactive e.g. through using an on-survey. These surveys mostly include questions and the option to provide feedback, mostly in a simple and short format (Dossetto 2022). *Worten Reuse* could introduce an on-site survey to collect feedback from customers. This information can subsequently be used to adjust the offer to the client's needs (for an overview of possible questions please refer to Appendix U). An analysis of the collected data can be used to develop a business plan accordingly.

6.4.3 Risks

By implementing these strategies, *Worten Reuse* could enhance the online customer journey, making information available more easily and engaging the customers. No major risks are involved with a restructuring of the website. Following the restructuring, the numbers of online purchases should be monitored closely, to understand whether the restructuring successfully contributes to increased online demand. If not, the decision can be reversed.

On-site survey could be interpreted as spam, or might be ignored by customers, nevertheless introducing such a survey is not costly and can be done easily. If no major conclusions can be drawn, the decision can be reversed as well.

7 Conclusion

The report at hand assess the environment in which *Worten Reuse* is embedded in more detailed. While the first attempt at the market of refurbished devices was not successful, with *Worten Reuse*, Worten has established a brand that can be successful in the market. Since *Worten Reuse* failed to establish a first-mover advantage, it has ample opportunity to establish a differentiation advantage. Guaranteeing the supply of used devices to refurbish them can greatly contribute to the expansion and overall profitability of the project. Recommendations were given, that can help to increase the supply taking two goals into account: the optimization of the trade-in process and the diversification of sources for supply. Firstly, making the process more convenient and trustful for the customer could motivate consumers to increasingly trade in devices. Additionally, economic reasons can motivate customers to trade in a device at *Worten Reuse*. Providing cash instead of vouchers could further enhance customer motivation.

If supply is secured, further demand needs to be established. Two overarching goals were established: expanding the product portfolio and improving the online costumer journey. *Worten Reuse* can achieve the first goal by refurbishing newer devices and similar devices as currently, but by other brands. In addition, *Worten Reuse* could sustain a first-mover advantage by expanding the portfolio to for example household appliances or televisions. *Worten Reuse* wants to increase the share of purchases made online. It was suggested that this can be done by simplifying the buying process, as well as making information for comparison more easily and comprehensively available to the customer. For a map of the expected impact of recommendations and the required efforts please refer to Appendix V.

Limitations

Several limitations apply to the report. The recommendations given need to be assessed for their technical and financial feasibility. Especially recommendations concerning expanding the product portfolio bear a higher level of risk. While the research approach incorporates several

methodologies, such decisions that entail a higher risk should be assessed, taking into account technical capabilities of the TSCs and requirements. Due to the limited scope of the paper, additional recommendations that had a less significant impact were excluded after the evaluation with Worten and internal assessment.

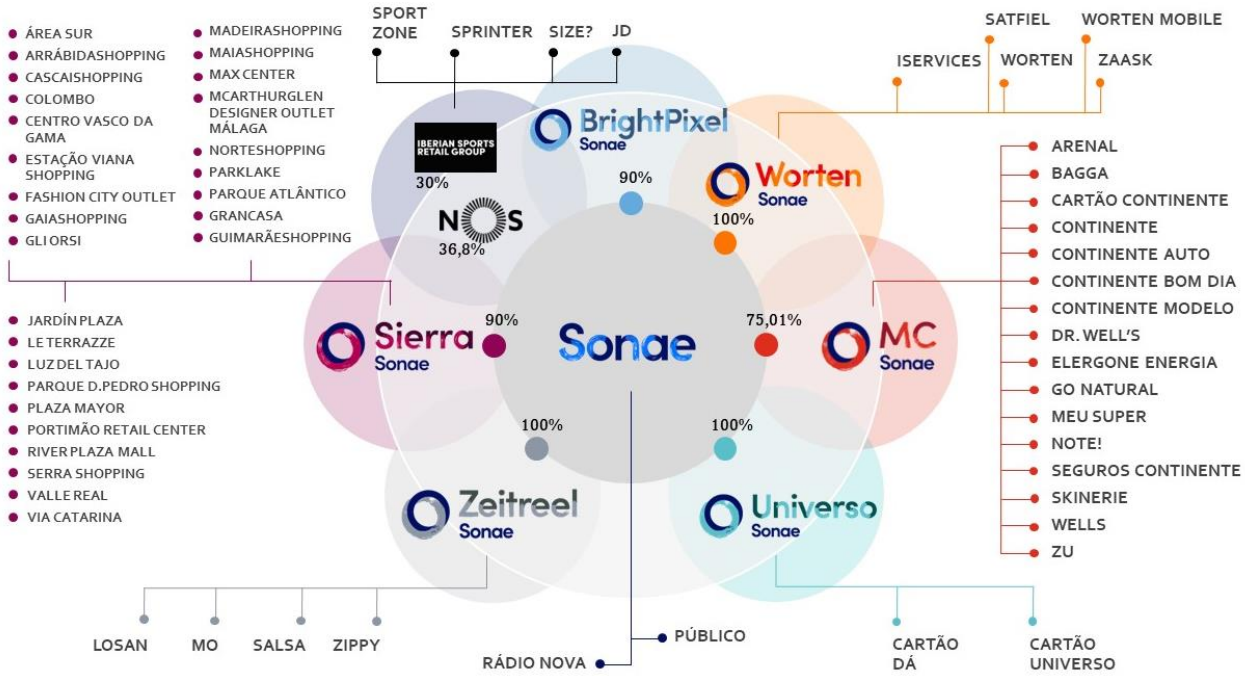
Unfortunately, Worten was unable to share quantitative financial information as well as qualitative information regarding their strategy, as no agreement on non-disclosure of the report could be reached between the Nova School of Business and Economics and Worten.

Next steps

In order to account for the risk identified, Worten should assess the recommendations made internally. Decisions should be made taking into account internal information that include performance measurement, but also technical capabilities. External interviews to analyze feasibility of some recommendation including especially the expansion of the product portfolio, could help to get further insights and assess likelihood of success if the recommendation is implemented. Overall it is suggested to design a roadmap to implement the recommended measures.

Appendix A

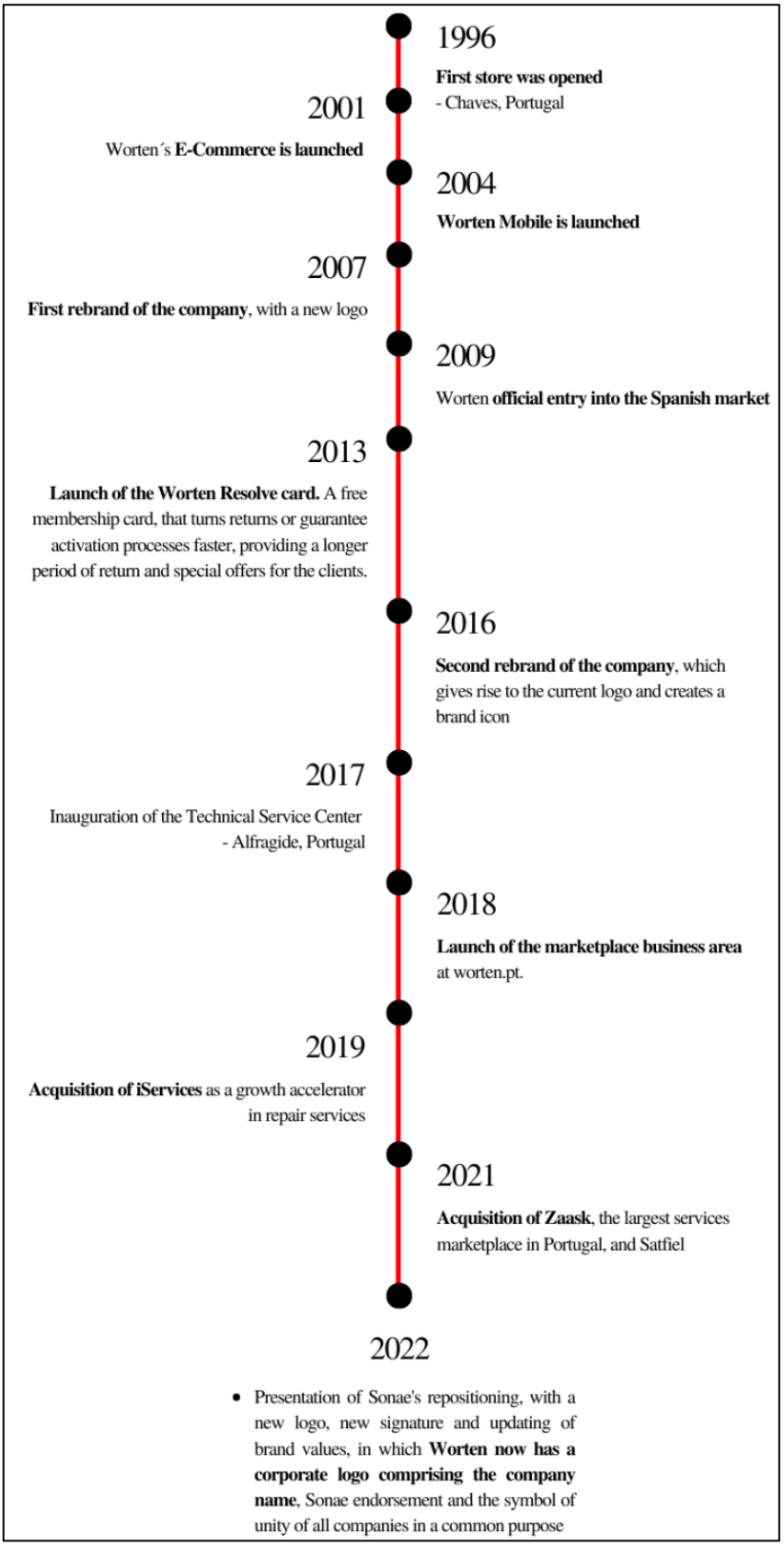
Organizational Chart Sonae Group



Own illustration based on (SONAE SGPS n.d. – a, SONAE SGPS n.d. - c)

Appendix B

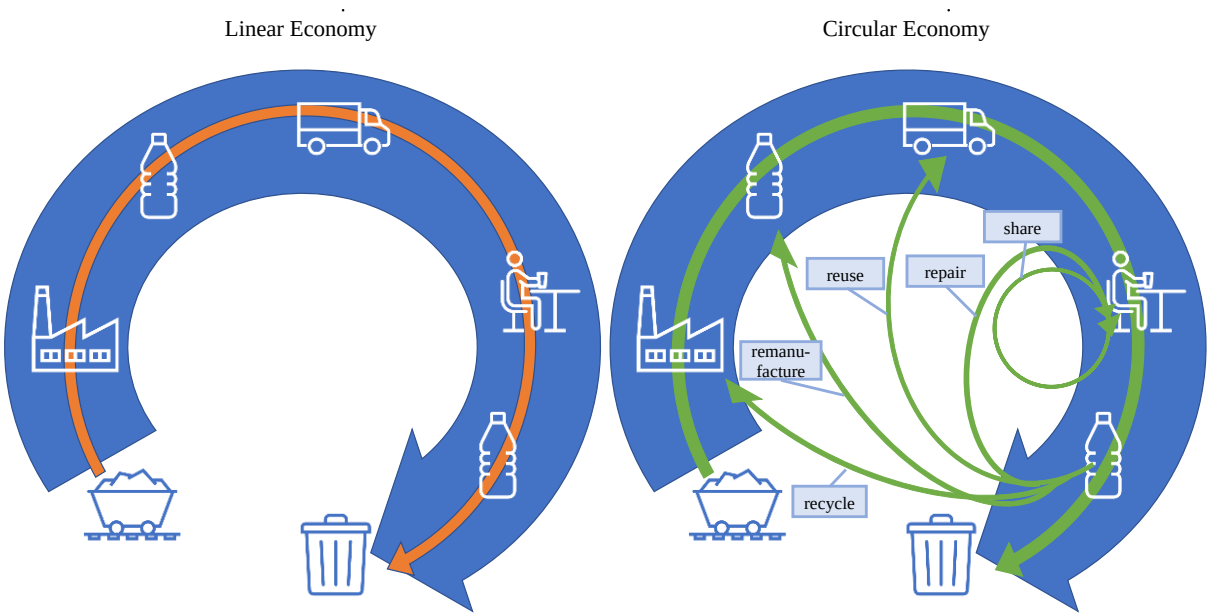
History of Worten



Own illustration based on (Worten n.d. - b)

Appendix C

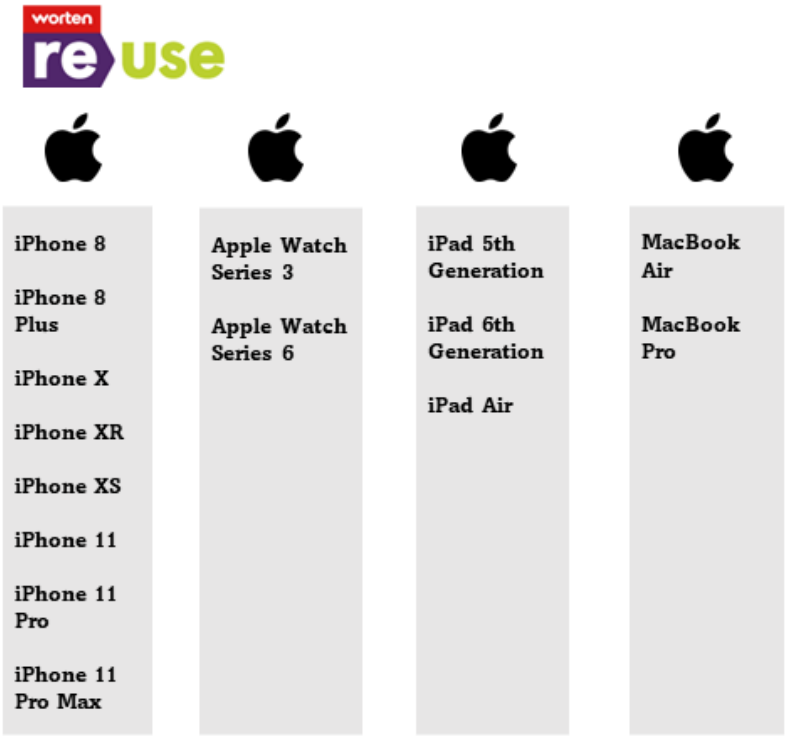
Illustration of linear vs circular Economy



Own illustration based on (European Parliamentary Research Service 2018)

Appendix D

Overview of Product Portfolio *Worten Reuse*



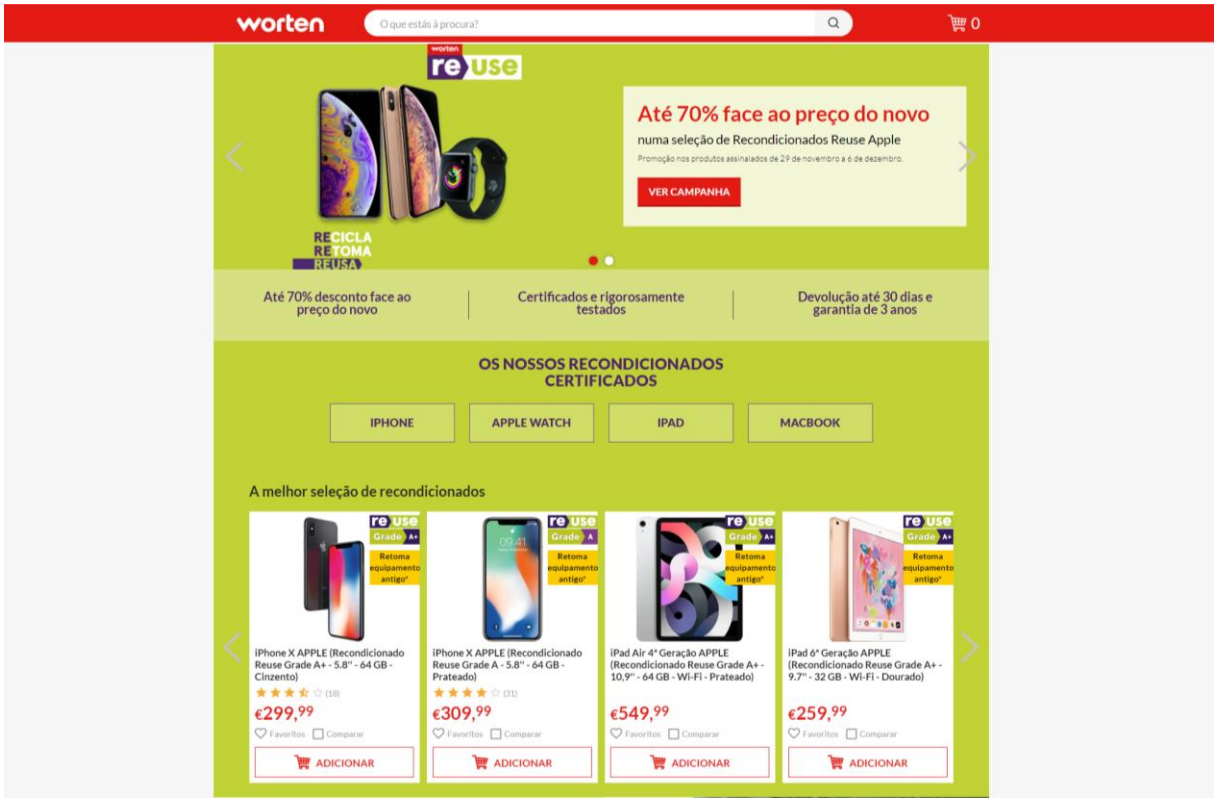
Own illustration based on internal interviews conducted with Worten employees

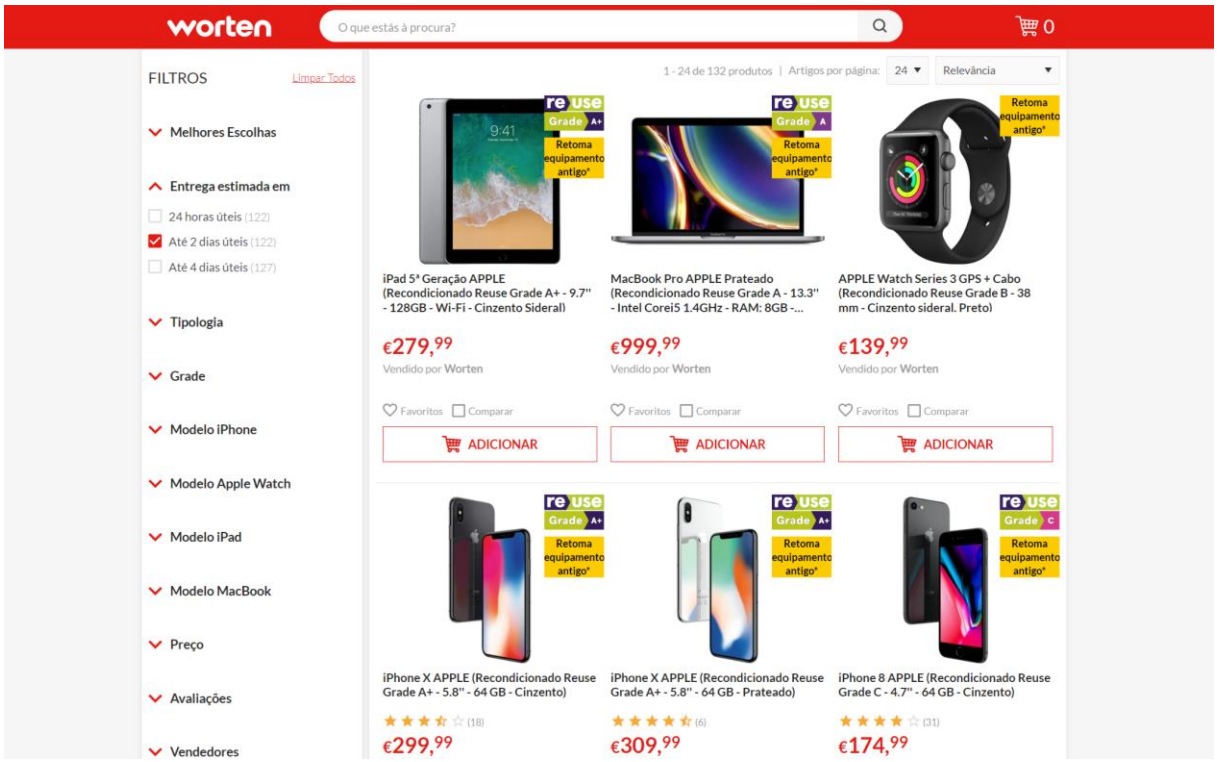
Appendix E

Reuse Section in Worten´s store

Appendix F

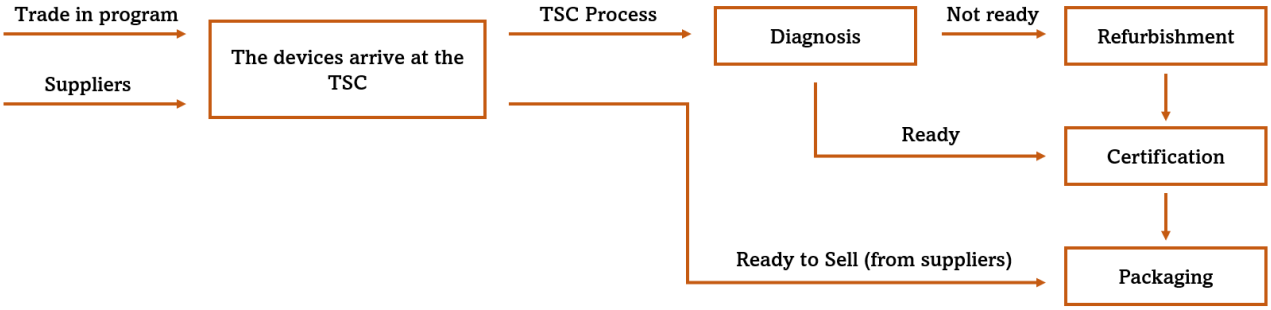
Online Presence of *Worten Reuse*





Appendix G

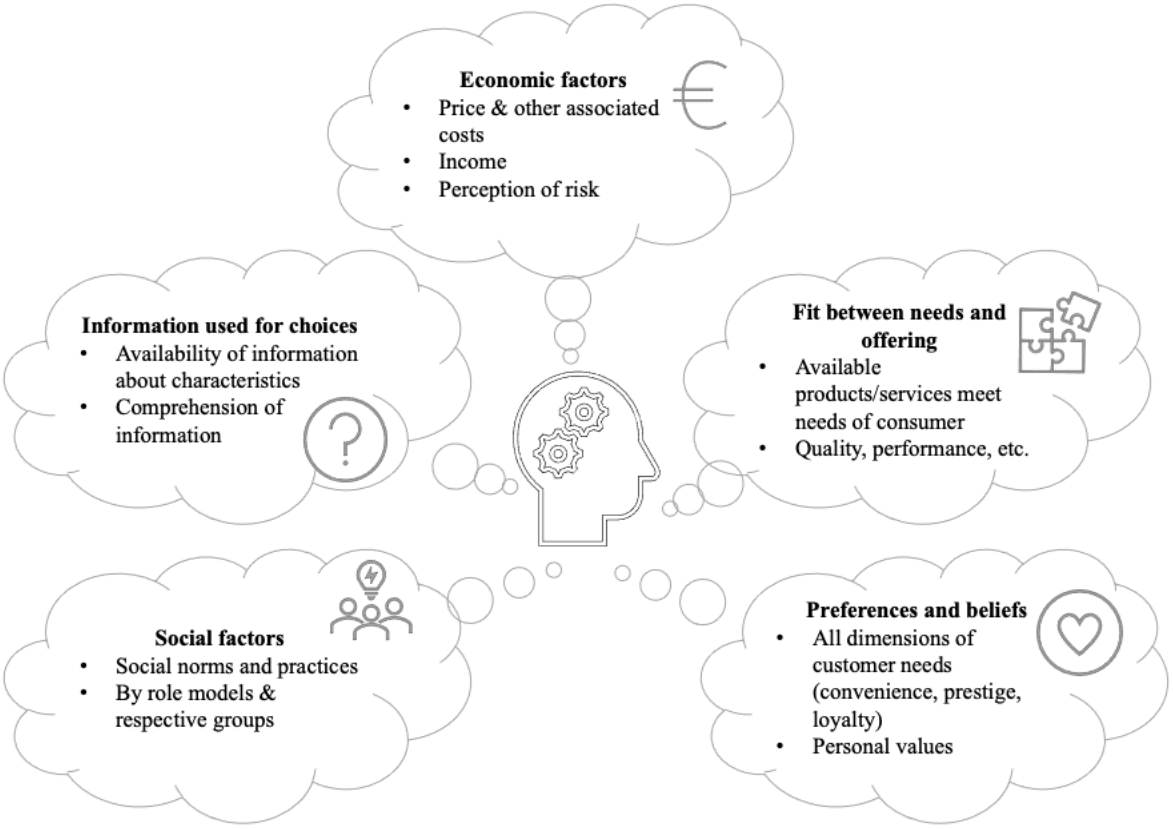
Refurbishment process



Own illustration based on internal interviews conducted with Worten employees

Appendix H

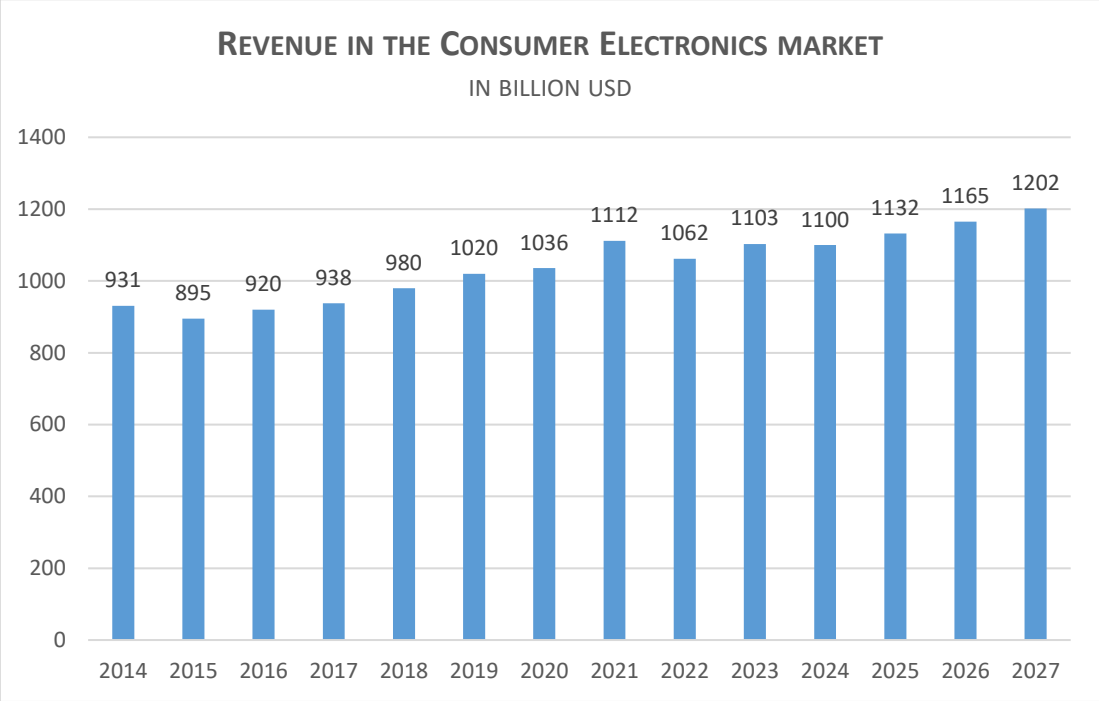
Dimensions Consumer Behavior



Own illustration based on (European Environment Agency 2020)

Appendix I

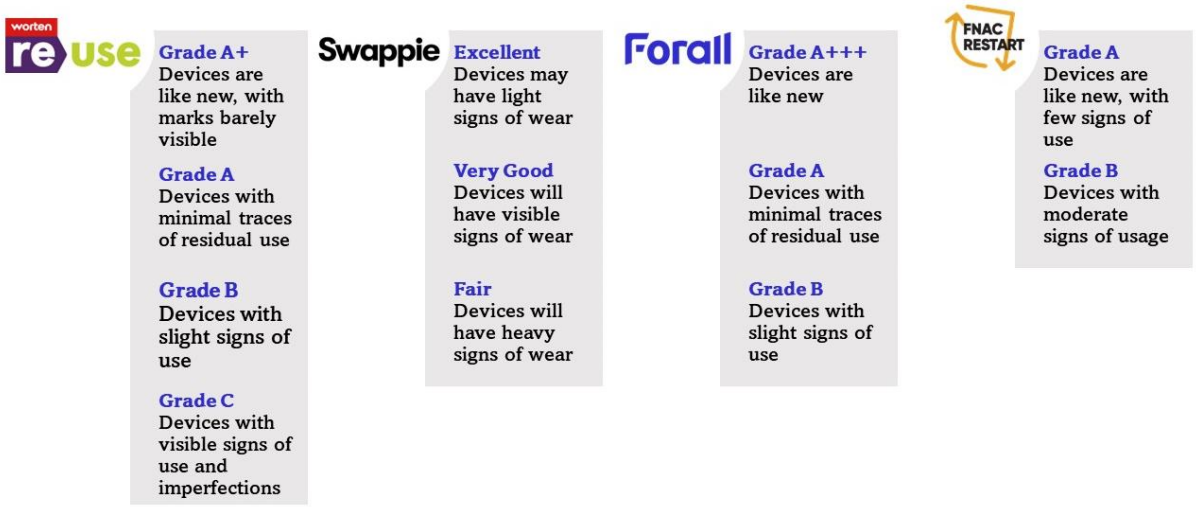
Historical data and future outlook on the market of consumer electronics



Source: Own illustration, based on information provided by (Statista 2022)

Appendix J

Grades and classification criteria of *Worten Reuse* and competitors



Own illustration based on (Forall Phones n.d.) (Swappie n.d.) (Worten n.d.) (Fnac n.d.)

Appendix K

Main players acting as direct competitors - Refurbishment process

Swappie	Before selling a phone, Swappie's technicians test them using a 52-step process. A technician checks all of the iPhone's functions including the touch screen, the battery, the speaker, the microphone and the display. Once all faulty components are replaced or repaired, the phone goes through another inspection process. When the phone is ready a technician classifies it into one out of three categories to indicate its external appearance. The phone is then offered for sale on Swappie's website (Swappie n.d. - a). On the company website, the customer can choose between a wide range of iPhones, all of them with a 2-year warranty.
Forall Phones	In addition to an assessment carried out by the brand and/or dealer of the used consumer electronics, devices undergo a rigorous technical inspection by the company experts before being ready to sell. The equipment is cleaned and tested to ensure that it is 100% functional at all levels. If necessary, the experts intervene and recondition the used device. Following this process, devices are categorized according to their aesthetic signs of use into three grades. Forall Phones not only focuses on refurbished Apple devices, besides iPhones and Apple MacBooks, the company also sells refurbished e-books. All equipment are sold with a 5-year warranty (Forall Phones n.d. – b).
Fnac	The used devices are first evaluated and classified to fit into a grade, before the reconditioning starts. The refurbishment is performed by technician in Fnac's LAB. At this stage the equipment is tested, sanitized and reconfigured with the original software to be 100% functional. All components are tested to define their condition. Finally, the devices are repackaged into a new box. The end result is the reconditioning of a used product, but revised, certified and with a 3-year warranty. Currently, Apple products (iPhone, iPad, MacBook and Watch), Samsung Smartphones and Playstation 4 are part of the program. The consumer can either buy them online or in-store.

Appendix L

EU efforts towards Circular Economy

Year		Efforts
December 2019	Presentation of European Green Deal by the Commission	• No net emissions of greenhouse gases by 2050 • Economic growth decoupled from resource use • No person and no place left behind (European Commission n.d. - b)
March 2020	Circular Economy Action Plan "to accelerate the transition towards a regenerative growth model that gives back to the planet more than it takes, advance towards keeping its resource consumption within planetary boundaries, and therefore strive to reduce its consumption footprint and double its circular material use rate in the coming decade." (European Commission 2020, 4)	Commission is going to present a "Circular Electronics Initative" including: • Ecodesign directive for electronics o Product design for energy efficiency, durability, reparability, upgradability, maintenance, reuse and recycling • Establishing the "right to repair", as well as right for updating of obsolete software • Establishing common charger for all devices for mobile phones and other devices, as well as introduction of incentives to sell chargers separately from new devices • Improving colletion and treatment of e-waste • Exploring options for a take back scheme for mobile phones, tablets and chargers that operates EU-wide • Restricting hazardous substances in electronics (European Commission 2020, 10-11) (European Commission 2020)
March 2022	Presentation of proposals to make sustainable products the norm by the Commission	Regulation on Ecodesign for Sustainable products: • Products have to be designed for energy and resource efficiency, durability, reparability, upgradability, maintenance, reuse and recycling • Information requirements to make information available for customer about the environmental impact of the purchase • Introduction of Digital Product Passports to simplify repair and recycle process ➔ New ecodesign introduced to cover more products and introduce more requirements to achieve efforts towards circularity ➔ Adoption of Ecodesign and Energy Labelling Working Plan 2022-2024 (European Commission 2022a, 2022b)

Appendix M

Survey Results

Survey Introduction

Circular Economy in Consumer Electronics

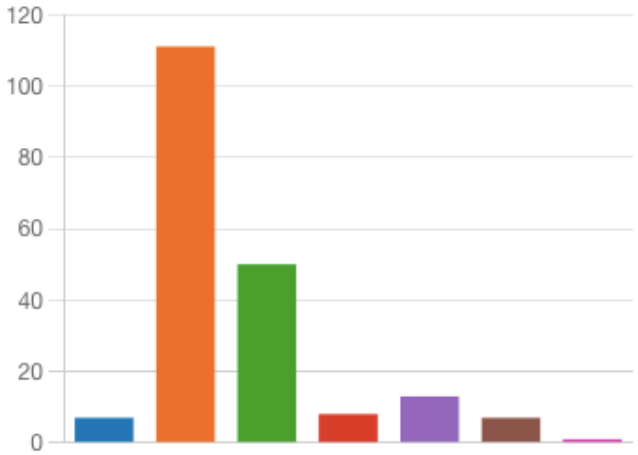
Declaration of Consent
By proceeding, you consent that Ana Rita Leal Alvarinho and Paulina Zander, Master's students at Nova School of Business and Economics, may use the information obtained through this survey for research purposes.
The findings of the survey will contribute to the Master's thesis of the three students, which deals with the topic of circular economy in consumer electronics. The primary focus of this research is to understand consumer behavior in buying and disposing of consumer electronics in Portugal. The target audience for the survey is people that currently live in Portugal, or have lived in Portugal in the past.
The data will be accessed and analyzed by Ana Rita Leal Alvarinho, Victoria Sant' Anna Feres De Carvalho, and Paulina Zander. The analysis and findings will be shared publicly.

You can contact Ana Rita Leal Alvarinho (32136@novasbe.pt) or Paulina Zander (49320@novasbe.pt) at any time with requests for enforcement of the rights under the General Data Protection Regulation to access, rectify, be informed about processing or erase your data.

Respondent Characteristics

Q1: How old are you?

Under 18	7
18-24	111
25-34	50
35-44	8
45-54	13
55-64	7
Above 64	1

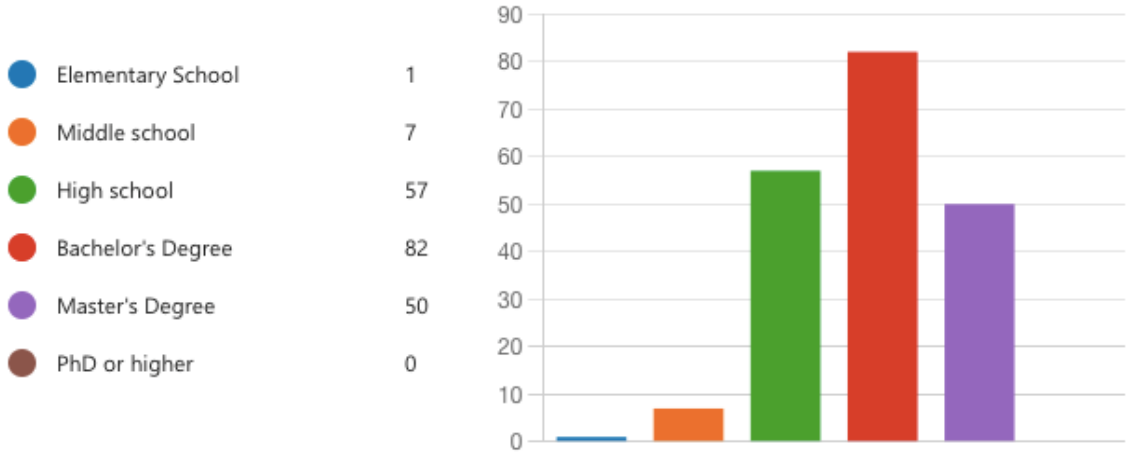


Q2: What gender do you identify as?

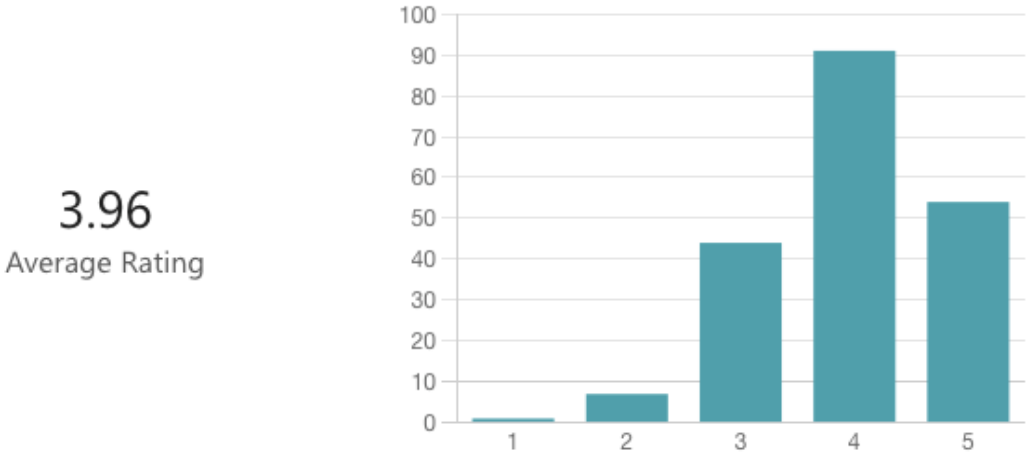
Woman	133
Non-binary	2
Man	61
Prefer not to say	1

Q3: Where do you live?

Q4: What is the highest degree or level of education you have completed?

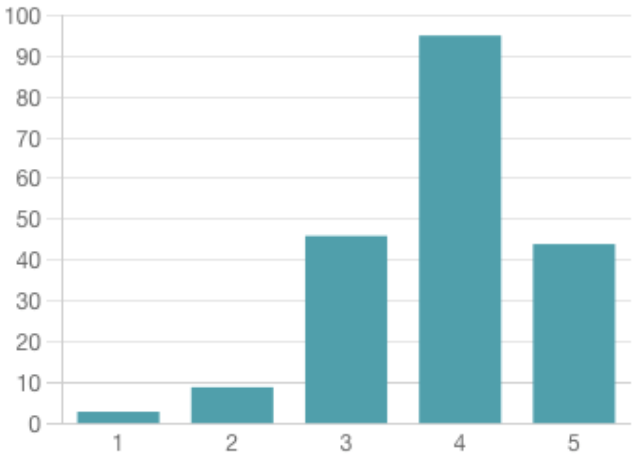


Q5: From 1-5, how familiar are you with the topic of sustainability? (1 = Not familiar at all, 5 = Very familiar)



Q6: From 1-5, how familiar are you with technological products? (1 = Not familiar at all, 5 = Very familiar)

3.85
Average Rating

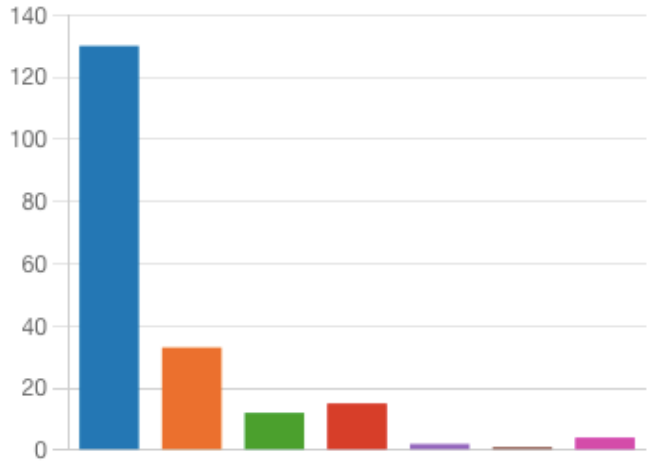


Survey Results

Q7: From which brand do you usually buy the following product?

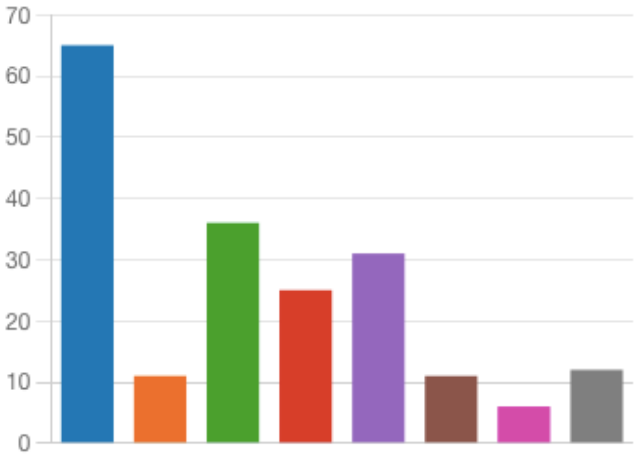
Q7.1: Smartphone

Apple	130
Samsung	33
Huawei	12
Xiaomi	15
Oppo	2
I do not own this	1
Other	4



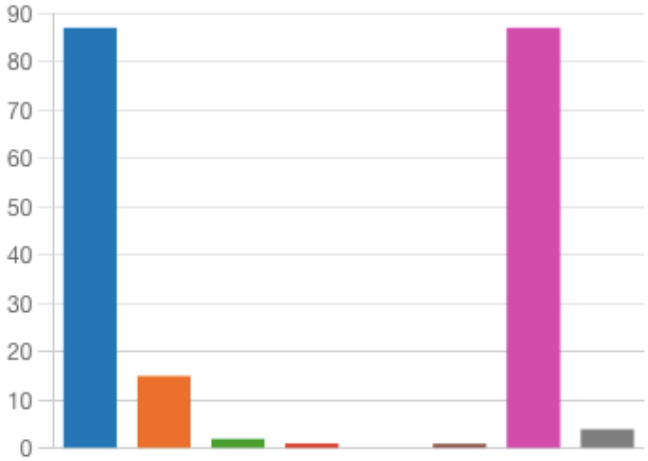
Q7.2: Laptop

Apple	65
Dell	11
HP	36
Lenovo	25
Asus	31
Microsoft	11
I do not own this	6
Other	12



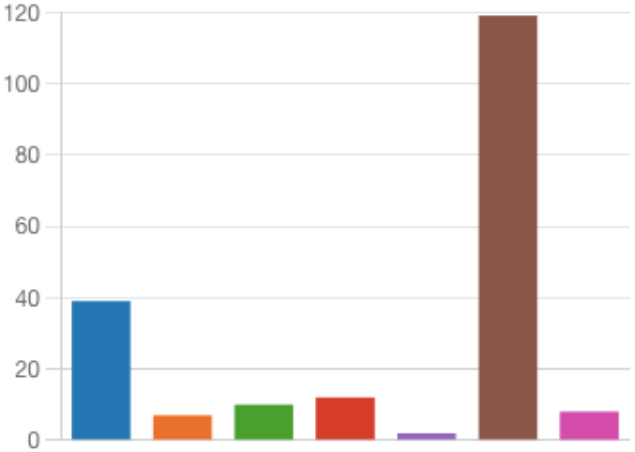
Q7.3: Tablet

Apple	87
Samsung	15
Lenovo	2
Huawei	1
Microsoft	0
Google	1
I do not own this	87
Other	4



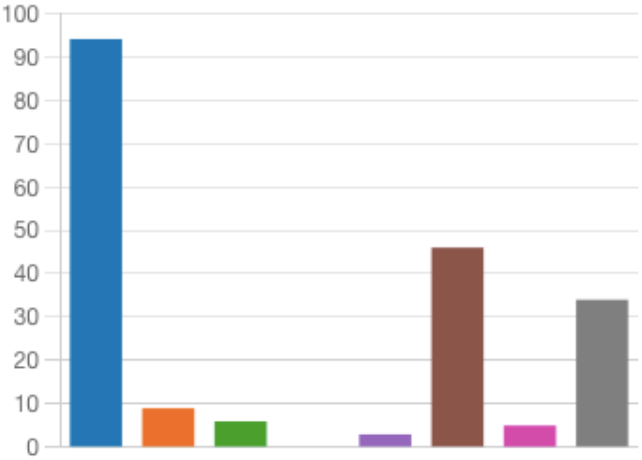
Q7.4: Smartwatch

Apple	39
Samsung	7
Amazfit	10
Huawei	12
Garmin	2
I do not own this	119
Other	8



Q7.5: Earpods

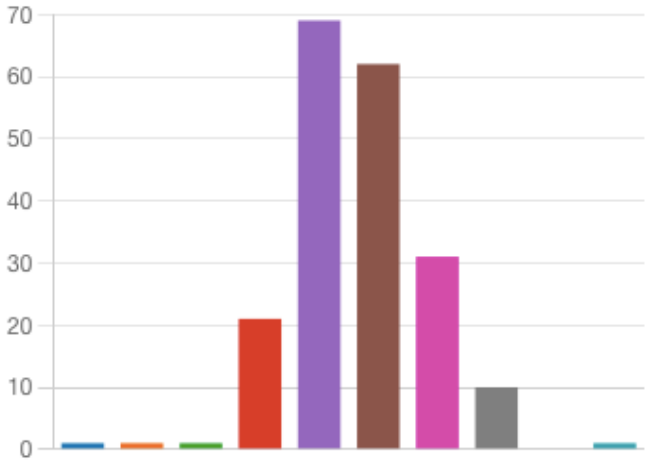
Apple	94
Samsung	9
Sony	6
Jabra	0
Goodis	3
I do not own this	46
Huawei	5
Other	34



Q8: How often do you usually replace the following devices?

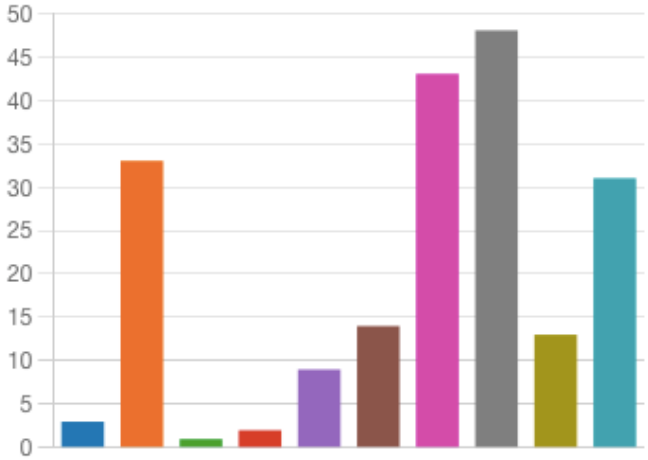
Q8.1: Smartphone

I have never owned this	1
I didn't replace it yet	1
0-1 year	1
1-2 years	21
2-3 years	69
3-4 years	62
4-5 years	31
5-6 years	10
6-7 years	0
7+ years	1



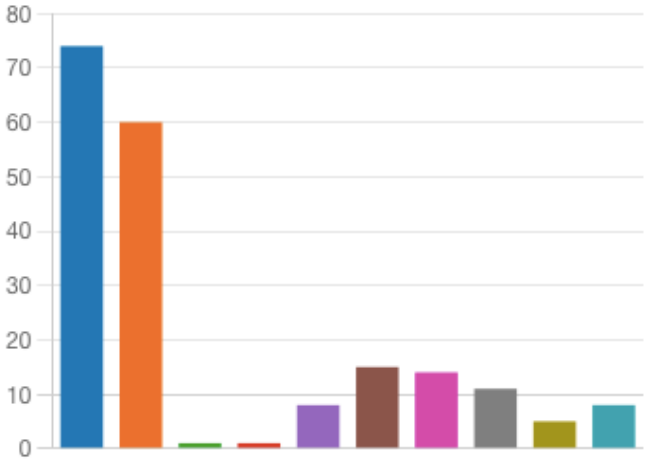
Q8.2: Laptop

I have never owned this	3
I didn't replace it yet	33
0-1 year	1
1-2 years	2
2-3 years	9
3-4 years	14
4-5 years	43
5-6 years	48
6-7 years	13
7+ years	31



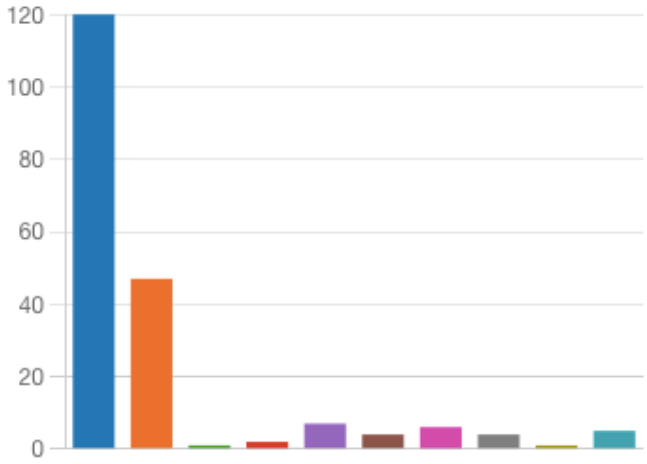
Q8.3: Tablet

I have never owned this.	74
I didn't replace it yet.	60
0-1 year	1
1-2 years	1
2-3 years	8
3-4 years	15
4-5 years	14
5-6 years	11
6-7 years	5
7+ years	8

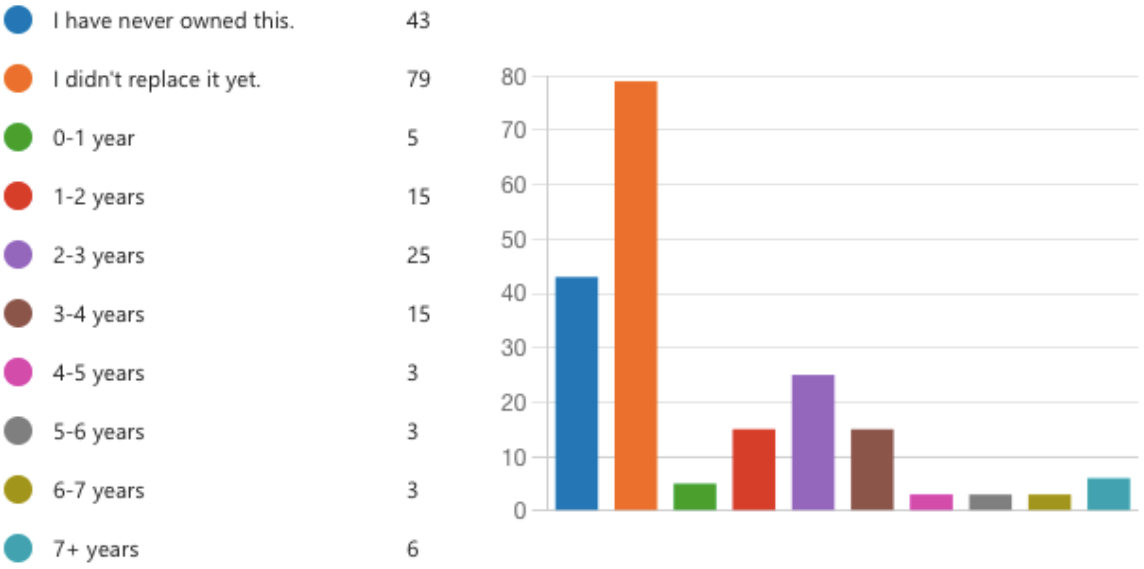


Q8.4: Smartwatch

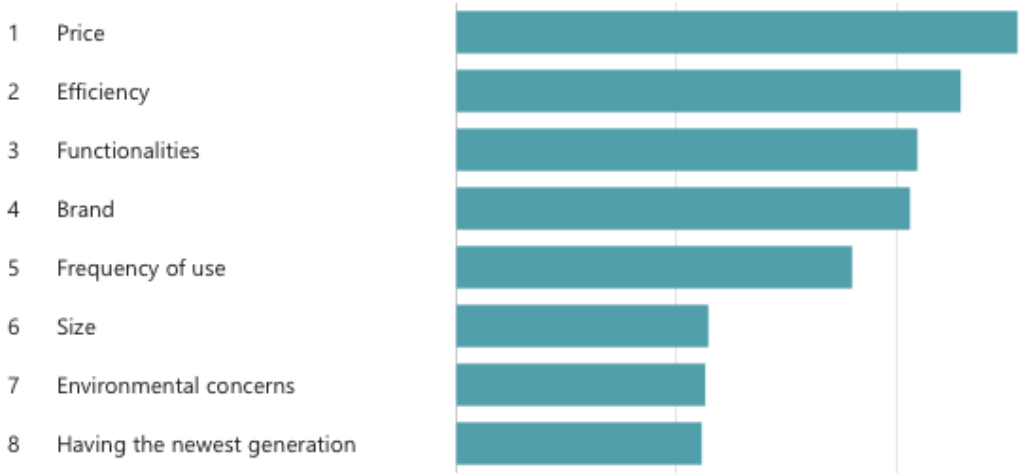
I have never owned this.	120
I didn't replace it yet.	47
0-1 year	1
1-2 years	2
2-3 years	7
3-4 years	4
4-5 years	6
5-6 years	4
6-7 years	1
7+ years	5



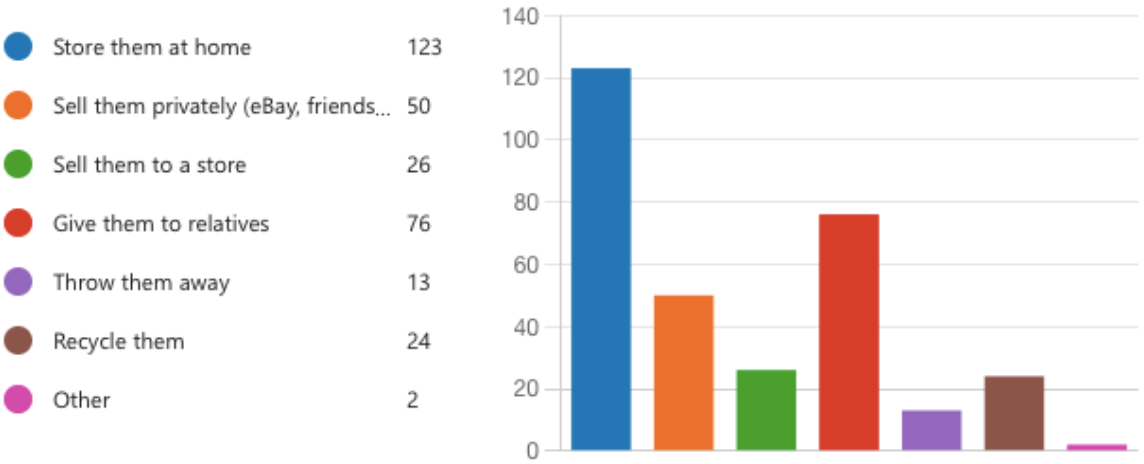
Q8.5: Earpods



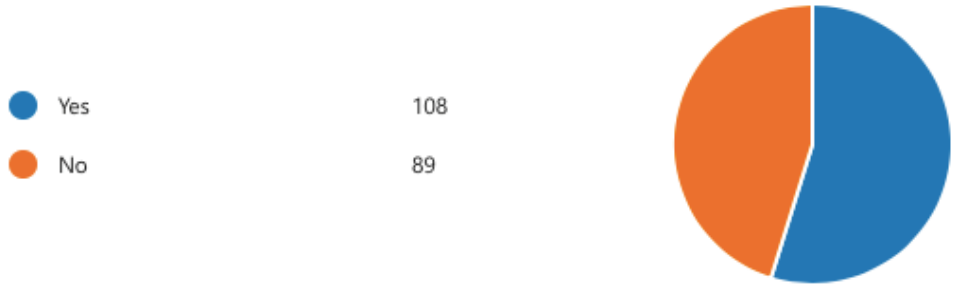
Q9: What do you consider important when buying electronic devices? Please rank the options below, starting with the one that is most important for you at the top.



Q10: What do you do with your old devices?



Q11: Do you know what the term refurbished means in the context of electronic devices?



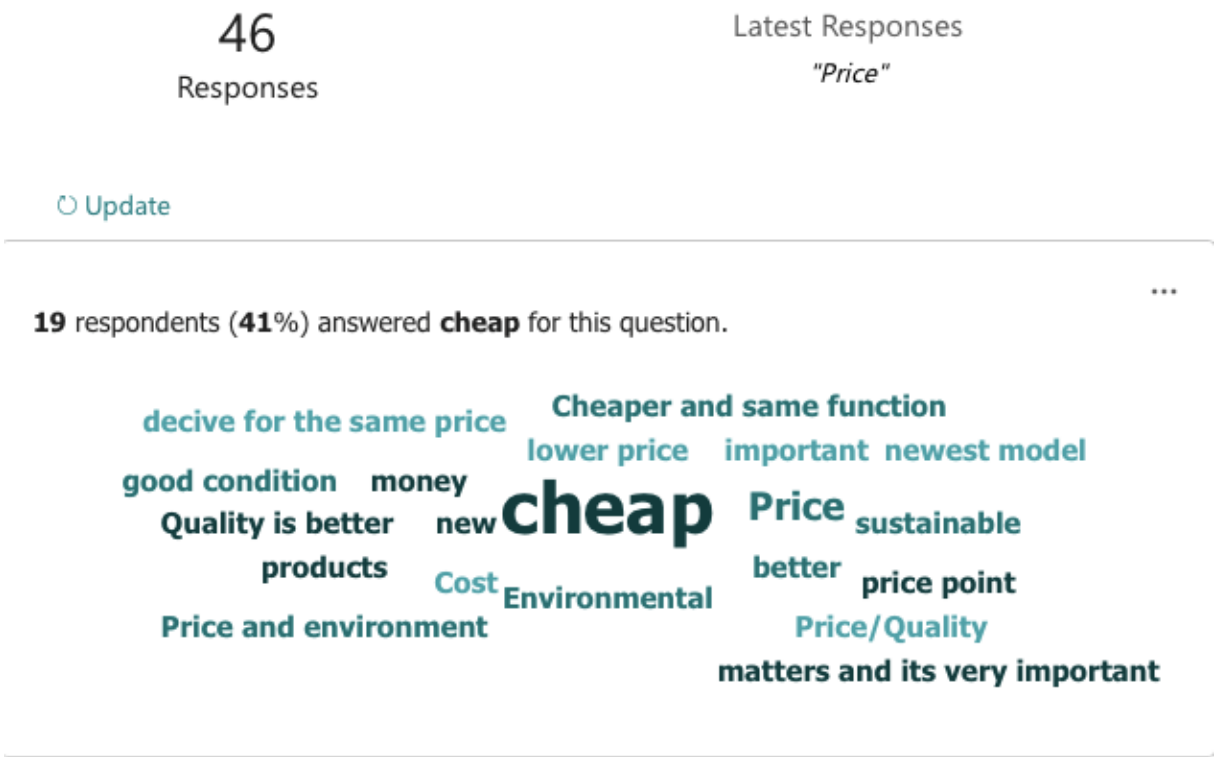
D1: Definition Refurbished Device

The verb "refurbished" is defined as follows: "made to look new again by work such as painting, repairing, and cleaning", according to Cambridge Dictionary.
Usually, a refurbished electronic is a used product that has been serviced by a manufacturer or a 3rd party and was consequently restored to a like-new condition.

Q12: Have you ever bought a refurbished device?

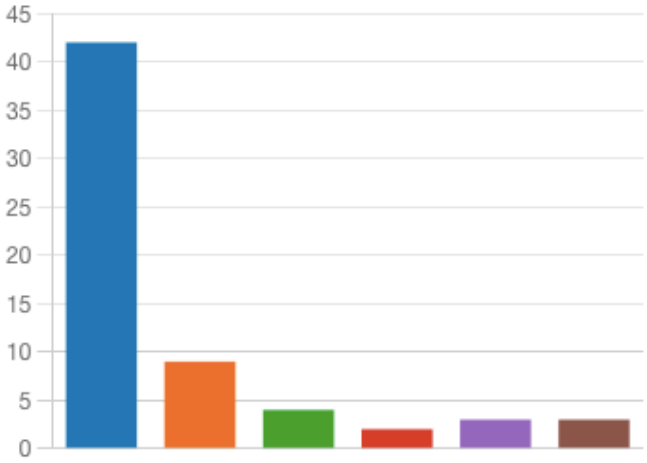
Skip to Q17 if answer = "No"

Q13: Why did you decide to buy a refurbished device?



Q14: Which device(s) have you bought?

Smartphone	42
Laptop	9
Tablet	4
Smartwatch	2
Earpods	3
Other	3

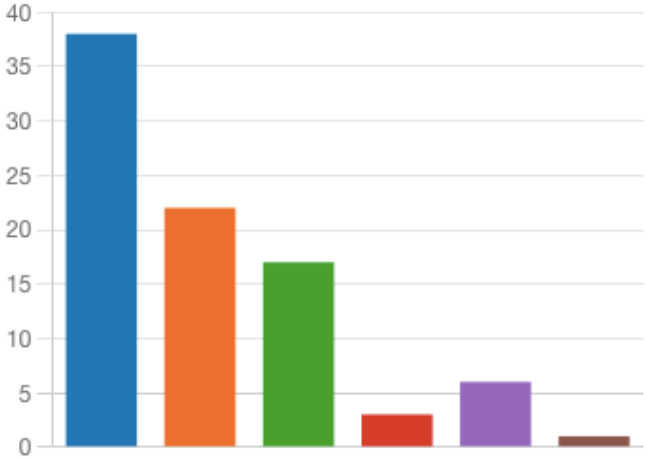


Q15: Where did you buy it?

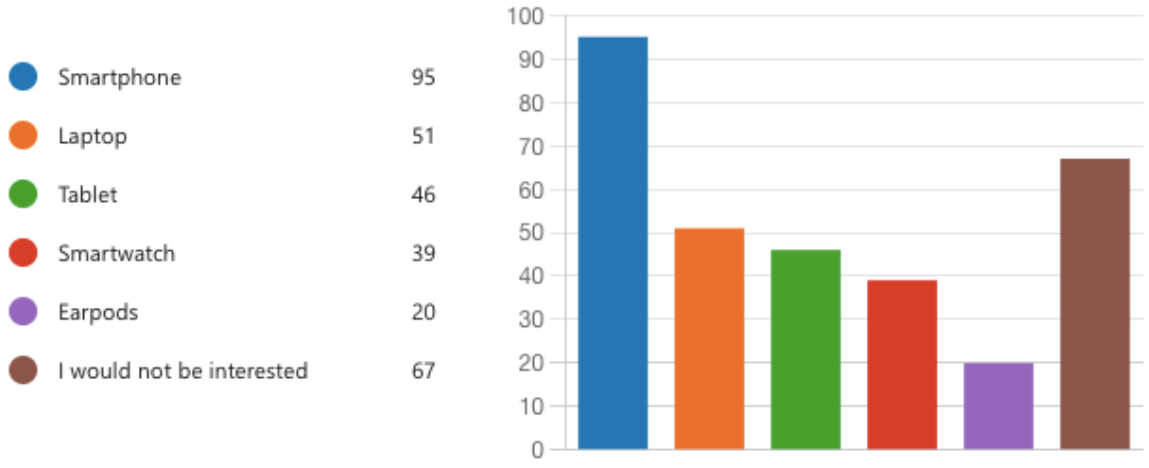
Worten	8
Fnac	4
Forall Phones	6
Swappie	7
Other	27

Q16: Why did you choose to buy it there?

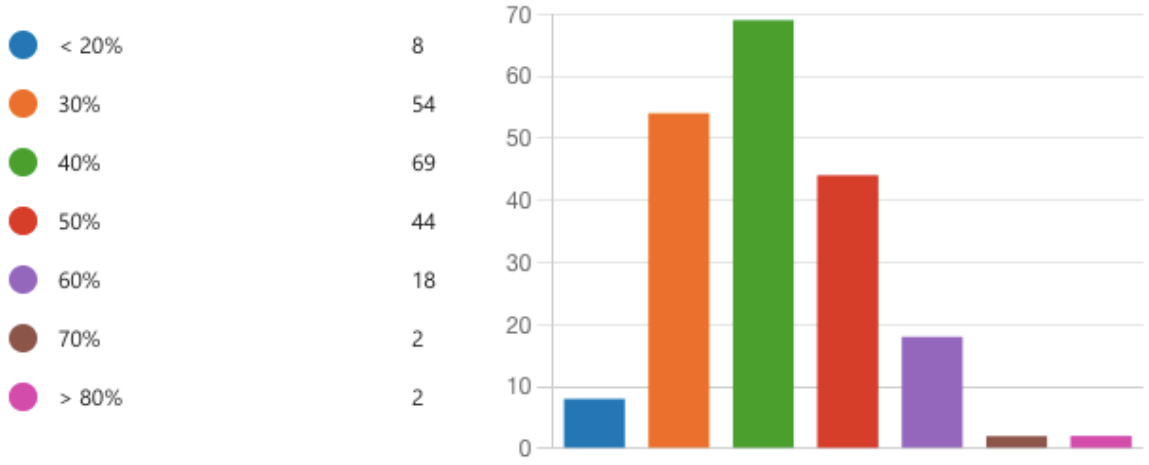
Best price	38
Convenience	22
Good review from friends/family	17
Didn't know other companies th...	3
Bigger/better guarantee	6
Other	1



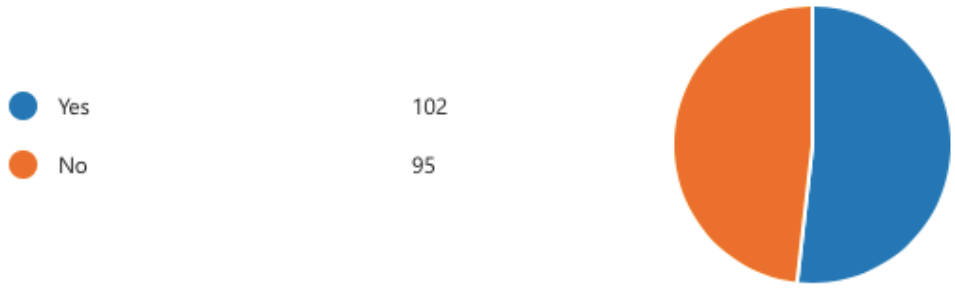
Q17: Would you be interested in buying (other) refurbished devices?



Q18: What discount in price would you expect when buying a refurbished device compared to the same device brand new?

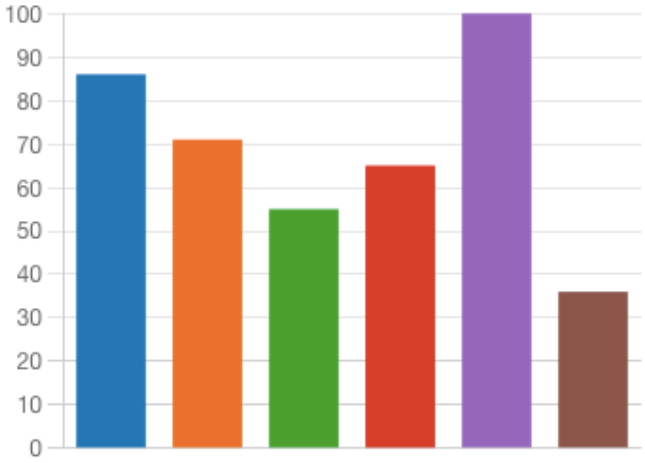


Q19: Currently, most consumer electronics from the brand Apple are being refurbished. Would you be interested in buying a refurbished product form brands other than Apple?



Q20: Have you ever heard of these projects/companies?

Reuse by Worten	86
Restart by Fnac	71
Apple refurbishment	55
Forall Phones	65
Swappie	100
None of the above	36



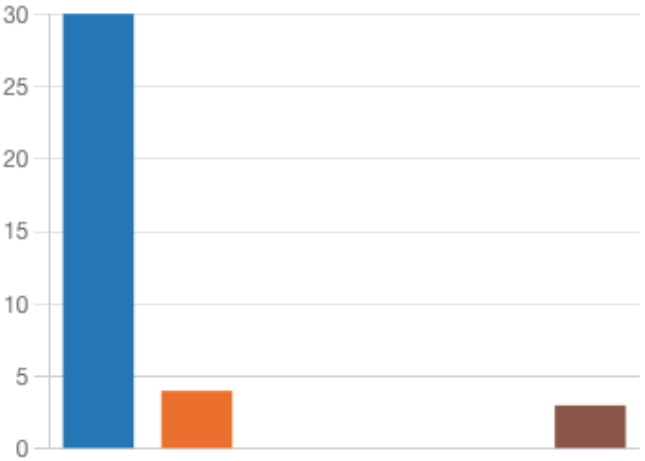
Q21: Have you ever traded in an old device?

Skip to Q26 if answer = "No"

Yes	33
No	164

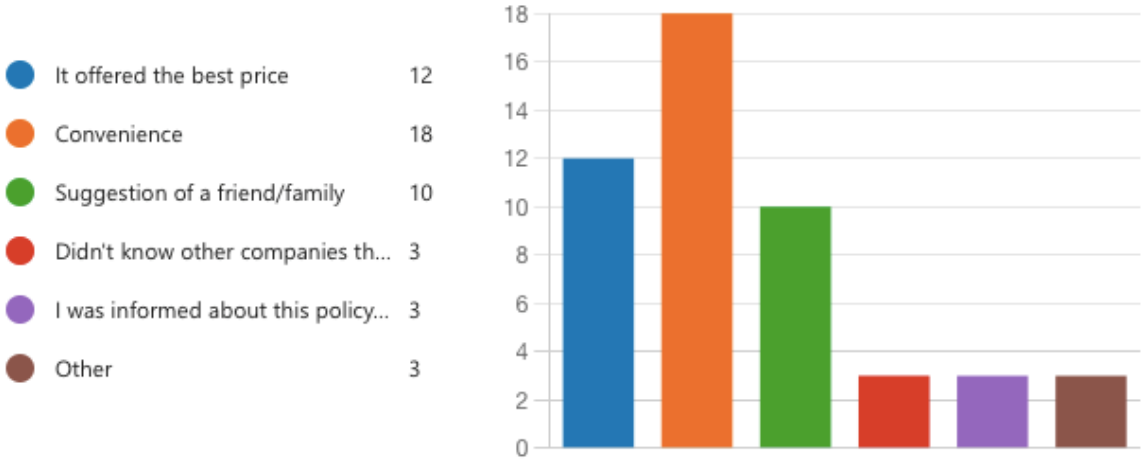
Q22: Which device(s) have you traded in?

Smartphone	30
Laptop	4
Tablet	0
Smartwatch	0
Earpods	0
Other	3



Q23: Where did you trade it in?

Q24: Why did you choose this company to trade in your old device?



Q25: How would you prefer to trade in your old equipment?

Q26: Which other products, besides the ones mentioned in this survey, would you consider trading in or buying refurbished?

197
Responses

Latest Responses

"accessories for laptops like usb cables, chargers etc."

"None"

"Laptops, earbuds."

---

34 respondents (**17**%) answered **None** for this question.

Appendix N

List of devices traded in by participants

Device	Amount
Smartphone	30
Laptop	4
(Games for) Gaming Console	3

Own illustration based on survey results

Appendix O

List of stores where participants conducted a trade-in

Store	Amount of participants that did a trade-in
Apple	9
Fnac	8
Worten	4
Forall Phones	1
Swappie	1
Other (including Backmarket, CeX, local stores)	12

Own illustration based on survey results

Appendix P

Overview of product range for different competitors

FNAC RESTART

iPhone 11 iPhone 12 Mini iPhone 12 Pro Max	Apple Watch Series 5 Apple Watch Series 6	iPad 6th Generation	MacBook Air MacBook Pro	Samsung Galaxy S20 Samsung Galaxy S21	Playstation 4

Forall

amazon kindle

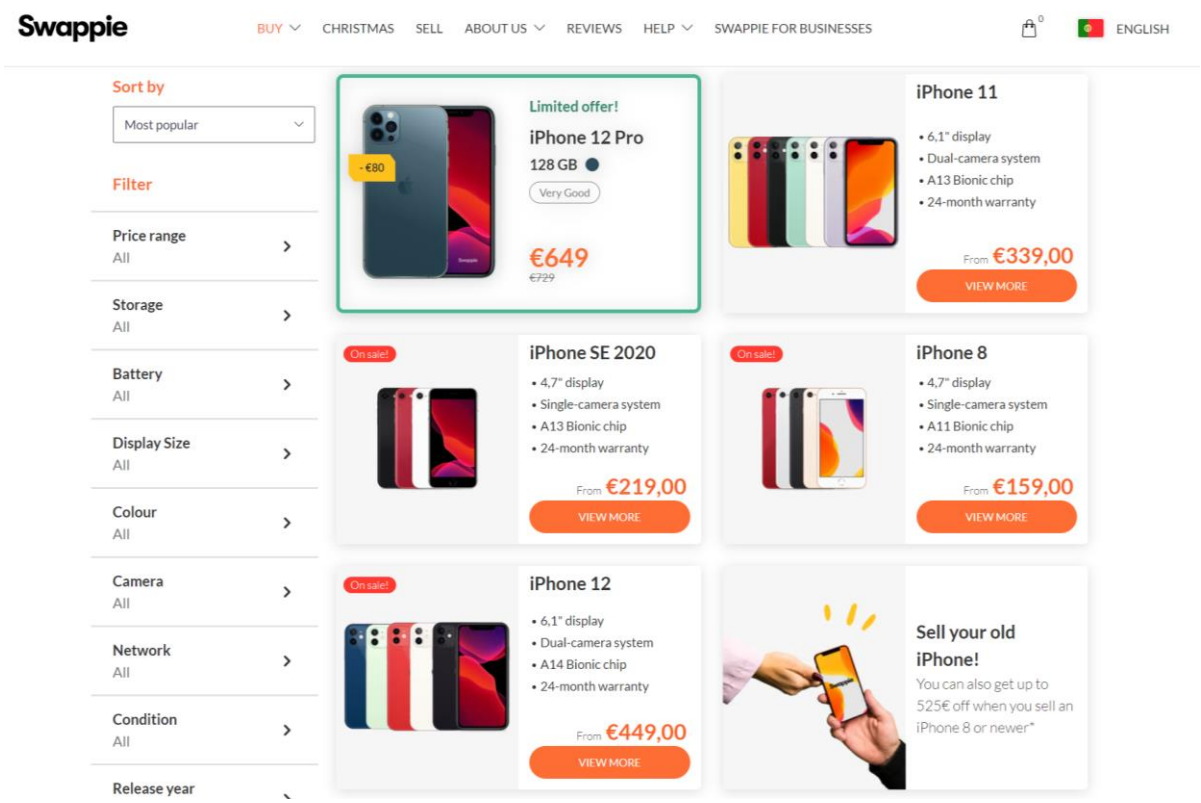
iPhone 8 iPhone 8 Plus iPhone X iPhone XR iPhone XS iPhone XS Max iPhone SE 2020 iPhone 11 iPhone 11 Pro iPhone 11 Pro Max	iPhone 12 Mini iPhone 12 iPhone 12 Pro iPhone 12 Pro Max iPhone 13 Mini iPhone 13 iPhone 13 Pro iPhone 13 Pro Max	MacBook MacBook Pro MacBook Air iMac	Kindle Basic Kindle PaperWhite Kindle Oasis Kindle Fire Kindle Voyage

Swappie

iPhone 7	iPhone 12 Mini
iPhone 7 Plus	iPhone 12
iPhone 8	iPhone 12 Pro
iPhone 8 Plus	iPhone 12 Pro Max
iPhone X	iPhone 13 Mini
iPhone XR	iPhone 13
iPhone XS	iPhone 13 Pro
iPhone XS Max	iPhone 13 Pro Max
iPhone SE 2020	iPhone SE 2022
iPhone 11	iPhone 14
iPhone 11 Pro	iPhone 14 Pro
iPhone 11 Pro Max	iPhone 14 Plus

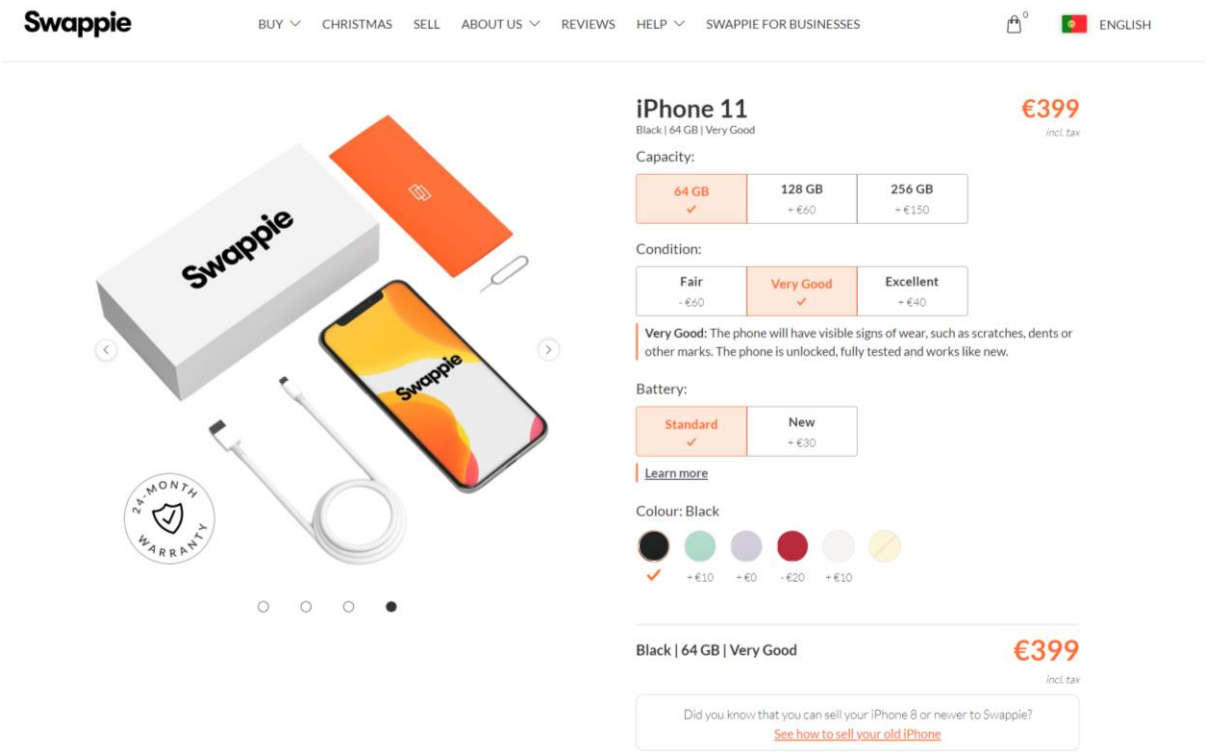
Appendix Q:

Swappie website – View when searching for an iPhone



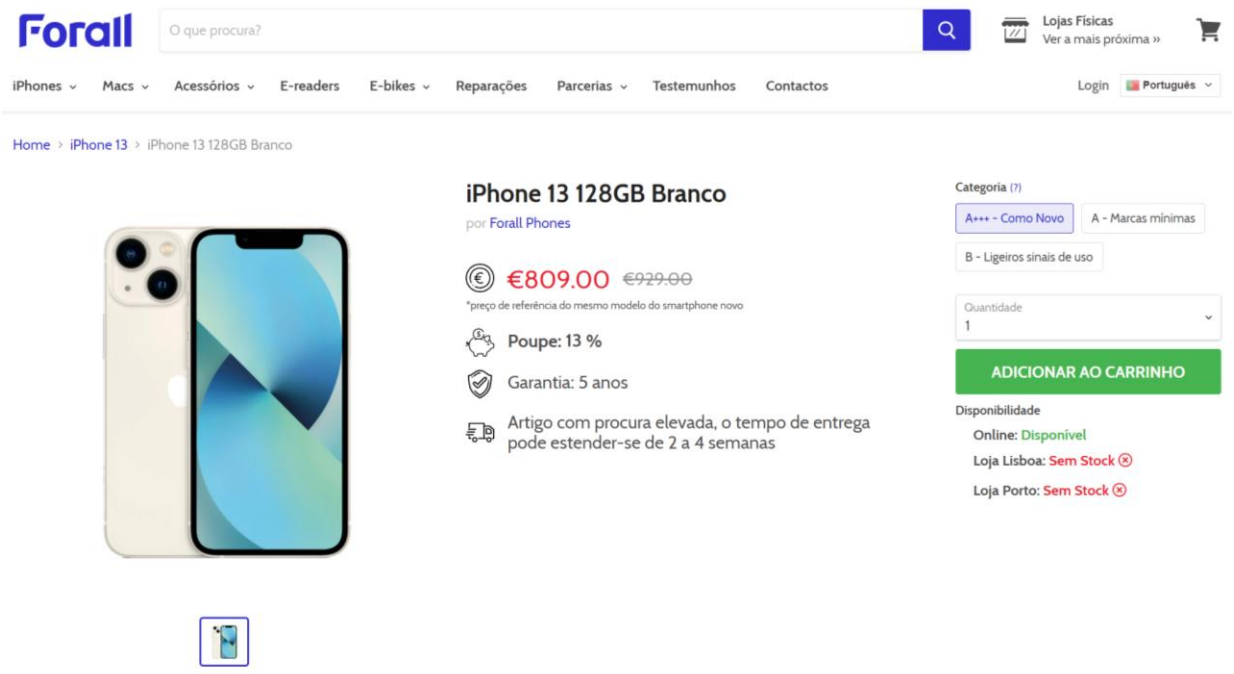
Appendix R

Swappie website – View when clicking on an iPhone



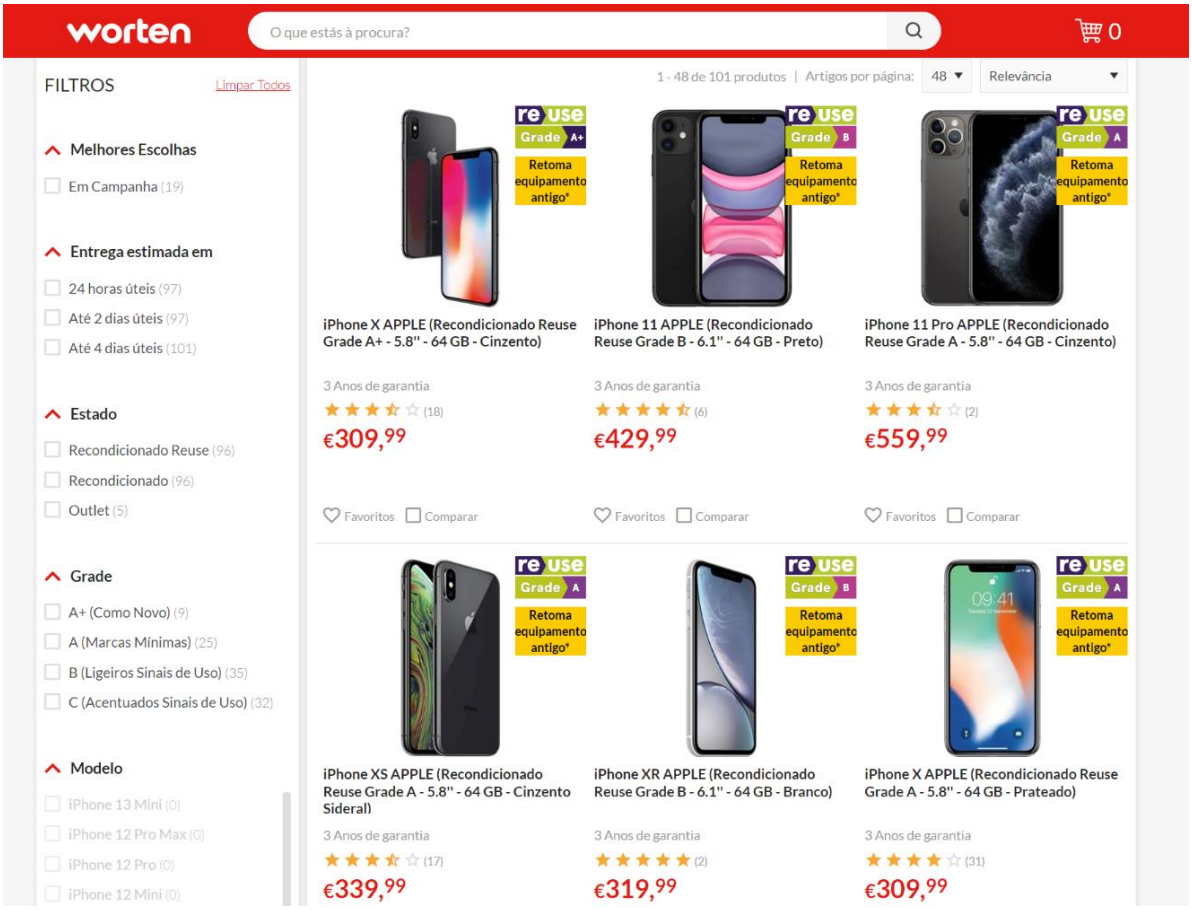
Appendix S

Forall Phones website – View when clicking on an iPhone



Appendix T

Worten website – View when searching for an iPhone



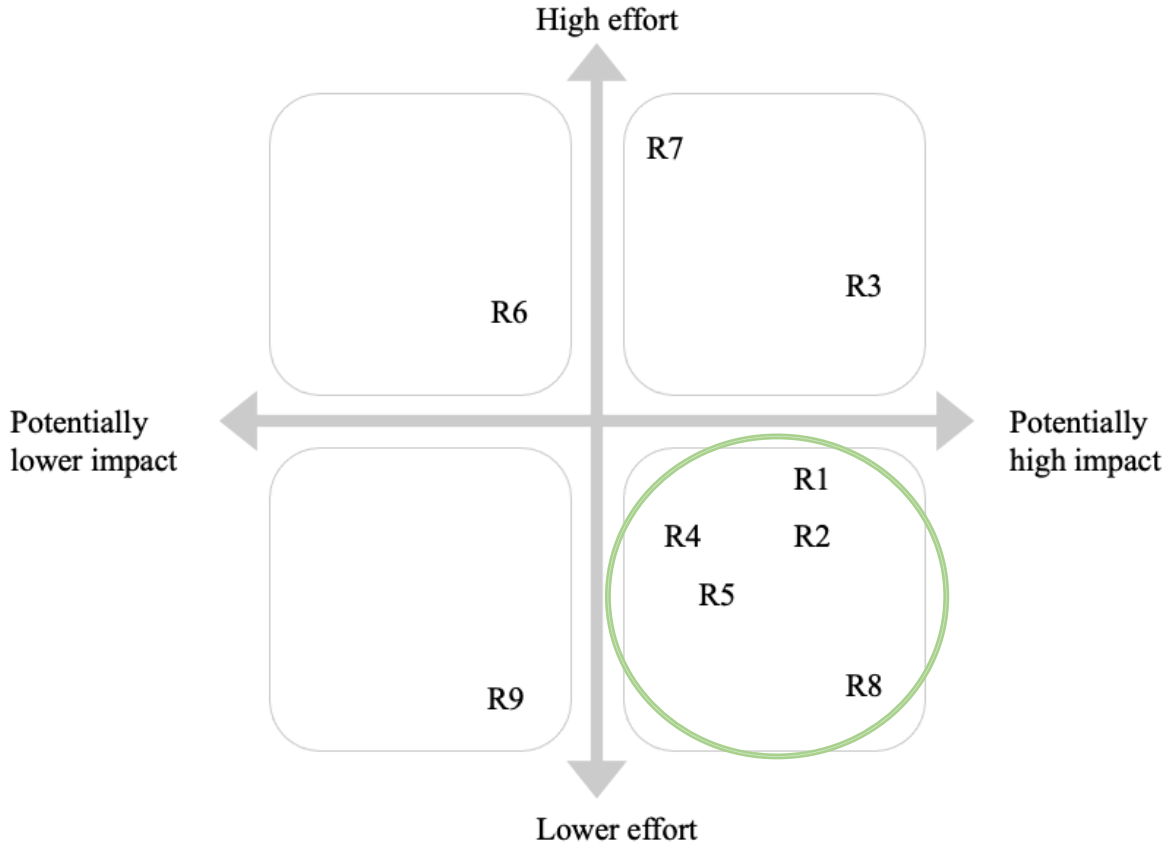
Appendix U

Overview of questions for on-site survey

Question	**Possible options**
Which refurbished device(s) would you be interested in buying?	Microwave; Speaker; Coffee machine; Kitchen robot; Blender; Fan; Iron; Vacuum Cleaner; Camera; Television; E-reader; Game console.
Which model of iPhone are you looking for?	iPhone 14; iPhone 13; iPhone 12; iPhone 11; iPhone X; iPhone XS; iPhone XR; iPhone 8.
Which refurbished game console(s) would you be interested in buying?	Playstation; Nintendo Switch; Xbox; None.
Are you aware of Worten's trade-in program?	Yes, No.
Which aspects do you value when buying a refurbished device?	Price; Being able to see the device; Brand; Warranty; Newest model.
How would you prefer to be paid if trading-in your device?	Cash; Bank transfer; Gift card; Irrelevant.

Appendix V

Mapping of Recommendations



Own illustration based on findings

List of Abbreviations

bn	billion
CEO	Chief Executive Officer
E-buyers	Electronic Buyers
E-commerce	Electronic Commerce
EU	European Union
E-waste	Electronic Waste
ISO	International Organization for Standardization
TSC	Technical Service Center
US	United States of America
VAT	Value Added Tax

Reference List

AICEP. 2022. *Conheça as maiores marketplaces do seu setor de atividade.* July 28. Accessed 12 9, 2022. https://www.portugalexporta.pt/noticias/maiores-marketplaces.

Ala-Kurikka, Susanna. 2015. *Lifespan of consumer electronics is getting shorter, study finds.* March 3. Accessed December 4, 2022. https://www.theguardian.com/environment/2015/mar/03/lifespan-of-consumer-electronics-is-getting-shorter-study-finds.

Back Market. n.d. *Sobre nós.* Accessed 12 9, 2022. https://www.backmarket.pt/pt-pt/about-us.

Baldé, C P, V Forti, V Gray, R Kueh, and P Stegmann. 2017. *The Global E-waste Monitor 2017 - Quantities, Flows, and Resources.* Bonn/Geneva/Vienna: United Nations University (UNU), International Telecommunication Union (ITU), International Solid Waste Association (ISWA), 1-102.

Baubonienė, Živilė, and Gintarė Gulevičiūtė. 2015. *E-COMMERCE FACTORS INFLUENCING CONSUMERS' ONLINE SHOPPING DECISION.* Paper, Mykolas Romeris University.

Blog FNAC Expert. 2021. *Porque devo escolher um equipamento recondicionado FNAC?* 16 May. Accessed December 8, 2022. https://www.fnac.pt/Porque-devo-escolher-um-equipamento-recondicionado-FNAC/cp2131/w-4#bl=CONSELHOS%20DOS%20NOSSOS%20EXPERTS|PAG_6731f558-3b0b-45a4-b31f-aa32b71650e7|BL1.

Cambridge Dictionary. n.d. – a. *consumer electronics.* Accessed December 4, 2022. https://dictionary.cambridge.org/dictionary/english/consumer-electronics.

—. n.d. – b. *natural resources.* Accessed December 4, 2022. https://dictionary.cambridge.org/de/worterbuch/englisch/natural-resources.

ChannelAdvisor. 2022. *Trust the Data: How Consumer Trends Are Shaping E-Commerce in 2022.* October 2022. Accessed 12 7, 2022. https://www.channeladvisor.com/blog/industry-trends/trust-the-data-how-consumer-trends-are-shaping-e-commerce-in-2022/.

Chatterji, Mo. 2022. *Using stuff longer: Does the shift to a circular economy have a simple solution?* September 5. Accessed December 6, 2022. https://www.weforum.org/agenda/2022/09/using-stuff-longer-does-the-shift-to-a-circular-economy-have-a-simple-solution/.

CTT. 2022. "e-commerce Report 2022." *Campanhas CTT.* Accessed December 8, 2022. https://campanhas.ctt.pt/hubfs/CTT_eCommerceReport_2022.pdf?utm_campaign=202211_b2b_ecomreport&utm_medium=email&_hsmi=235933878&_hsenc=p2ANqtz-

9S7XiMj2mYUmMD-ym7RD4Yv8ZKx2nBXutSMPRqHcEMiBQ5mMSvuHszKACGuSqavjZAPi83IoxDFlCOv65At1mEWQ7-YA&utm_content=2359338.

Dossetto, Fio. 2022. *The easiest way to find out what people need, right on your website.* August 18. Accessed 12 10, 2022. https://www.hotjar.com/blog/on-site-surveys/.

Durand, Ricardo. 2020. *Há uma nova loja em Portugal a vender iPhones recondicionados – conheça a Swappie.* Accessed 12 8, 2022. https://www.pcguia.pt/2020/06/ha-uma-nova-loja-em-portugal-a-vender-iphones-recondicionados-conheca-a-swappie/.

Engel, J.F, R.D Kollat, and P.W Miniard. 1986. *Consumer Behavior.* Chicago: Dryden Press.

Essex, David. n.d. *sales and operations planning (S&OP).* Accessed December 4, 2022. https://www.techtarget.com/searcherp/definition/sales-and-operations-planning-SOP.

European Commission. n.d - a. *Waste from Electrical and Electronics Equipment (WEEE).* Accessed December 4, 2022. https://environment.ec.europa.eu/topics/waste-and-recycling/waste-electrical-and-electronic-equipment-weee_en.

—. n.d. – b. *A European Green Deal.* Accessed December 6, 2022. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en.

—. 2020a. *Circular Economy Action Plan.* European Union. Accessed December 6, 2022. https://ec.europa.eu/environment/circular-economy/pdf/new_circular_economy_action_plan.pdf.

—. 2020b. *Changing how we produce and consume: New Circular Economy Action Plan shows the way to a climate-neutral, competitive economy of empowered consumers.* 11 March. Accessed December 6, 2022. https://ec.europa.eu/commission/presscorner/detail/en/ip_20_420.

—. 2022a. "COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS On making sustainable products the norm." *EUR-Lex.* March 30. Accessed December 6, 2022. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0140&qid=1649112555090.

—. 2022b. *Green Deal: New proposals to make sustainable products the norm and boost Europe's resource independence.* 30 March. Accessed December 6, 2022. https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2013.

European Environment Agency. 2020. *Europe's consumption in a cricular economy: the benefits of longer-lasting electronics.* June 18. Accessed December 4, 2022. https://www.eea.europa.eu/publications/europe2019s-consumption-in-a-circular/benefits-of-longer-lasting-electronics.

European Parliament. 2015. *Circular economy: definition, importance and benefits.* 2 December. Accessed December 4, 2022. https://www.europarl.europa.eu/news/en/headlines/economy/20151201STO05603/circular-economy-definition-importance-and-benefits.

—. 2018. *Waste management in the EU: infographic with facts and figures.* 6 April. Accessed December 4, 2022. https://www.europarl.europa.eu/news/en/headlines/society/20180328STO00751/eu-waste-management-infographic-with-facts-and-figures.

—. 2020. *E-waste in the EU: facts and figures (infographic).* 23 December. Accessed December 4, 2022. https://www.europarl.europa.eu/news/en/headlines/society/20201208STO93325/e-waste-in-the-eu-facts-and-figures-infographic.

European Parliamentary Research Service. 2018. *Circular economy.* Accessed December 4, 2022. https://www.europarl.europa.eu/thinktank/infographics/circulareconomy/public/index.html.

Ferreira, Christina A. 2021. *Worten, Delta e Dott.pt aceleram a fundo nas vendas online e mantêm foco no digital em 2022.* Dezember 22. Accessed December 10, 2022. https://tek.sapo.pt/noticias/internet/artigos/worten-delta-e-dott-pt-aceleram-a-fundo-nas-vendas-online-e-mantem-foco-no-digital-em-2022.

Fnac. n.d. – a. *O INÍCIO | UM OLHAR DIFERENTE.* Accessed December 8, 2022. https://www.fnac.pt/quemsomos.

—. n.d. – b. *Retomas Fnac.* Accessed 12 8, 2022. https://www.fnac.pt/retomas-apple#bl=Retomas_BTN_17.

Forall Phones. n.d. – a. *Como funciona o nosso serviço.* Accessed December 8, 2022. https://forallphones.pt/pages/como-funciona.

—. n.d. – b. *Preguntas Frequentes.* Accessed December 8, 2022. https://forallphones.pt/pages/faq.

—. n.d. – c. *Retomas.* Accessed 12 8, 2022. https://forallphones.pt/pages/retomas.

Gerhardt, Carsten, and Yelena Ageyeva-Furman. 2022. *Kearney.* 31 March. Accessed December 6, 2022. https://www.kearney.com/sustainability/article/-

/insights/circularity-is-the-path-to-a-sustainable-europe-and-beyond.

Grande Consumo. 2022. *Fnac aposta no relançamento do programa Restart.* October 25. Accessed December 8, 2022. https://grandeconsumo.com/fnac-aposta-no-relancamento-do-programa-restart/.

Han, Yufei. 2021. "Consumer Electronics Report 2021." Statista. April. Accessed December 6, 2022. file:///Users/Paulina/Downloads/study_id55488_consumer-electronics-market-report.pdf.

IPC. 2022. *Higher Costs Continue to Dominate Electronics Industry Narrative.* 9 June. Accessed December 6, 2022. https://www.ipc.org/news-release/higher-costs-continue-dominate-electronics-industry-narrative.

Laricchia, Federica. 2022. *Top purchased refurbished smartphone models as of February 2022.* 18 October. Accessed December 6, 2022. https://www-statista-com.eu1.proxy.openathens.net/statistics/1305977/top-purchased-refurbished-smartphones/.

McGillycuddy, Cillian. 2022. *What Does E-commerce Look Like in a Post-Pandemic World?* June 23. Accessed 12 7, 2022. https://www.websell.io/post-pandemic-ecommerce.

Murphy, Michael. 2021. *Electronics can trigger a more circular, sustainable world - here's how.* World Economic Forum. May 12. Accessed December 4, 2022. https://www.weforum.org/agenda/2021/05/electronics-can-trigger-a-more-circular-sustainable-world-here-s-how/.

OECD. 2001. *Glossary of Statistical Terms - Natural Resources.* 25 September. Accessed December 4, 2022. https://stats.oecd.org/glossary/detail.asp?ID=1740.

Oxford Learner's Dictionaries. n.d. *consumer electronics.* Accessed December 4, 2022. https://www.oxfordlearnersdictionaries.com/definition/english/consumer-electronics.

QYResearch. 2022. *Global Personal/Consumer Electronics Market Insights and Forecast to 2028.* January. Accessed December 6, 2022. https://reports.valuates.com/market-reports/QYRE-Auto-26P3708/global-personal-consumer-electronics.

Rallo, Jim. 2014. "The Rise of Refurbished Products." *liquidityservices.com.* Accessed December 4, 2022. https://www.liquidityservices.com/wp-content/uploads/2018/07/wp_rtcb0101_1502.pdf.

Rodrigues, José Varela. 2020. *Forall Phones vendida a investidor privado português com ligações à China.* 16 December. Accessed December 8, 2022. https://jornaleconomico.pt/noticias/apos-venda-falhada-em-2019-forall-phones-e-vendida-a-investidor-privado-com-ligacoes-a-china-677125.

Sana. n.d. *Online marketplace.* Accessed 12 9, 2022. https://www.sana-commerce.com/e-

commerce-terms/what-is-an-online-marketplace/.

Sattler, Tawni. 2022. *4 practical ways to improve your ecommerce customer journey.* August 18. Accessed 12 10, 2022. https://www.hotjar.com/blog/ecommerce-customer-journey/.

SONAE SGPS. 2022. *Relatório Integrado 2021 - Shaping tomorrow, today - Sonae.* Sonae.

—. n.d. – a. *Brands of companies by Sonae, in different areas of business.* Accessed November 11, 2022. https://www.sonae.pt/en/sonae/brand/jd/.

—. n.d. – b. *History.* Accessed November 12, 2022. https://www.sonae.pt/en/sonae/history/.

—. n.d. – c. *The group and our businesses.* Accessed November 12, 2022. https://sonae.pt/en/sonae/the-group-and-our-businesses/.

Statista. 2022. *Consumer Markets - Consumer Electronics Worldwide.* Accessed December 6, 2022. https://www-statista-com.eu1.proxy.openathens.net/outlook/cmo/consumer-electronics/worldwide.

Statista Research Department. 2022. *Consumer Electronics.* Accessed December 4, 2022. https://www-statista-com.eu1.proxy.openathens.net/outlook/cmo/consumer-electronics/worldwide.

Step Initiative. 2014. "One Global Definition of E-waste." *Solving the E-Waste Problem (Step) White Paper*, 3 June: 1-11.

Swappie. n.d. – a. *A Swappie celebra dois anos em Portugal. Mas como é que tudo começou?* Accessed December 8, 2022. https://swappie.com/pt/blog/a-swappie-celebra-dois-anos-em-portugal-mas-como-e-que-tudo-comecou/.

—. n.d. – b. *Vender.* Accessed 12 8, 2022. https://swappie.com/pt/vender/iphone/.

—. n.d. – c. *The Swappie Story.* Accessed December 8, 2022. https://swappie.com/pt-en/about-us/.

Tax and Customs Administration. n.d. *Margin scheme for VAT on second-hand goods.* Accessed December 4, 2022. https://business.gov.nl/running-your-business/business-taxes/filing-your-tax-returns/margin-scheme-for-vat-on-second-hand-goods/.

The Business Research Company. 2022. *onsumer Electronics E-Commerce Global Market Report 2022 – By Product (Video Products, Audio Products), By Business Model (Business To Business (B2B), Business To Consumer (B2C)), By Pricing Model (Low Cost Products, Medium Cost Products, High End Product.* October. Accessed December 8, 2022. https://www.thebusinessresearchcompany.com/report/consumer-electronics-ecommerce-global-market-report.

Toogood, Cathy. 2021. *Refurbished Mobile Phones: All You Need To Know.* May 5. Accessed December 6, 2022. https://www.forbes.com/uk/advisor/mobile-phones/refurbished-mobile-phones/.

Transparency Market Research. 2022. *Refurbished Electronics Market.* October. Accessed December 5, 2022. https://www.transparencymarketresearch.com/refurbished-electronics-market.html.

Watson, David, Anja Charlotte Gylling, Naoko Tojo, Harald Thorne-Holst, Bjørn Bauer, and Leonidas Milios. 2017. *Circular Business Models in the Mobile Phone Industry.* Copenhagen: Nordic Council of Ministers 2017.

Worten. 2021. *WORTEN REUSE: NEW OFFER OF RECONDITIONED SMARTPHONES.* 29 April. Accessed December 4, 2022. https://www.sonae.pt/fotos/press_releases/eng_lancamentoreuse_290421_1348486338608c3401606fe.pdf.

—. n.d. – a. *Sobre A Worten - História da Marca.* Accessed November 12, 2022. https://www.worten.pt/sobre-worten.

—. n.d. – b. *Retomas Reuse.* Accessed 12 8, 2022. https://www.worten.pt/retomas-reuse.